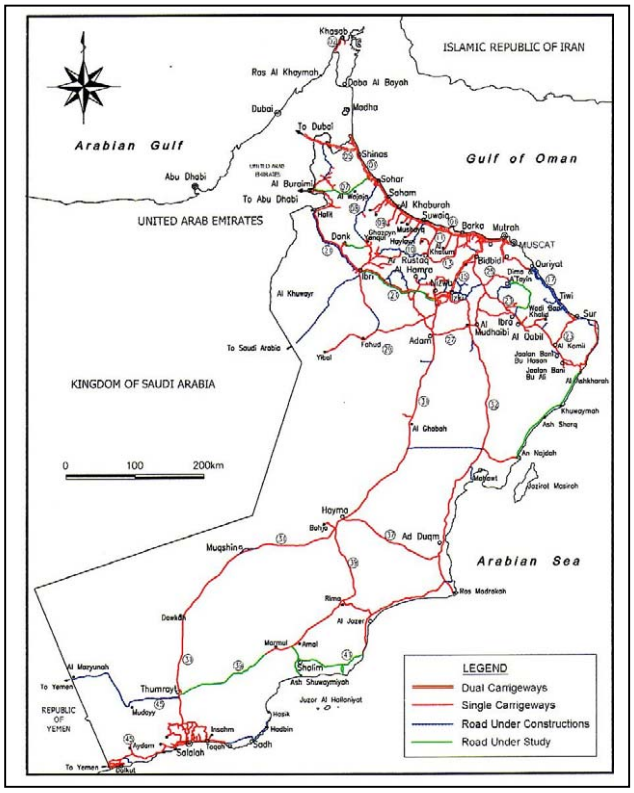
9.2.6 Shinas Port

1) Potential of Shinas Port

Shinas Port is currently functions to handle small-sized Dhows to transport cargo between Iran and to load fish on truck for export to Europe via Dubai. Elements of potential of Shinas Port can be summarized below;

Figure 9.2-15 Major Highway Network



- Close proximity to large markets with high potential of Iran by maritime transportation
- Close proximity to both Dubai and Sohar industrial Zone by land transportation
- Batinah highway passes by the Port area, and another trunk highly is also under planning
- Located in Al Batinah Region, which is one of the most highly populated regions of Oman
- Closest port with UAE border
- Production of aggregate and minerals nearby mountains
- Landing point of fish catch, and long experience to export to European markets

Source: JICA Road Study Team 2004

2) Aggregates and stones

Ministry of Commerce and Industry claims the potential of Shinas Port as an exporting port of aggregates and rocks. Outline of the proposal is shown as follows;

- Minerals and rocks that are expected to be exported from the proposed Shinas port
  Aggregate Gabbro & wadi gravel, Copper, Chromite
- Expected quantity
  0.75 to 1 million tons/annum of aggregate Copper
- Expected shipment date
  Approximately 2006-2007

Private companies are proposing to construct a jetty near the border with UAE, north of Shinas, by their own to load aggregates and stones for exporting to Gulf countries. It is expected that financial viability and management scheme of the project are yet to be discussed among and settled by ministries concerned and private circles.

3) Planning policy

- Provide Basic Infrastructure

Shinas Port was originally constructed in 1995 as a fishery harbor, and then converted to a commercial port in 2001. Minimum requirements as a commercial port have not been realized so far. Therefore, minimum port infrastructures such as channel and basin for commercial vessels are firstly provided.

- Monitor the Port Activities

There are many unknown factors as to port planning because of limited historical records on port activities. Before proposing and implementing large scale port facility developments, close monitoring on port activities should be preceded.

- Small or Medium scale Development

Where Shinas Port is located is close to residential areas, and port backup area is also limited in space. Waterways behind the port and some of marine organisms nearby may require preservation. Therefore, small or medium scale development should be considered.

4) Alternative facility layout plans

i. Wali Office's Proposal for next phase Projects

Wali office of the region is considering the expansion of the Shinas Port to function as a trigger to promote regional development. According to their plan, which is shown in Figure 9.2-16, the port is to expand the entrance channel, deepen the basin of the port on the northern limit with an area of 145,000 sq.m, and provide quays in the northern part of the port where commercial activities are expected. The fishery activities are planned in the opposite part of the port.

ii. JICA Study Team's Proposal

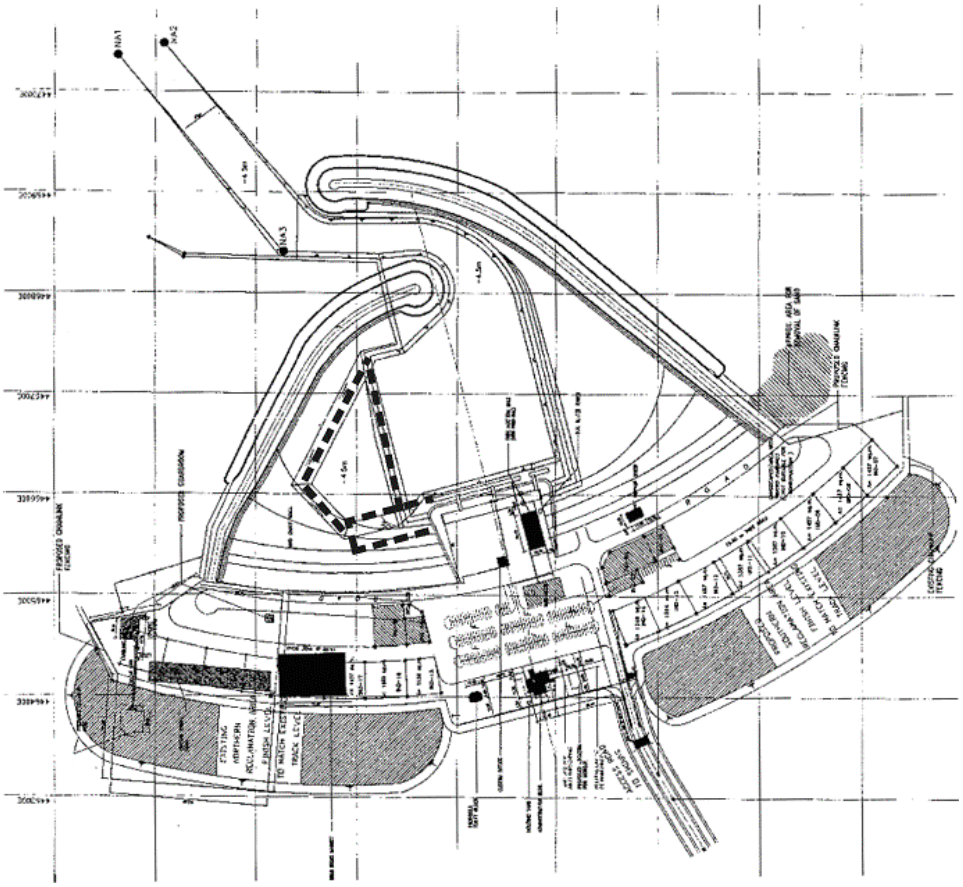
Regarding the aggregate exporting base at Shinas Port, existing Shinas Port is too small to accommodate bulk carriers for transporting minerals and stones to foreign countries. A group of private circles has a plan to construct a jetty near the border with UAE to export aggregates to nations in the Gulf. This proposed project can be carried out technically and financially by the private circles themselves with government's permits.

The JICA Study Team proposes an alternative expansion plan of Shinas Port. Basic idea of the Team's proposal is in line with Wali office's proposal. The Study Team sees the potential of live sheep import from Iran by 3,000 DWT vessels. Currently live sheep are imported through Sultan Qaboos Port with

vessels of about 40,000 GRT from Australia, which cannot be accommodated at Shinas Port because of their size.

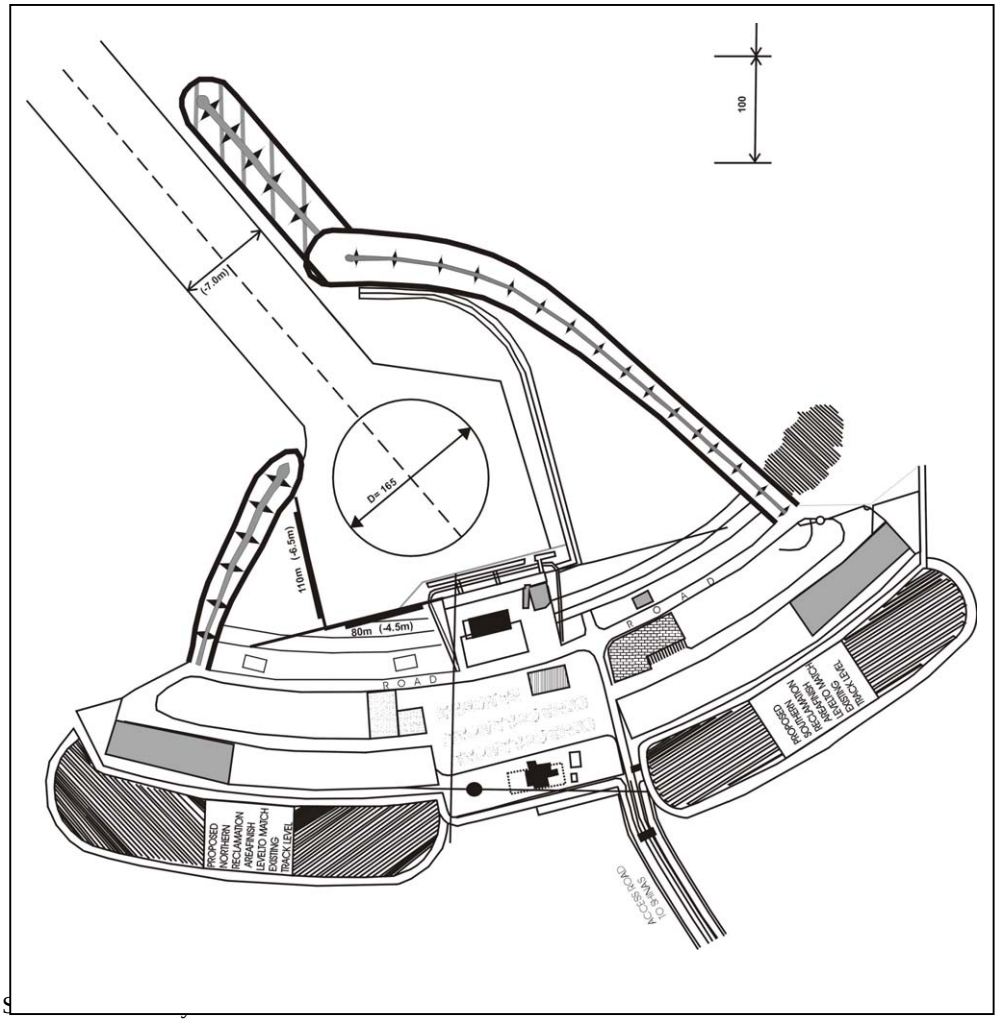
Live sheep can be imported by smaller vessels from Iran. Vessels size is assumed as 3,000 DWT, overall length of the vessel is 94m. Required dimensions of the new berth are 110m in length with 6.5m alongside water depth. The channel and basin have to be widened and deepened to agree with the planned vessel particulars, and appropriate length of stopping distance at the entrance channel is also required. Another fixed quay with a minimum water depth for small ships to load and unload cargoes is also constructed. Proposed facility layout plan is shown in Figure 9.2.-17.

Figure 9.2-16 Alternative A of Shinas Port Development Plan for 2025



Source: MOTC/DGPMA

Figure 9.2-17 Alternative B of Shinas Port Development Plan for 2025



5) Waterway

Photo 9.2-6 clearly shows that Shinas Port was situated on the sandbar, and a waterway passed just behind the port. Cluster of mangrove is observed along the waterway on this photo. A part of the waterway was reclaimed by the dredged soil in the course of fishery/commercial port construction. As human society gains a lot from the natural environment, deep consideration should pay how to preserve the waterway and maritime organisms. Recovery works of the waterway is also highly recommended.

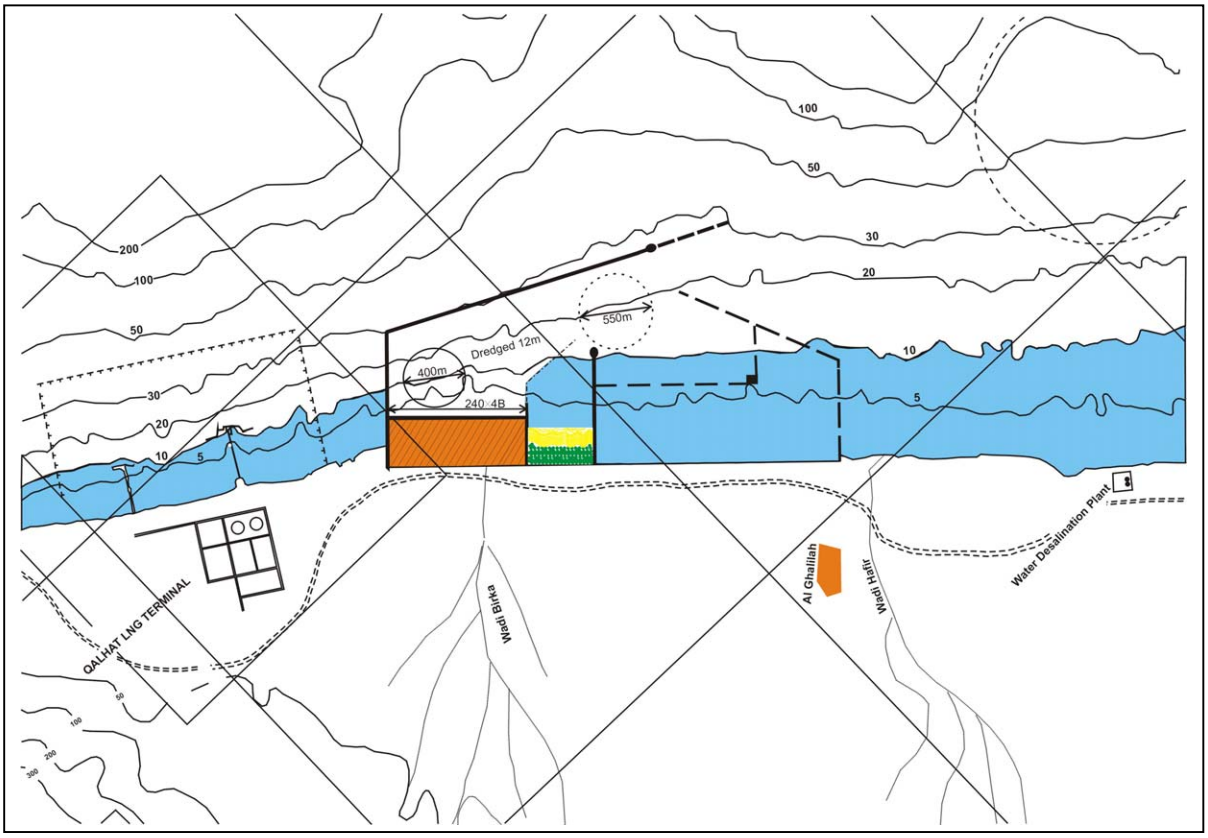
Photo 9.2-6 Waterway at Shinas Port

9.2.7 New Port

As explained earlier, Sultan Qaboos Port cannot accommodate all of the cargoes forecast for the year 2025. Sultan Qaboos Port is a special port, which represents the entire nation, a busy port with government vessels, naval ships and cruise liners, and an urban port which is surrounded by shops, restaurants, offices and houses. Cargoes which cannot find space for handling have to be handled at another port.

Volume of cargo handled at a New Port is estimated at 1.75 million ton of conventional cargo in 2025. No containers are planned to pass through the New Port. Selection of the site for the New Port is out of Scope of Work of this JICA Study. The New Port will be or will not be located to the north or to the south of Sultan Qaboos Port. The JICA Study Team took the liberty to sketch the layout plan of the New Port at an area just southeast of the Qalhat LNG terminal. Ras as Sawadi, which is located at the middle between Muscat and Sohar, may be another candidate to be investigated further. Conceptual layout of the New Port is shown in Figure 9.2-18.

Figure 9.2-18 Conceptual Layout of a New Port



Source: JICA Study Team

9.3 Environment and Social Consideration

(1) Evaluation on Present Environmental Conditions

Please refer to Appendix I for a detailed description of the present environmental conditions of each port.

(2) Environmental Impacts of the Alternative Long-term Development Plans, Mitigation Measures and Identification of Stakeholders

The environmental impacts of the alternative long-term development plans (including the operation phase) in respect to pollution, biophysical and social environment are identified through the analysis of the existing environmental conditions and the usage of scoping checklist. Also mitigation measures are proposed for some of the environmental impacts.

In the scoping checklist, the significance of the possible impacts are rated into 4 levels (A, B, C, D). The rating is based only through reference to the negative environmental impacts, since positive impacts were hard to define at this stage of the Study. Furthermore, impacts to certain environmental parameters were difficult to rate mainly due to the lack of information. In these cases, the rating is indicated as “U”, meaning undecided. The parameters that are either rated A, B, C or U should be considered for further detailed environmental assessment, with “A” rated parameter having the highest priority.

In definition, stakeholders include people or entities that benefit from the projects (e.g. shipping agencies, local industries) as well as those who are adversely affected (e.g. local residents requiring resettlement). For this Study, the latter stakeholders, or in other words the stakeholders that could be adversely affected (negative stakeholders) from the long-term development plans are only identified, through reference to the environmental impacts identified in the scoping procedure.

1) Sultan Qaboos Port

i. Key environmental impacts

The common key environmental impacts of the two alternatives identified through the scoping procedure are as follows.

- The adjacent residential and commercial areas are susceptible to impacts from large-scale construction works (e.g. road congestion, high levels of dust, noise, influx of workers).
- Corals are major features of the capital area coastline and could be damaged during the port expansion works.
- Fishermen from the Aint district (approximately 2 –3 km west of the port) operate gill net and handline fishery in and around the proposed breakwater area.
- Muttrah is a major tourist destination and large-scale construction works and alteration in the landscape could distract tourist to the area.
- Resettlement could be required depending on the route of the new access road.

In addition to the above impacts, Alternative A will have further potential environmental impacts due to the connection of breakwater to the land. This will likely cause;

- Alteration in the local water circulation,
- Restriction in water exchange and create water stagnation within the port area,
- Deterioration of water and sediment quality,

Restriction in alongshore sediment transportation.

Table 9.3-1 Scoping Checklist of Two Alternative Development Plans of Sultan Qaboos Port

Environmental factors		Rating	Justification
Pollution	Air quality	B	Quarrying behind the port. (Con) Increase in shipping and heavy vehicle traffic. (Con&Ope) Residential and commercial area is located near the port.
	Seawater quality	B	Alternative A Breakwater construction and landfill of container berth. (Con) Increase in shipping traffic and port activity. (Ope) Restriction of water exchange due to the breakwater. (Ope)
		C	Alternative B Breakwater construction and landfill of container berth. (Con) Increase in shipping traffic and port activity. (Ope)
	Bottom sediment quality	B	Alternative A Increase in shipping traffic and port activity. (Ope) Deterioration of sediment quality through the deterioration of water quality. (Con&Ope)
		C	Alternative B Increase in shipping traffic and port activity. (Ope)
	Noise / vibration	B	Blasting and quarrying behind the port. (Con) Increase in heavy vehicle traffic. (Con&Ope) Residential and commercial area is located near the port.
	Odor	U	Possible odor from commodities. (Ope)
Biophysical environment	Ecosystem	B	Possible damage of corals near the port. (Con) Mortality of local benthic community. (Con)
	Topography/ geology	B	Alteration of port hinterland topography through quarrying. (Con)
	Groundwater	D	No discharge to local groundwater. (Con&Ope)
	Wadi flow	D	No major wadis near the port.
	Water circulation	B	Alternative A The breakwater will restrict the water exchange and could create water stagnation within the port. (Ope)
		C	Alternative B The breakwater could slightly alter the local current regime. (Ope)
	Coastal erosion /accretion	B	Alternative A Restriction of alongshore sediment transport due to the breakwater. (Ope)
		D	Alternative B No restriction of alongshore sediment transport. (Ope)
	Landscape	B	Alteration of the Muttrah landscape through quarrying. (Con&Ope)
Social environment	Resettlement	U	No resettlement will be involved from the port expansion. However, resettlement could be required depending on the route of the new access road. (Con)
	Livelihood	C	Possible degradation of social security through influx of construction workers. (Con)
	Fisheries	A	The breakwater area is a fishing ground for some fishermen. (Con&Ope) Hindrance to fishing activity through increase in shipping vessels. (Con&Ope)
	Tourism	B	Distraction of tourist to the Muttrah area. (Con)
	Land/water use	D	No change in current land / water use. (Con&Ope)
	Cultural assets	B	An old watchtower is located near the quarry site. (Con)
	Infrastructure	D	No negative impact on infrastructure. (Con&Ope)
	Waste	B	Increase in calling ships and port activity will generate more waste. (Ope)

A: Significant potential impact, B: Moderate potential impact, C: Small potential impact, D: No potential impact,
U: Undecided (not enough information)
Con: Construction phase, Ope: Operation phase
Note: The environmental impacts of the alternatives are compared only for environmental factors that are considered to be different between the two alternatives.

Source: JICA Study Team

ii. Proposed mitigation measures

Mitigation measures are proposed for some of the major environmental impacts common to the two alternatives.

Table 9.3-2 Proposed Mitigation Measures for the Environmental Impacts of Sultan Qaboos Port Development

Environmental Factors	Key Impacts	Proposed Mitigation Measures
Air quality	Deterioration of air quality through quarrying activities. (Con)	➢ Dust suppression by water spraying and dust collector.
	Deterioration of air quality through increase in heavy vehicle traffic. (Con&Ope)	➢ A new access road will be constructed, which will reduce traffic jams and air pollution. ➢ Transportation by heavy vehicles should be avoided as much as possible during peak traffic hours.
Noise	Increase in noise level through quarrying activities. (Con)	➢ Employment of noise abatement devices and measures. ➢ Limitation of quarrying activities during night time.
	Increase in noise level through increase in heavy vehicle traffic. (Con&Ope)	➢ Transportation by heavy vehicles should be avoided as much as possible during peak traffic hours and night time.
Ecosystem	Mortality and decrease of adjacent corals through landfill and breakwater construction. (Con)	➢ Use of silt curtain to limit turbidity dispersion and damage to the adjacent corals. ➢ Designing of eco-friendly breakwater to enhance settlement of new corals.*
Resettlement	Resettlement of local residents could be required depending on the route of the new access road. (Con)	➢ Careful planning of access route to minimize resettlement. ➢ Pre-discussion with local residents.
Fisheries	The fishing ground around the breakwater will be lost. (Con&Ope)	➢ Appropriate compensation to the affected fishermen. ➢ The eco-friendly breakwater could provide new habitat for various fishery species. Consequently, the outside of the breakwater could function as a new fishing ground.
Tourism	Distraction of tourist to the area through construction activities and alteration of landscape (Con)	➢ Careful planning of quarrying to minimize degradation of the landscape.

Con: Construction phase, Ope: Operation phase

Source: JICA Study Team

*: Breakwater could induce coral settlement through adoption of eco-friendly design and technique. The rubble mound breakwater proposed by the JICA Study Team will likely attract coral settlement on the armor concrete blocks and armor rocks. There are some simple techniques to enhance coral settlement such as by artificially creating rough surface on the armor concrete blocks. Please refer to Annex II for the detailed description of coral settlement techniques. Also in comparison to caisson breakwater, rubble mound breakwater will enhance greater coral settlement and growth since corals tend to prefer substrate with relatively low gradient.

iii. Identification of stakeholders

Based on the analysis of the existing environmental conditions and scoping procedure, some of the major stakeholders are listed in the following Table with brief justifications for its inclusion.

Table 9.3-3 Some of the Major Stakeholders of Sultan Qaboos Port

Stakeholder	Justification
Local fishermen	The breakwater area is a fishing ground. Hindrance to fishing activity through increase in shipping traffic.
Local residents	Increase in heavy vehicle traffic passing through the adjacent residential area. Generation of noise and deterioration of air quality through quarrying.
Local shop owners	Possible decrease in tourist during the construction phase.
Local tourism operators	The adjacent area is a major tourist destination.

Source: JICA Study Team

2) Salalah Port

Table 9.3-4 Scoping Checklist of Two Alternative Development Plans of Salalah Port

Environmental Factors		Rating	Justification
Pollution	Air quality	B	Generation of dust from land grading works. (Con) Large increase in heavy vehicle traffic. (Con&Ope) Handling of bulk cargo near the passenger terminal. (Ope)
	Seawater quality	A	Dredging and landfill. (Con) Increase in shipping traffic and port activity. (Ope) Restriction of water exchange. (Ope)
	Bottom sediment quality	B	Deterioration of sediment quality through the deterioration of water quality. (Con&Ope)
	Noise / vibration	C	Increase in heavy vehicle traffic. (Con & Ope) No residential area near the port.
	Odor	U	Possible odor from commodities. (Ope)
Biophysical environment	Ecosystem	A	Mortality of local benthic community through landfill. (Con) Disturbance to various marine species. (Con&Ope) Possible impact on the mangrove through erosion or accretion of coastline. (Ope)
	Topography / geology	B	Major alteration of underwater topography. (Con)
	Groundwater	C	Possible intrusion of seawater into groundwater through dredging and landfill. (Con) The local groundwater is not used.
	Wadi flow	B	Alteration of wadi discharge path. (Con)
	Water circulation	A	Alteration of current regime and possible water stagnation within the port. (Ope)
	Coastal erosion / accretion	A	Enhancement of coastal erosion and accretion through restriction of sediment transport. (Ope)
	Landscape	B	Major alteration of coastal landscape.
Social environment	Resettlement	D	No resettlement will be involved.
	Livelihood	C	Possible degradation of social security through influx of construction workers. (Con)
	Fisheries	A	Loss of nearshore fishing ground. (Con&Ope) Hindrance to fishing boats using Raysut Fishery Harbour. (Con&Ope) Higher risk of navigational accidents. (Con&Ope)
	Tourism	C	Avoidance of tourist to stay in hotels near the port (e.g. Hotel Hilton). The port area is not a tourist destination.
	Land / water use	B	Possible conflict with the Raysut Fishery Harbour.
	Cultural assets	D	No significant cultural asset near the port.
	Infrastructure	B	The coastal road could be affected from erosion (Ope)
	Waste	B	Increase in calling ships and port activity will generate more waste (Ope)

A: Significant potential impact, B: Moderate potential impact, C: Small potential impact, D: No potential impact,
U: Undecided (not enough information)
Con: Construction phase, Ope: Operation phase
Note: The environmental impacts of the alternatives are compared only for environmental factors that are considered to be different between the two alternatives.
Source: JICA Study Team

i. Key environmental impacts

The key environmental impacts of the two alternatives identified through the scoping procedure are listed below. There were no differences in the level and contents of the environmental impact between the two alternatives, since the differences lie only between the location of the bulk and container terminal within the port.

- Deterioration of water quality through dredging, landfill, increased port activities and restriction of water exchange.
- Large quantity of benthic and pelagic marine species will be lost or disturbed through dredging and landfill works.
- The existing coastal erosion and accretion problems along the Salalah coastline could be greatly enhanced through the port expansion, which could have major impact on the coastal infrastructure and mangrove.
- The fishing grounds near the port will be lost through the expansion of the port. Access to the other nearshore fishing grounds will be hindered.
- There could be major conflict with the Raysut Fishery Harbour, regarding the land / water use near the fishery harbour.

ii. Proposed mitigation measures

Mitigation measures are proposed for some of the major environmental impacts common to the two alternatives.

Table 9.3-5 Proposed Mitigation Measures for the Environmental Impacts of Salalah Port Development

Environmental Factors	Key Impacts	Proposed Mitigation Measures
Air quality	Generation of dust from land grading (Con)	➢ Dust suppression by water spraying and dust collector.
Water quality	Deterioration of water quality through landfill and dredging (Con)	➢ Use of silt curtain to limit turbidity dispersion.
	Deterioration of water quality through restriction of water exchange (Con&Ope)	➢ Requires further consideration.
Ecosystem	Mortality of local marine organisms through landfill and dredging (Con)	➢ The extended breakwater should provide new habitat for some marine organisms.
Coastal erosion	Enhancement of coastal erosion and accretion (Ope)	➢ Employment of appropriate coastal erosion restoration technique.
Fisheries	Loss of nearshore fishing ground and hindrance to fishing ground access (Con&Ope)	➢ Appropriate compensation to the affected fishermen.
Land / water use	Possible conflict with the Raysut Fishery Harbour (Con&Ope)	➢ Pre-discussion with the Raysut Fishery Harbour.

Con: Construction phase, Ope: Operation phase

Source: JICA Study Team

iii. Identification of stakeholders

Based on the analysis of the existing environmental conditions and scoping procedure, some of the major stakeholders are listed in the following Table with brief justifications for its inclusion.

Table 9.3-6 Some of the Major Stakeholders of Salalah Port

Stakeholder	Justification
Local fishermen Raysut Fishery Harbour	Loss of nearshore fishing grounds. Access to fishing ground hindered. Higher risk of navigational accidents.
Local residents	Increase in heavy vehicle traffic.
Tourist hotels	Hotel Hilton located near the port.

Source: JICA Study Team

3) Sohar Port

Table 9.3-7 Scoping Checklist of Two Alternative Development Plans of Sohar Port

Environmental Factors		Rating	Justification
Pollution	Air quality	C	Slight increase in heavy vehicle traffic. (Con&Ope) Residential area is located near the port.
	Seawater quality	B	Dredging and landfill. (Con&Ope) Dumping of excess dredged material. (Con) Increase in shipping traffic and port activity. (Ope)
	Bottom sediment quality	C	Deterioration of sediment quality through the deterioration of water quality. (Con&Ope)
	Noise / vibration	C	Slight increase in heavy vehicle traffic. (Con&Ope) Residential area is located near the port.
	Odor	B	Handling of oil, bulk cargo and so on. (Ope) Residential area is located near the port.
Biophysical environment	Ecosystem	B	Mortality of benthic organisms within the port and dumping ground of excess dredged material. (Con).
	Topography / geology	C	Slight alteration of underwater topography. (Con)
	Groundwater	B	Possible seawater intrusion into groundwater during dredging and landfill. (Con)
	Wadi flow	D	No impact on wadi flow.
	Water circulation	D	No alteration.
	Coastal erosion / accretion	D	The current erosion / accretion problems will not be enhanced.
	Landscape	D	No major alteration to landscape.
Social environment	Resettlement	D	No resettlement will be involved. (Con&Ope)
	Livelihood	C	Possible degradation of social security through influx of construction workers. (Con)
	Fisheries	C	Hindrance to fishing activity through increase in shipping vessels. (Ope)
	Tourism	D	No major tourist site near the port.
	Land / water use	B	The local farmers may be required to alter their groundwater source. (Con)
	Cultural assets	C	Forts, mosque, cairns found in the adjacent villages.
	Infrastructure	U	Possible requirement of new access road.
	Waste	B	Increase in calling ships and port activity will generate more waste. (Ope)

A: Significant potential impact, B: Moderate potential impact, C: Small potential impact, D: No potential impact,
U: Undecided (not enough information)
Con: Construction phase, Ope: Operation phase
Note: The environmental impacts of the alternatives are compared only for environmental factors that are considered to be different between the two alternatives.
Source: JICA Study Team

i. Key environmental impacts

The key environmental impacts of the two alternatives identified through the scoping procedure are listed below. There were no differences in the level and contents of the environmental impact between the two alternatives, since the differences lie only between the location of the bulk and container terminal within the port.

- Deterioration of water quality through dredging, landfill and dumping of excess dredged material.
- There will be an excess of dredged material.
- Seawater intrusion into the groundwater was a problem during past dredging and landfill works. Similar problems may occur again and affect the local farmers.

ii. Proposed mitigation measures

Mitigation measures are proposed for some of the major environmental impacts common to the two alternatives.

Table 9.3-8 Proposed Mitigation Measures for the Environmental Impacts of Sohar Port Development

Environmental Factors	Key Impacts	Proposed Mitigation Measures
Air quality	Generation of dust from land grading (Con)	➢ Dust suppression by water spraying and dust collector.
Water quality	Deterioration of water quality through landfill and dredging (Con)	➢ Use of silt curtain to limit turbidity dispersion.
Ecosystem	Dumping of excess dredged material (Con)	➢ Selection of environmentally feasible dumping ground for the excess dredged material.
Groundwater	Possible intrusion of seawater into groundwater through dredging and landfill (Con)	➢ Installation of impermeable layer to limit sea water intrusion.

Con: Construction phase, Ope: Operation phase

Source: JICA Study Team

iii. Identification of stakeholders

Based on the analysis of the existing environmental conditions and scoping procedure, the some of the major stakeholders are listed in the following Table with brief justifications for its inclusion.

Table 9.3-9 Some of the Major Stakeholders of Sohar Port

Stakeholder	Justification
Local fishermen	Hindrance to fishing activity through increase in shipping traffic of large commercial vessels.
Local residents	Increase in heavy vehicle traffic passing through the adjacent residential area. Generation of noise and degradation of air quality from increased port activities.
Local farmers	Possible seawater intrusion into the groundwater through dredging and landfill.

Source: JICA Study Team

4) Khasab Port (Canal construction)

Since most of the major construction activities of Khasab Port are near completion and that further expansion is not considered for the long-term development plan, scoping of the environmental impacts is considered to be unnecessary. Instead the possible environmental impacts of the proposed canal have being identified through the scoping procedure.

Table 9.3-10 Scoping Checklist for the Canal Construction

Environmental Factors		Rating	Justification
Pollution	Air quality	C	Excavation and blasting. (Con) No residential area near the site.
	Seawater quality	B	Excavation and dumping of excavated material. (Con)
	Bottom sediment quality	C	Dumping of excavated material. (Con)
	Noise / vibration	C	Excavation and blasting. (Con) No residential area near the site.
	Odor	D	No major odor source expected.
Biophysical environment	Ecosystem	A	Direct destruction of corals through excavation. (Con) Mortality of benthic community through dumping of excavated material. (Con) Introduction of non-resident species through mixing of two different water bodies. (Con&Ope) Restriction of terrestrial animal movement. (Con&Ope)
	Topography / geology	A	Alteration of coastal morphology. (Con)
	Groundwater	D	No groundwater near the site.
	Wadi flow	D	No wadi near the site.
	Water circulation	A	Alteration of water circulation pattern due to the difference in sea level of two water bodies. (Ope)
	Coastal erosion / accretion	C	Possible enhancement of erosion from alteration of water circulation. (Ope)
	Landscape	A	Major alteration to the unspoilt landscape.
Social environment	Resettlement	D	No resettlement will be involved.
	Livelihood	D	No human settlement near the site.
	Fisheries	B	Possible disturbance to fishing activity. (Con)
	Tourism	B	Major tourist destination. (Con)
	Land / water use	D	No land use plan near the site.
	Cultural assets	C	Abandoned village and Islamic grave near the site.
	Infrastructure	D	No impact on infrastructure.
	Waste	B	Large volume of construction waste. (Con)

A: Significant potential impact, B: Moderate potential impact, C: Small potential impact, D: No potential impact,
U: Undecided (not enough information)
Con: Construction phase, Ope: Operation phase
Source: JICA Study Team

i. Key environmental impacts

The key environmental impacts identified through the scoping procedure are listed below.

- Corals play an integral role in the marine ecosystem of the Musandam region, and the corals near the canal site will be lost or disturbed.

- Canal construction could alter the ecosystem of the Musandam region, through for instance the introduction of non-resident species from the canal.
- Musandam Peninsula is a popular tourist destination and canal construction could lower the tourism value of the area through alteration of the natural landscape and the ecosystem.
- Large volume of excavated material will have to be dumped into either the sea or land.
- The water circulation pattern of the Musandam Peninsula could alter significantly due to the differences in the water level of the two water bodies.

ii. Proposed mitigation measures

Mitigation measures are proposed for some of the major environmental impacts.

Table 9.3-11 Proposed Mitigation Measures for the Environmental Impacts of Canal Development

Environmental Factors	Key Impacts	Proposed Mitigation Measures
Ecosystem	Loss or disturbance to the adjacent corals (Con)	➢ Use of silt curtain to limit turbidity dispersion ➢ Transplantation of the affected corals
	Generation of large amount of excavated material (Con)	➢ Careful selection of dumping ground to limit impact on the ecosystem
	Obstruction in movement of land mammals (Con&Ope)	➢ Construction of bridge over the canal
Landscape	Degradation of unspoilt landscape (Con&Ope)	➢ Careful designing of canal to limit landscape degradation

Con: Construction phase, Ope: Operation phase

Source: JICA Study Team

iii. Identification of stakeholders

Based on the analysis of the existing environmental conditions and scoping procedure, some of the major stakeholders are listed in the following Table with brief justifications for its inclusion.

Table 9.3-12 Some of the Major Stakeholders (Canal Construction)

Stakeholder	Justification
Local fishermen	Possible hindrance to fishermen that operate near the proposed canal site.
Tourism operators	Possible hindrance to tourism operators that organize cruise trip, diving trips near the canal site.

Source: JICA Study Team

5) Duqm Port

Table 9.3-13 Scoping Checklist of Two Alternative Development Plans of Duqm Port

		Rating	Justification
Pollution	Air quality	B	Generation of dust from land grading works. (Con) Increase in shipping and heavy vehicle traffic. (Con&Ope) Possible emission of dust, paint, etc. from drydock. (Ope) No residential area near the site.
	Seawater quality	B	Alternative A Dredging, landfill and construction of breakwater. (Con) Restriction of water exchange. (Ope) Increase in shipping traffic and port activity. (Ope) Possible inputs of hazardous substances from drydock. (Ope)
		A	Alternative B Dredging, landfill and construction of breakwater. (Con) Restriction of water exchange (Ope) Increase in shipping traffic and port activity. (Ope) Possible inputs of hazardous substances from drydock. (Ope) Risk of oil spill from single mooring buoy. (Ope)
	Bottom sediment quality	B	Deterioration of sediment quality through the deterioration of water quality. (Con&Ope)
	Noise / vibration	B	Increase in heavy vehicle traffic. (Con&Ope) Noise from drydock activities. (Ope) No residential area near the site.
	Odor	C	Alternative A Odor from drydock and fishery facilities. (Ope) No residential area near the site.
		B	Alternative B Odor from oil, drydock and fishery facilities. (Ope) No residential area near the site.
Biophysical environment	Ecosystem	A	Alternative A Loss of roosting and feeding area of migratory birds. (Con&Ope) Mortality of local benthic community through dredging and landfill. (Con) Disturbance to various marine species from construction and port activities. (Con&Ope) Risk of contamination from drydock. (Ope)
		A	Alternative B Loss of roosting and feeding area of migratory birds. (Con&Ope) Mortality of local benthic community through dredging and landfill. (Con) Disturbance to various marine species from construction and port activities. (Con&Ope) Risk of contamination from drydock. (Ope) Risk of oil spill from single mooring buoy. (Ope)
	Topography / geology	B	Alteration in coastal and underwater topography. (Con)
	Groundwater	C	Possible intrusion of seawater into the local groundwater during dredging and landfill. (Con) The local groundwater is not used.
	Wadi flow	D	No wadi near the port.
	Water circulation	B	Alteration in the water circulation through the presence of breakwater. (Ope)
	Coastal erosion / accretion	B	Erosion or accretion likely along the coast through restriction of sediment transport. (Ope)
	Landscape	B	Major alteration in the unspoilt landscape.
Social	Resettlement	D	No resettlement will be involved.

environment	Livelihood	B	Possible degradation of social security through influx of construction workers. (Con) Likely change from the traditional lifestyle. (Con&Ope)
	Fisheries	A	Relocation of fish processing factory and fish landing area could be necessary. (Con) Loss of nearshore fishing ground. (Con&Ope) Close proximity of fishery berth to drydock. (Ope)
	Tourism	D	Duqm is not an established tourist destination.
	Land / water use	B	The proposed port area is currently used only for fishery activities.
	Cultural assets	D	No cultural assets near the port.
	Infrastructure	D	No negative impact on infrastructure.
	Waste	B	Alternative A Generation of various hazardous wastes from drydock. (Ope)
		A	Alternative B Generation of various hazardous wastes from drydock. (Ope) Generation of various oily wastes from oil tankers. (Ope)

A: Significant potential impact, B: Moderate potential impact, C: Small potential impact, D: No potential impact,
U: Undecided (not enough information)
Con: Construction phase, Ope: Operation phase
Note: The environmental impacts of the alternatives are compared only for environmental factors that are considered to be different between the two alternatives.
Source: JICA Study Team

i. Key environmental impacts

The common environmental impacts of the two alternatives identified through the scoping procedure are as follows.

- Deterioration of water quality through dredging, landfill, increased port activities and restriction of water exchange.
- There are high risks of contamination (e.g. TBT, heavy metals, PAHs) from the dry dock facility, which could have significant impact on the local ecosystem.
- Various benthic and pelagic marine species will be lost or disturbed mainly during the construction phase.
- The Duqm port area is a major roosting and feeding area for migratory birds and port development will lead to the partial loss of their habitat.
- The adjacent coastline will be susceptible to erosion and accretion through the restriction of sediment transport.
- The local fishermen utilize the Duqm port area for fish landing and processing. Temporal relocation of the fish landing area will be required during the construction phase. The fish processing factory may have to be shifted depending on the layout of the port.
- The drydock activities may have hygienic problems for the adjacent fishery activities.
- The traditional lifestyle of the local residents could change significantly either in a positive or negative way, through port associated development of the region (e.g. influx of construction people, new employment opportunities other than fishing, etc.).

In addition to the above impacts Alternative B have further potential environmental impacts due to the oil export facilities. Consequently there is an added risk of oil spill accident in Alternative B, especially during the rough sea conditions experienced during the SW monsoon season. Large-scale oil spills can have a devastating impact on the local ecosystem.

ii. Proposed mitigation measures

Mitigation measures are proposed for some of the major environmental impacts of the two alternatives.

Table 9.3-14 Proposed Mitigation Measures for the Environmental Impacts of Duqm Port Development

Environmental Factors	Key Impacts	Proposed Mitigation Measures
Water quality	Deterioration of water quality through landfill and dredging (Con)	➢ Use of silt curtain to limit turbidity dispersion.
	Deterioration of water quality through restriction of water exchange (Con&Ope)	➢ Requires further consideration.
	High risk of contamination from drydock (Ope)	➢ Regular environmental monitoring.
	High risk of contamination from oil tankers and single mooring buoys (Ope)	➢ Construction of oil reception facility. ➢ Preparation of Oil Spill Contingency Plan
Ecosystem	Mortality of local marine organisms through dredging and landfill (Con)	➢ The breakwater should provide new habitat for some marine organisms.
	Loss of roosting and feeding area of migratory birds (Con&Ope)	➢ Requires further consideration.
Coastal erosion	Enhancement of coastal erosion and accretion through restriction of sediment transport (Ope)	➢ Employment of appropriate coastal erosion restoration technique.
Fisheries	Relocation of fish landing area during construction phase (Con)	➢ Alternative fish landing area available (e.g. Ras Madraka).
	Loss of nearshore fishing ground (Con&Ope)	➢ Appropriate compensation to the affected fishermen.
	The drydock activities may have hygienic problems for the adjacent fishery activities (Ope)	➢ Installation of a barrier between the drydock and fishery terminal.
Livelihood	Possible dramatic change from the existing traditional lifestyle (Con&Ope)	➢ Regular interview of local residents regarding their livelihood.
Waste	Generation of various hazardous wastes from drydock (Ope)	➢ Preparation of appropriate Waste Management Plan.

Con: Construction phase, Ope: Operation phase

Source: JICA Study Team

iii. Identification of stakeholders

Based on the analysis of the existing environmental conditions and scoping procedure, some of the major stakeholders are listed in the following Table with brief justifications for its inclusion.

Table 9.3-15 Some of the Major Stakeholders of Duqm Port

Stakeholder	Justification
Local fishermen	Possible relocation of fish processing factory and fish landing area. Loss of nearshore fishing ground.
Local residents	Influx of construction workers into the Duqm Town.

Source: JICA Study Team

6) Shinas Port

Table 9.3-16 Scoping Checklist of Two Alternative Development Plans of Shinas Port

Environmental Factors		Rating	Justification
Pollution	Air quality	C	Increase in heavy vehicle traffic. (Con&Ope) Residential area is located near the port.
	Seawater quality	C	Alternative A Dredging and landfill. (Con)
		B	Alternative B Dredging, landfill and breakwater construction. (Con)
	Bottom sediment quality	C	Deterioration of sediment quality through the deterioration of water quality. (Con&Ope)
	Noise / vibration	B	Increase in heavy vehicle traffic. (Con&Ope) Residential area is located near the port.
	Odor	C	Possible odor from imported goats. (Ope)
Biophysical environment	Ecosystem	C	Mortality of local benthic community. (Con)
	Topography / geology	C	Slight alteration of underwater topography. (Con)
	Groundwater	C	Possible seawater intrusion into groundwater during dredging and landfill. (Con)
	Wadi flow	D	No alteration to wadi flow.
	Water circulation	D	Alternative A No alteration to nearshore current regime.
		C	Alternative B Minor alteration of nearshore current regime due to the extended breakwater. (Con&Ope)
	Coastal erosion / accretion	C	Alternative A No difference with the current situation.
		B	Alternative B Enhancement of erosion and accretion both side of the port. (Con&Ope)
	Landscape	D	No major alteration to landscape.
Social environment	Resettlement	D	No resettlement will be involved.
	Livelihood	C	Possible degradation of social security through influx of construction workers. (Con)
	Fisheries	C	Possible disturbance to local fishermen through increase in commercial vessels. (Ope)
	Tourism	C	No major tourist site at the moment.
	Land / water use	D	No major alteration in current land use.
	Cultural assets	D	No significant cultural assets near the port.
	Infrastructure	D	No negative impact on infrastructure.
	Waste	C	Excrement from imported goats. (Ope)

A: Significant potential impact, B: Moderate potential impact, C: Small potential impact, D: No potential impact,
U: Undecided (not enough information)
Con: Construction phase, Ope: Operation phase
Note: The environmental impacts of the alternatives are compared only for environmental factors that are considered to be different between the two alternatives.
Source: JICA Study Team

i. Key environmental impacts

The common environmental impacts of the two alternatives identified through the scoping procedure are as follows.

- Deterioration of water quality through dredging and landfill.

- The activities of the local fishermen could be hindered through the increase in commercial vessels.
- Excrement from imported goats could pollute the local environment without proper waste management.

In addition to the above impacts Alternative B have further potential environmental impacts due to the expanded breakwater. This will likely enhance the ongoing shoreline erosion problem around Shinas Port.

ii. Proposed mitigation measures

Mitigation measures are proposed for some of the major environmental impacts of the two alternatives.

Table 9.3-17 Proposed Mitigation Measures for the Environmental Impacts of Shinas Port Development

Environmental Factors	Key Impacts	Proposed Mitigation Measures
Noise	Increase in heavy vehicle traffic (Con&Ope)	➢ Heavy vehicles should avoid passing through residential areas as much as possible especially during night time.
Water quality	Deterioration of water quality through landfill and dredging (Con)	➢ Use of silt curtain to limit turbidity dispersion.
Coastal erosion	Enhancement of shoreline erosion and accretion (Ope)	➢ Employment of appropriate coastal erosion restoration technique.
Fisheries	Hindrance to fishermen using Shinas Port through increase in commercial vessels (Ope)	➢ Clear demarcation of port use between commercial and fishing vessels
Waste	Excrement from imported goats (Ope)	➢ Preparation of appropriate Waste Management Plan.

Con: Construction phase, Ope: Operation phase

Source: JICA Study Team

iii. Identification of stakeholders

Based on the analysis of the existing environmental conditions and scoping procedure, some of the major stakeholders are listed in the following Table with brief justifications for its inclusion.

Table 9.3-18 Some of the Major Stakeholders of Shinas Port

Stakeholder	Justification
Local fishermen	Hindrance to fishermen through increase in commercial vessels.
Local residents	Increase in heavy vehicle traffic passing through the residential area.

Source: JICA Study Team

(3) National Laws and Regulations Relevant to Port Development

This section provides a brief guide to the national laws and regulations most relevant to port development and operation in the Sultanate of Oman.

1) Laws and Regulations Relevant to Environmental Conservation and Impact Assessment

- RD 114/01 Law on the Conservation of the Environment and Prevention of Pollution
- MD 187/01 Organizing the Issuance of Environmental Approvals and the Final Environmental Permits
- MD 68/04 Updation of MD 187/01

RD 114/01 provides the framework for much of Oman's pollution control legislation and it covers both onshore and offshore environments. According to RD 114/01 the owner of a proposed project is required to submit an Environmental Impact Statement (EIS) and Environmental Impact Assessment (EIA) study (if required) to MRMEWR to apply for an Environmental Permit.

MD 68/04 provides the procedures and fees involved in obtaining an Environmental Permit.

In 2000 Directorate General of Environmental Affairs of the MRMEWR issued a guidance document entitled "*Guidelines for Obtaining Environmental Permits"*. This document contains the official MRMEWR guideline for conducting Environmental Impact Assessment (EIA) study.

2) Laws and Regulations Relevant to Marine Environment Protection

- RD 34/74 (3 August 1974) Law on the Control of Marine Pollution
- RD 53/81 Issuing the Law on Sea Fishing and the Protection of Marine Biological Wealth
- MD 3/82 Issuing the Regulations for the Law on Sea Fishing and the Protection of Marine Biological Wealth
- MD 7/84 (12 May 1984) Regulations and Criteria for the Disposal of Liquid Substances into the Marine Environment

RD 34/74 regulates discharges from ships and offshore installations in a "pollution-free zone" which extends from the outer limits of Oman's territorial waters (12 nautical miles offshore) to a maximum 38 nautical miles offshore or the boundaries of other States. Within this "pollution-free zone" it is prohibited to discharge pollutants from any ship, fixed or floating platform or pipeline. Pollutants in this case include: oil or oily mixtures with an oil content greater than 100 ppm and any dangerous or noxious materials, such as effluent, sewage, refuse or waste, which have a harmful impact on water.

RD 53/81 provides the basis for regulation of fishing and protection of marine resources. MD 3/82 contains provisions for protection of marine species including seabirds and turtles.

MD 7/84 prohibits disposal of liquid substances into the marine environment without a permit from MRMEWR. This regulation applies from the high tide mark to the boundary of Oman's territorial

waters. Effluent to be disposed of must be treated or comply with certain criteria regarding chemical content and effect on the marine environment (e.g. color changes, foul smells, tainting of seafood, increased turbidity, temperature increase, reduced oxygen, pH changes, dilution etc.). Substances banned from disposal at sea include: insecticides, herbicides, radioactive materials and chemical or biological warfare agents. In some cases the applicant may be required to carry out a field survey of at least three months duration to determine seasonal variations in the physical, chemical and biological characteristics of the discharge area.

3) Laws and Regulations Relevant to Wastes and Hazardous Materials Management

- RD 115/01 Law on Protection of Sources of Potable Water from Pollution
- MD 8/84 Regulations for the Disposal of Liquid Industrial Waste
- MD 17/93 (2 Feb 1993) Regulations for the Management of Solid Non-Hazardous Waste
- MD 18/93 (2 Feb 1993) Regulations for Management of Hazardous Wastes
- MD 145/93 (13 June 1993) Regulations for Wastewater Re-Use and Discharge
- MD 39/04 Regulations for Permits for the Management of Marine Environment

A permit from MRMEWR is required for discharge of wastewater or sludge. Due to limited freshwater resources in Oman, MD145/93 requires that wastewaters should be reused before disposal and not wasted unless no form of reuse is possible. The regulations contain quality limits for discharged wastewater and reuse criteria.

In accordance to MD39/04, permits are required for dumping solid substances into the marine environment. The project proponent is required to submit specific documents to obtain the permit.

- RD 46/95 Issuing the Regulations Regarding the Distribution and Use Of Chemicals
- MD 248/97 (6 July 1997) Issuing the Regulation for the Registration of (Potentially Toxic) Chemical Substances and the Relevant Permits
- MD 249/97 (6 July 1997) Regulations for the Control and Management of Radioactive Materials
- MD 37/01 Regulates and controls handling of ozone depleting substances (ODS)
- MD 317/01 Regulations on Packing, Packaging and Labeling of Hazardous Chemicals

All chemicals used in Oman must be registered and a permit is required for their use. Two forms are required from the Department of Chemical Substances at MRMEWR:

- "Toxic Chemical Substance registration Form" to register new chemicals.
- Environmental Permit for Dealing with Toxic Chemical Substances to apply for a permit

The use of radioactive materials is regulated under MD 249/97. A permit is required to import or use a radioactive source.

4) Laws and Regulations Relevant to Air and Noise Pollution

- MD 79/94 (20 March 1994) Issuing Regulations For Noise Pollution Control In Public Environment
- MD 80/94 (20 March 1994) Issuing Regulations For Noise Pollution Control In Working Environment
- MD 5/86 (17 May 1986) Regulations for Air Pollution Control From Stationary Sources

Noise limits in a public environment are set depending upon the time of day and type of noise generating activity (e.g. industrial plants and public works, road traffic, airports, airborne operations of commercial and general aviation) and type of area in which the noise generating activity is located (e.g. residential, recreational, industrial/commercial).

5) Laws and Regulations Relevant to Nature Reserves

- RD 6/03 Law on Nature Reserves and Wildlife Conservation. Replaces RD26/79
- RD 38/75 Designating the Qurm Nature Reserve
- RD 4/94 Designating the Arabian Oryx Sanctuary
- RD 23/96 Designating the Dimaniyat Island Nature Reserve
- RD 25/96 Designating the Ra's Al Hadd Turtle Reserve
- RD 48/97 Designating the Jebel Samhan Nature Reserve
- RD 49/97 Proclaimed "The *Khawrs Reserve of Dhofar Coast"*
- RD 50/97 Designating the As Saleel Natural Park

6) Others

- MD 200/00 *Regulation* for Crushers, Quarries and Transport of Sand from Coasts, Beaches and Wadis
- MD 20/90 (title unkown)

MD 200/00 prohibits the use of crushers or quarry sites and excavation of sand without the permit from MRMEWR.

MD 20/90 establishes setbacks for new construction along the coastline. The setback for a natural coastline is 300 m, 150 m for sandy beaches around khawrs and 50 m along beaches where the construction will have a limited impact on the environment.

(4) Procedures for Obtaining Environmental Permit for Port Development Projects

In accordance to Royal Decree 114/01 and "Guidelines for Obtaining Environmental Permits", prior to the implementation of any new development or major expansion projects such as commercial ports, the project owner is required to obtain an approval from MRMEWR, through submission of "Application for Environmental Permit". For projects with potential environmental impacts, submission of a detailed EIA or an environmental report may be requested as a condition of approval.

If EIA is required, the scope of the EIA and TOR will be decided through consultation with MRMEWR. The EIA will be conducted by the MRMEWR registered consultant. The complete EIA will be reviewed by MRMEWR and it could either be accepted, or the Ministry could request for further study, or request for an alternative proposal. If it is accepted the Ministry will issue an approval.

The type of approval issued by the MRMEWR differs with the characteristics of the project. For port projects that are considered as infrastructure and have negligible environmental impacts in the operation phase, or in other words if follow-up from MRMEWR is deemed unnecessary (e.g. Khasab Port) after the completion of the construction, the MRMEWR will issue "Environmental Permit to Infrastructure Projects" upon approval of the project with attached conditions*. Roads, pipelines and power lines are usually classified into this category.

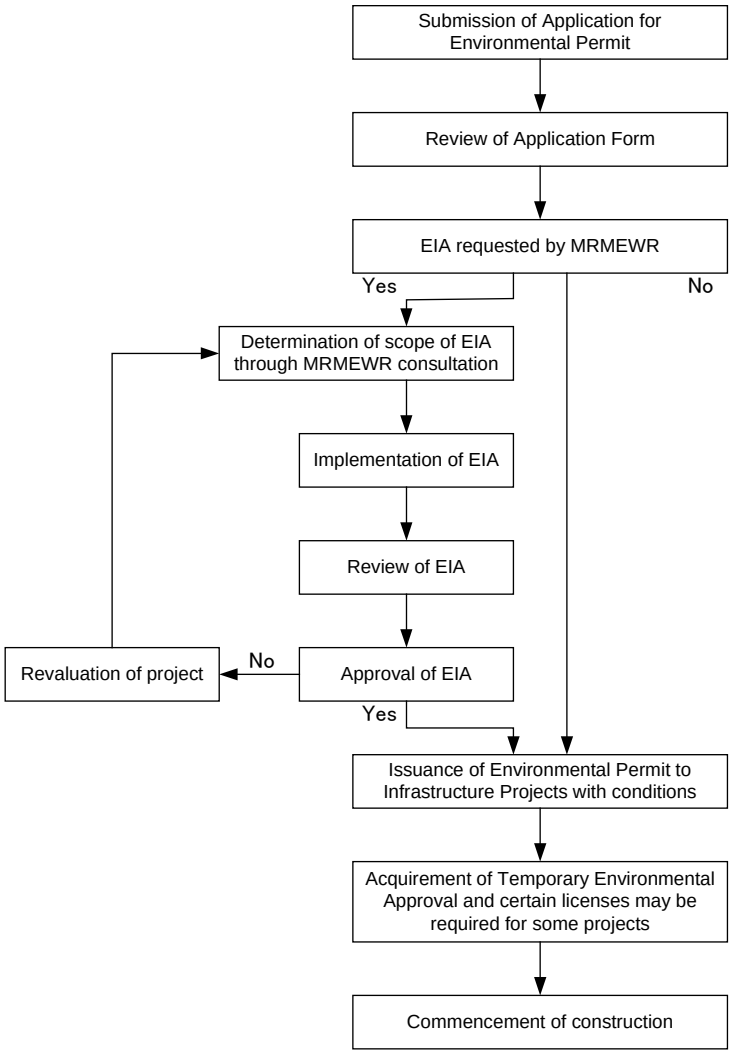
On the other hand, for projects that require close environmental follow-up (e.g. Sohar Port) during the whole project cycle, the MRMEWR will initially issue "Preliminary Environmental Approval" upon approval of the project with attached conditions*. At the completion of the construction stage, MRMEWR will inspect the site and upon satisfactory fulfillment of the above conditions, MRMEWR will issue "Final Environmental Permit". The permit is valid for two years and can only be renewed after passing the inspection of the MRMEWR. Without a valid "Final Environmental Permit" the project owner is liable to penalization from MRMEWR.

For some projects the project owner must obtain "Temporary Environmental Approval" prior to the construction. This approval deals with the temporary works that are specifically involved only during the construction phase, such as quarrying, workers camp, workshop and so on. This approval is valid for one year and must be renewed until the end of the construction.

The above procedures are separately summarized in the flow chart of Figure 9.3-1 and 9.3-2.

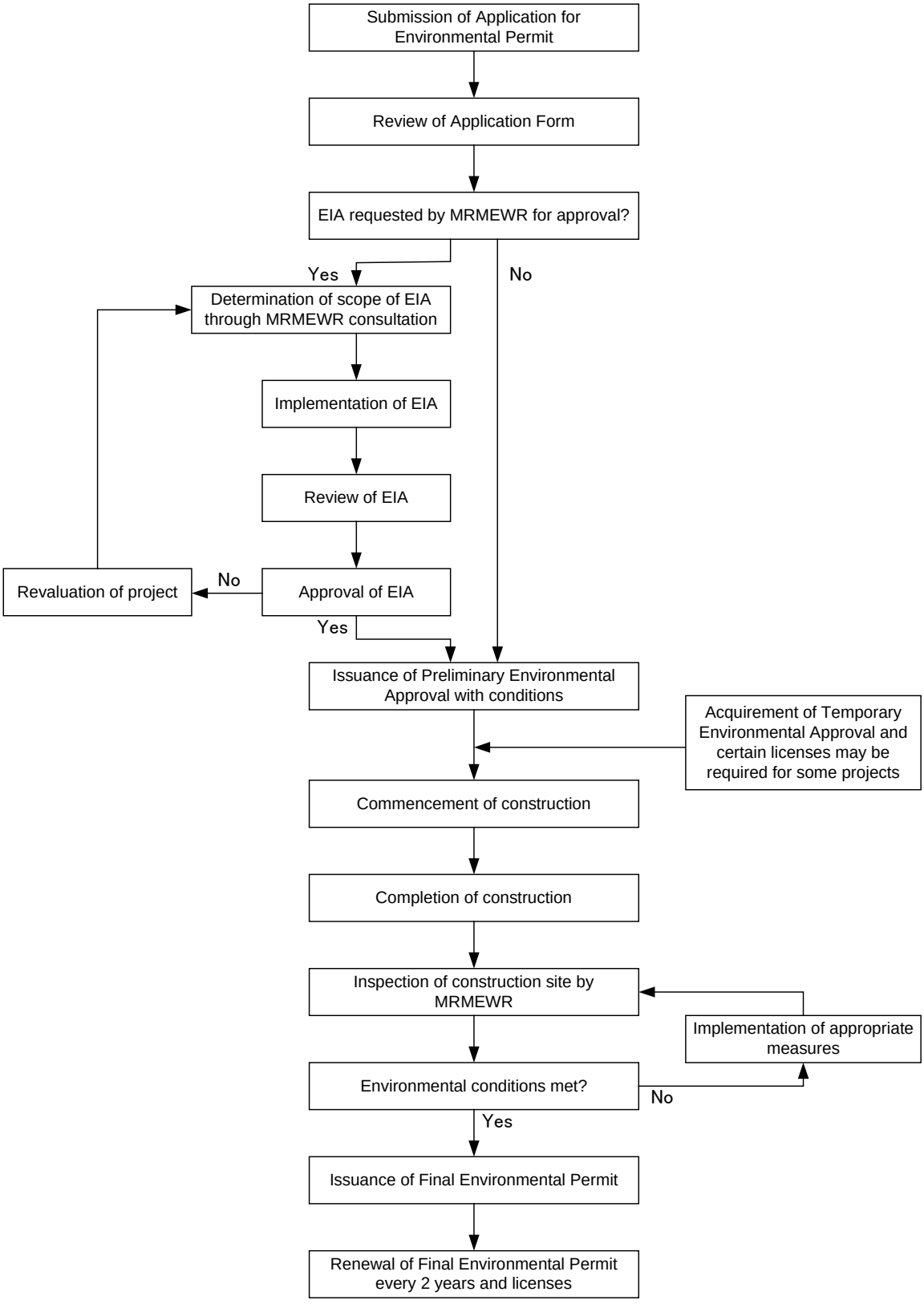
*The attached conditions will often request the acquirement of certain license such as for handling hazardous substances, dumping of solid substances into sea and so on.

Figure 9.3-1 Procedures for Obtaining "Environmental Permit" for Port Development Projects (Infrastructure Projects requiring no follow-up)



Source: JICA Study Team

Figure 9.3-2 Procedures for Obtaining "Environmental Permit" for Port Development Projects (Port Projects requiring follow-up after construction)



Source: JICA Study Team

9.4 Preliminary Engineering and Cost Estimate on the Pre-screened Alternatives

Pre-screening of the alternatives for long-term development plan at each major port has been conducted as shown in Section 9.2. In this section, preliminary discussion on the design and implementation plan of major port facilities are presented, and each project cost is estimated in order to select the best alternative for Long-term Development Plan at each major port.

There is no specifically established design standard applied for port facilities in Oman. Therefore, the design in this study has been prepared based on Technical Standard for Port and Harbour Facilities in Japan supplemented by other internationally accepted standards such as British Standard (BS).

The exchange rate applied for the study is USD 1 = OR. 0.3845 = JPN 109.4 following the current rates on September 1, 2004. The project costs are composed of the construction cost by the public sector and the equipment cost by the private sector. The construction cost includes physical contingency and engineering services for engineering design and construction supervision but does not include custom duties, inflation, etc.

9.4.1 Sultan Qaboos Port

Through pre-screening on possible alternative plans for Sultan Qaboos Port, two Alternatives A and B have been selected for further detailed examination and selection. (Refer Figures 9.2-3 and 9.2-4) The remarkable difference between two plans is the length of breakwater. The breakwater in Alternative A is connected to the land, while that in Alternative B is planned without connection. The major facilities are summarized in Table 9.4-1.

Table 9.4-1 Size of Major Port Facilities of Two Alternatives at Sultan Qaboos Port

	Alternative A	Alternative B
Breakwater	2000m	1500m
Quay wall	1050m	1050m

Source: JICA Study Team

1) Preliminary design

i. Design criteria

Design criteria for new breakwater and quay wall at Sultan Qaboos Port have been determined as shown in Table 9.4-2.

Table 9.4-2 Design Criteria at Sultan Qaboos Port

Item	Description
Design Wave	Wave height; 6.0m, wave period; 12s
Tidal Levels	MHHW +2.64m CD MLHW +2.55m CD MHLW +1.67m CD MLLW +0.91m CD LAT ±0.00m CD
Existing Water Depth	-40.0m (breakwater) -16.0m (quay wall)
Design Depth	Quay wall; -16.0m Turning basin; -16.0m Access channel; -16.5m
Soil Conditions	Sandy layer (within 3m beneath the seabed); N-value 20 Gravelly layer (below sandy layer); N-value 50
Design Vessels	Container ship 60,000DWT
Crest Elevations	Quay wall; +4.2m CD Breakwater; +10.0m CD (Alternative A), +7.0m CD (Alternative B)
Seismic Condition	Not considered
Service Life Time	50 years

Source: Master Plan Study (JICA, 1990) arranged by JICA Study Team

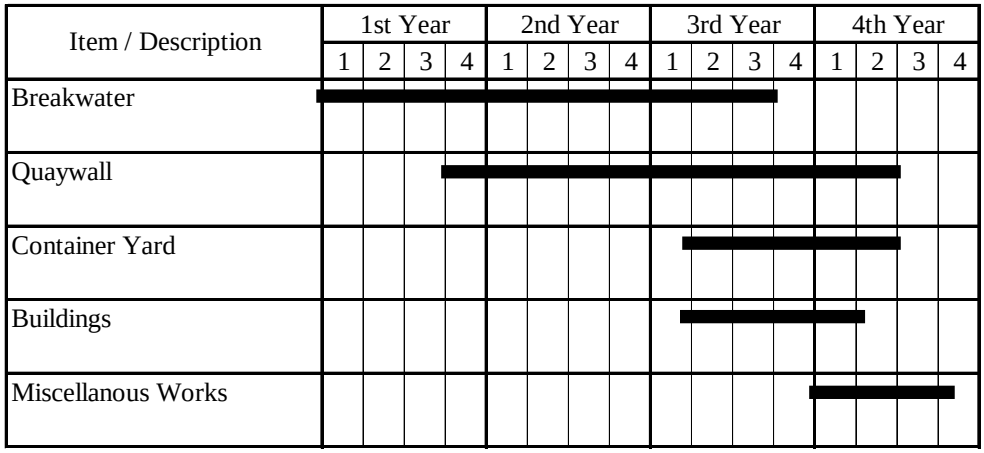
ii. Structural design

The preliminary structural design for breakwater and quay wall has been carried out in accordance with the above design criteria. Though the water depth at the proposed location of breakwater is quite deep, rubble-mound type with armoured by concrete blocks has been selected as the breakwater structure for two alternatives. The main reason in selecting the structure is availability of large quantity of rock material around Sultan Qaboos Port. It is supported by the fact that almost all structural type of breakwater in Oman is constructed by rubble-mound type with armoured by concrete blocks. Bearing in mind the above, pre-cast concrete block type has been applied for both berth structures.

2) Preliminary implementation program

The construction of breakwater in Alternative A may be carried out by chipping from the shore utilizing dump trucks. Though the length of breakwater is longer than that of Alternative B and more rock materials are needed, it has an advantage of non-disturbance from sea condition. Preliminary implementation program of major works of Alternative A is shown in Figure 9.4-1.

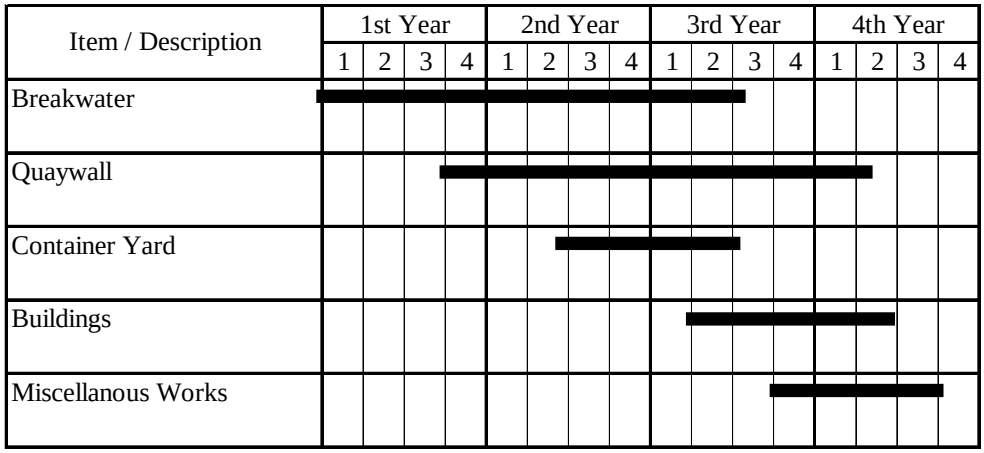
Figure 9.4-1 Preliminary Implementation Program of Major Works (Alternative A)



Source: JICA Study Team

On the other hand, the construction of Alternative B will be carried out by floating construction plant. Allowing overtopping waves, a low crest breakwater can be provided. The possible disadvantages due to interruptions by high tides, adverse weather or double handling of the materials could eat up saving obtained from smaller quantity of materials compared with Alternative A. Estimated implementation program of major works of Alternative B is shown in Figure 9.4-2.

Figure 9.4-2 Preliminary Implementation Program of Major Works (Alternative B)



Source: JICA Study Team

3) Preliminary cost estimate

i. Capital cost

Preliminary cost estimate has been conducted applying the unit cost of similar projects such as Sohar and Salalah. The results for both alternatives are as follows. The construction works are to be financed by the public sector, and equipment is to be purchased by the private sector.

Table 9.4-3 Result of Preliminary Cost Estimate

	Alternative A	Alternative B
Public Sector	R.O. 91 million	R.O. 88 million
Private Sector	R.O. 49 million	R.O. 49 million

Source: JICA Study Team

ii. Maintenance cost

The annual maintenance cost for both alternatives has been estimated. They are almost same as OR. 1.3 million, which is composed of OR. 0.1 million by the public sector and OR. 1.2 million by the private sector, except for renewal costs of equipment. The items which have been invested in the capital by the public sector are to be maintained by the public sector, and the same approach applies to the private sector.

4) Engineering aspects

Based on the collected data so far, it has been found that the berths of both alternatives are well sheltered. However, the berth near the port entrance may be affected by waves from November to March. There will be a few overtopping waves because of low crest breakwater of Alternative B. There is a possibility that the width of port entrance can be reduced to ensure higher calmness.

Considering the scale of the port development, the base data is not adequate to finalize the layout of the breakwater. Wave observations at the proposed site of the breakwater should be carried out for at least one year. Based on observed data, the effectiveness of the proposed breakwater layout should be verified by model testing.

With respect to sedimentation, the sediment passes through the port area in Alternative B. However, the sediment will be trapped and settled in the port basin in Alternative A, though its volume may not be so large.

9.4.2 Salalah Port

The Master Plan was set up by JICA Study Team in 2000. The construction of Berth No.5&6 and extension of breakwater will start in early 2005 in line with the plan. Therefore, the discussion in this section has been conducted based on the Master Plan except for Berth No.5&6 and extended breakwater.

Two pre-screened plan are considerable concerning long-term development plan at Salalah Port, as shown in Figure 9.2-6 and 9.2-7. The major port facilities required in the plan are summarized in Table 9.4-4 and 9.4-5. In the Alternative B, the present bulk berth has been planned to be converted to container berth.

Table 9.4-4 Size of Major Port Facilities of Alternative A at Salalah Port

	Proposed Plan	Remarks
Quay wall	Container (- 16m); 1750m	
	Container (- 16m); 700m	
	Bulk (- 16m); 300m	
	Passenger; 340m	
	Oil terminal; 300m	Dolphin
	Government berth; 800m	

Source: JICA Study Team

Table 9.4-5 Size of Major Port Facilities of Alternative B at Salalah Port

	Proposed Plan	Remarks
Quay wall	Container (- 16m); 1750m	
	Container (- 16m); 700m	Converted
	Bulk (- 16m); 900m	
	Passenger; 340m	
	Oil terminal; 300m	Dolphin
	Government berth; 800m	

Source: JICA Study Team

1) Preliminary design

i. Design criteria

Design criteria for quay wall at Salalah Port have been determined as shown in Table 9.4-6.

Table 9.4-6 Design Criteria at Salalah Port

Item	Description
Tidal Levels	MHHW +1.68m CD MLHW +1.64m CD MHLW +1.33m CD MLLW +0.65m CD LAT ±0.00m CD
Existing Water depth	varies
Design Depth of Berths	Container berth; -16.0m Bulk berth; - 16m Passenger berth; -10m Government berth; -8m
Soil Conditions	Sand layer (within 3m beneath the seabed) Limestone layer (below sand layer); N-value over 50
Design Vessels	Container ship 60,000DWT Bulk carrier 60,000DWT Tanker 35,000DWT Passenger ship 70,000GT
Crest Elevation	Quay wall; +4.0m CD
Seismic Condition	Not considered
Service Life Time	50 years

Source: Master Plan Study (JICA, 2000) and Definition Study (CES, 2004) arranged by JICA Study Team

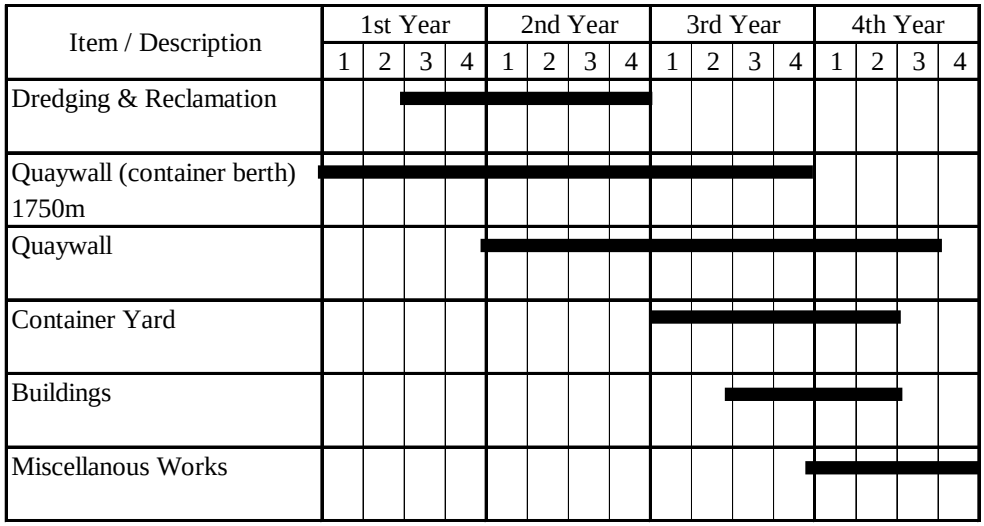
ii. Structural design

The structural design for quay wall has been carried out following the above design conditions. As pre-cast concrete block type was applied for the existing berth structure, it is made a reference to this structural design as well.

2) Preliminary implementation program

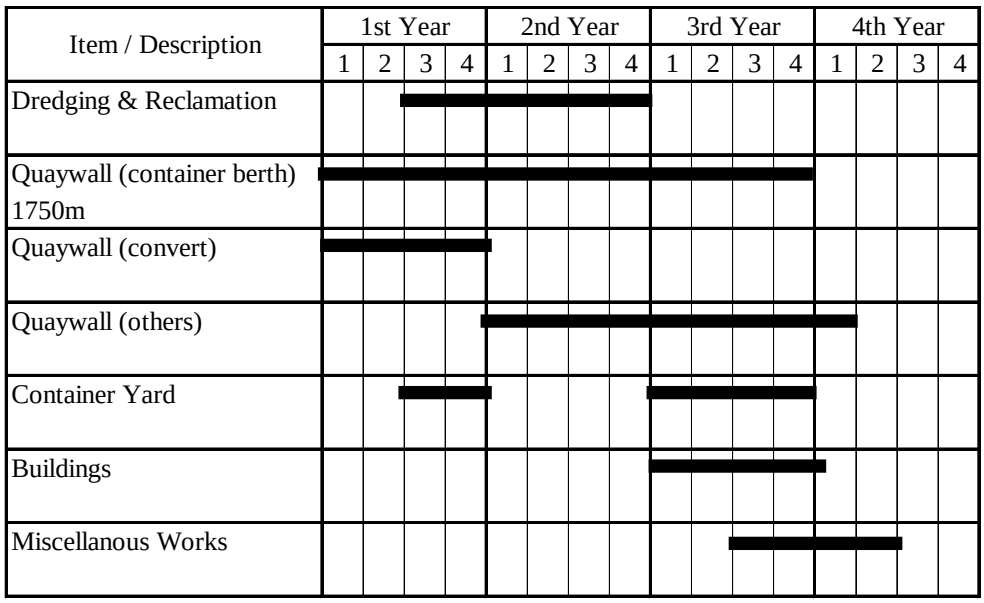
The most important is to plan an appropriate implementation program that will not cause disturbance for the present port operation. A trailer suction dredger is ideal to apply for dredging work. However, since most of dredging material is to be pumped into reclaimed area, a discharge pipe line system to dispose the dredged material is advisable. The pipe line should be placed on the seabed in the area where vessels often pass by. That is the reason why a cutter suction dredger is recommended. Both implementation programs of major works of the plan are shown in Figures 9.4-3 and 9.4-4.

Figure 9.4-3 Preliminary Implementation Program of Major Works (Alternative A)



Source: JICA Study Team

Figure 9.4-4 Preliminary Implementation Program of Major Works (Alternative B)



Source: JICA Study Team

3) Preliminary cost estimate

i. Capital cost

Preliminary cost estimate has been conducted applying the unit cost used so far in Salalah project. The results are as follows. The construction works are to be financed by the public sector, and equipment is to be purchased by the private sector.

Table 9.4-7 Result of Preliminary Cost Estimate

	Alternative A	Alternative B
Public Sector	R.O. 126 million	R.O. 122 million
Private Sector	R.O. 102 million	R.O. 102 million

Source: JICA Study Team

ii. Maintenance cost

The annual maintenance cost for both alternatives has been estimated. They are almost same as OR. 3.2 million, which is composed of OR. 0.2 million by the public sector and OR. 3.0 million by the private sector, except for renewal costs of equipment. The items which have been invested in the capital by the public sector are to be maintained by the public sector, and the same approach applies to the private sector.

4) Engineering aspects

There are two wadis near Salalah Port. However, no data on flood frequency and its discharge volume of wadis is available. At the detailed design stage, it should be carefully examined.

9.4.3 Sohar Port

Through pre-screening on possible plans for Sohar Port, two plans have been selected for further detailed examination and selection (Refer Figures 9.2-8 and 9.2-9). However, as there is no significant difference on design and cost estimate between them, Alternative B has been regarded as the representative. Based on the initial plan presented by foreign consultants, breakwaters and the southern (right) half of berth structure were constructed. Accordingly, only the northern (left) half of berth structures, turning basin and related facilities has been discussed in this section. The major port facilities required in the plan are summarized in Table 9.4-8.

Table 9.4-8 Size of Major Port Facilities of Alternative B at Sohar Port

	Proposed Plan	Remarks
Quay wall (- 16m)	Container; 1050m Bulk; 600m	
Turning basin (- 16m)	approximate 150 ha	

Source: MOTC arranged by JICA Study Team

1) Preliminary design

i. Design criteria

Design criteria for quay wall at Sohar Port have been determined as shown in Table 9.4-9.

Table 9.4-9 Design Criteria at Sohar Port

Item	Description
Tidal Levels	MHHW +2.72m CD MLHW +2.61m CD MHLW +1.67m CD MLLW +0.83m CD LAT ±0.00m CD
Existing Water depth	0.0m (quay wall)
Design Depth	Quay wall; -16.0m Turning basin; -16.0m (Access channel; -16.5m)
Soil Conditions	Loose sediments (within 4m beneath the seabed) Sandy silt or silty sand layer (10m thick below loose sediments); N-value 10-30 Sandstone (below sandy silt or silty sand layer); N-value over 50
Design Vessels	Container ship 60,000DWT
Crest Elevation	Quay wall; +4.6m CD
Seismic Condition	Not considered
Service Life Time	50 years

Source: Master Plan Study (JICA, 1990) arranged by JICA Study Team

ii. Structural design

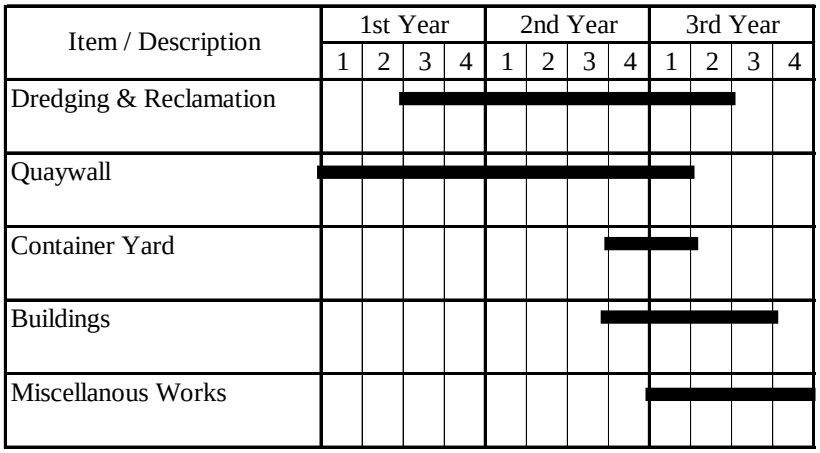
The preliminary structural design for quay wall has been carried out based on the above design conditions. Of course, as pre-cast concrete block type was applied for berth structure in the southern half of the port, it is made a reference to this structural design in the northern half of the port as well.

2) Preliminary implementation program

It is advisable that pump dredgers should be applied for dredging work because of huge dredging volume, which has been computed to be approximate 18 million m^3. Reclamation volume has also been computed to be 2 million m^3. There is an imbalance between dredging and reclamation volume. Excessive dredged material, especially loose sediments which are unsuitable for reclamation, will be dumped to the offshore. Environmental assessment should be carefully conducted around offshore dumping area.

It is also important to plan an appropriate implementation program that will not cause disturbance of the port operation. Preliminary implementation program of major works of proposed plan is shown in Figure 9.4-5.

Figure 9.4-5 Preliminary Implementation Program of Major Works



Source: JICA Study Team

3) Preliminary cost estimate

i. Capital cost

Preliminary cost estimate has been conducted applying the unit cost used so far in Sohar project. The results of cost estimate are approximate OR. 60 million by the public sector and OR. 34 million by the private sector. The construction works are to be financed by the public sector, and equipment is to be purchased by the private sector.

ii. Maintenance cost

The annual maintenance cost has been estimated at OR. 1.1 million, which is composed of OR. 0.3 million by the public sector and OR. 0.8 million by the private sector, except for renewal costs of equipment. The items which have been invested in the capital by the public sector are to be maintained by the public sector, and the same approach applies to the private sector.

4) Engineering aspects

There is a remarkable difference between the original and dredged depth in the port area. Even though the width of the port entrance is 500 m, waves will bring sediments into the port area little by little. Therefore, it is advisable that bathymetric survey should be conducted periodically, for example every two years.

9.4.4 Khasab Port

1) Port development project

The phase 1 development of Khasab Port has been completed in 2004, which includes the construction of breakwaters, the dredging of turning basin, 75 ha land reclamation, 300 m commercial berth, 3 floating jetties for Iranian vessels, 2 floating jetties for government vessels, 2 floating jetties for fishing boats and 100 m quay for fishery harbour. The phase 2 development is on-going and will be

completed within 2005, which includes the establishment of buildings for commercial berth. The project cost of phase 2 development is to be approximate OR. 2.4 million. The annual maintenance cost for the phase 1 and the phase 2 development was estimated at OR. 0.13 million. As for Long-term development, the construction of 400 m quay wall was preliminary planed in front of commercial zone, which has been estimated at approximate OR. 4.0 million with the annual maintenance cost of OR. 0.01 million.

2) Canal project

Two pre-screened plans are considerable concerning the Future Development Plan at Musandam Region, as shown in Figure 9.2-11. In the proposed plans, canals which enable small boats to pass through have been discussed. Though there are some candidate sites, the following dimensions of canals were assumed in this study. As for construction procedure, open cut excavation has been assumed.

Table 9.4-10 Dimensions of Canals

	Option 1	Option 2
Canal	Width; 50m Depth; 5m Length; 300m Height; 50m	Width; 50m Depth; 5m Length; 1000m Height; 30m

Source: JICA Study Team

i. Preliminary design

The slope of excavated rocky hill was assumed to be 45 degree. As the rock strength is expected to be hard, blasting will be required for excavation work.

ii. Preliminary implementation program

The construction of proposed plan will be carried out by floating construction plant in the beginning, because there is no road to/from the site. Later on, backhoes will be applied for excavation work. Estimated construction periods are 1.5 years for Option 1 and 2 years for Option 2.

iii. Preliminary cost estimate

Preliminary cost estimate has been conducted applying the unit cost of other projects. Only the public sector is to finance this project. The results of estimate are approximate OR. 15 million for Option 1 and OR. 25 million for Option2. The annual maintenance cost are approximate OR. 0.10 million for Option 1 and OR. 0.15 million for Option 2.

iv. Engineering aspects

It is said that there is a big tidal difference between both edges. Before the construction of canal, it is

necessary to measure the tidal difference in order to understand the impact to the environment around the canal. The big tidal difference will cause fast tidal current in the canal. If it is hard for small boats to pass by, gate system should be considered.

9.4.5 Duqm Port

Two pre-screened plans are considerable concerning the Long-term Development Plan at Duqm Port, as shown in Figures 9.2-12 and 9.2-13. Alternative A was planned to have functions such as ship repair, commercial port, fishery port by a consultant namely Haskoning. As for Alternative B, JICA Study Team has added a concept that Duqm Port can play an important role in oil stock into Alternative A. It was assumed that the establishment of oil refinery facilities and the procurement of tanks for oil stock are out of scope in this study. The major facilities required in the plan are summarized in Table 9.4-11.

Table 9.4-11 Size of Major Port Facilities of Alternatives at Duqm Port

	Proposed Plan	Remarks
Breakwater	Main breakwater; 1800m Sub breakwater; 1200m+ α	
Quay wall	Multi-purpose; 380m (-10m) Fishery; 300m (-5m), 200m (-8m) Government; 240m (-8m) Tugs, etc; 300m (-5m)	
Mooring Facility	3 single mooring buoys; (-20m), (-25m), (-30m)	Alternative B
Shipyard	Tanker 100,000DWT	

Source: Feasibility Study (Haskning, 2004) arranged by JICA Study Team

1) Preliminary design

i. Design criteria

Design criteria for quayside facilities at Duqm Port were summarized as shown in Table 9.4-12.

Table 9.4-12 Design Criteria at Duqm Port

Item	Description
Design Wave	Wave height; 5.8m, wave period; 10s
Tidal Levels	MHHW +2.36m CD MLHW +2.29m CD MHLW +1.48m CD MLLW +0.70m CD LAT ±0.00m CD
Existing Water Depth	-1.0m (quay wall) 0.0 - 12.0m (breakwater)
Design Depth	Quay wall; -10.0m (commercial berth), -8.0&-5.0m (fishery berth) Turning basin; -10.0m (Access channel; -12.0m)
Soil Conditions	Loose sediments (within 4m beneath the seabed) Mudstone or siltstone (below loose sediments)
Design Vessels	Tanker 100,000DWT (shipyard)
Crest Elevation	Quay wall; +5.0m CD
Seismic Condition	Not considered
Service Life Time	50 years

Source: Feasibility Study (Haskoning, 2004)

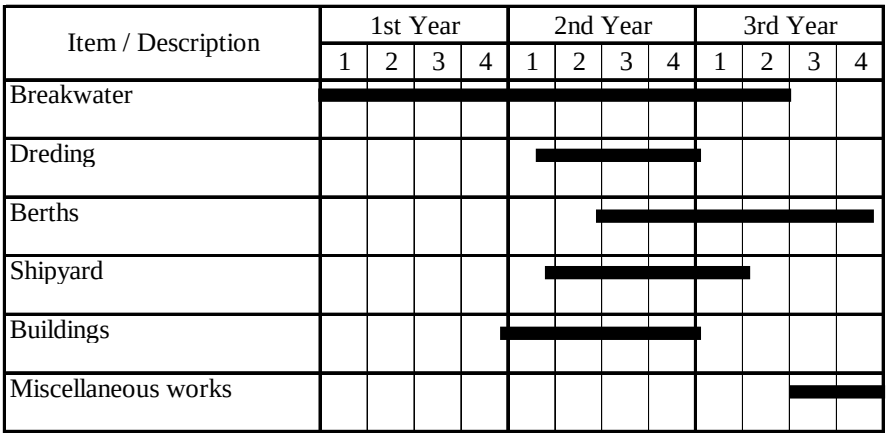
ii. Structural design

Preliminary structural design for breakwater and quay wall was carried out based on the Feasibility Study (Haskoning, 2004). Rubble mound type was applied for the structure of breakwater, and pre-cast concrete block type was for that of quay wall.

2) Preliminary implementation program

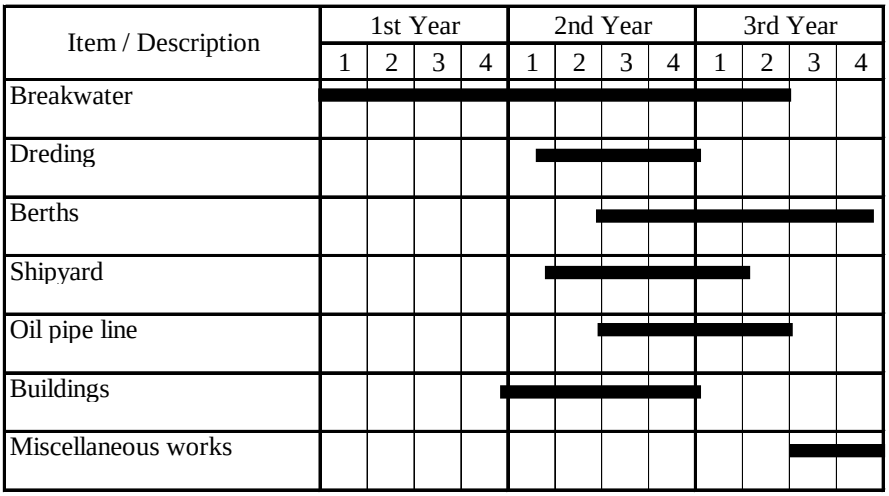
As two breakwaters require a lot of rock materials, it is important to ensure appropriate quarry sites to provide rock materials as near as possible. Because the progress of breakwater work influences all other works. Moreover, dredged material was expected to be unsuitable for reclamation, and no quarry site has been found out around Duqm Port in the site visit. The dredging work can not start until the main breakwater provides calmness inside the port area despite of significant dredging volume, which was computed to be approximate 13 million m^3. Therefore, it is advisable that cutter suction dredgers should be applied for dredging work. Preliminary implementation program of major works of both alternatives are shown in Figures 9.4-6 and 9.4-7.

Figure 9.4-6 Preliminary Implementation Program of Major Works (Alternative A)



Source: JICA Study Team

Figure 9.4-7 Preliminary Implementation Program of Major Works (Alternative B)



Source: JICA Study Team

3) Preliminary cost estimate

i. Capital cost

Preliminary cost estimate has been conducted applying the unit cost used in the Feasibility Study (Haskoning, 2004) and, similar projects such as Salalah and Sohar. The results are as follows. The construction works are to be financed by the public sector, and equipment is to be purchased by the private sector.

Table 9.4-13 Result of Preliminary Cost Estimate

	Alternative A	Alternative B
Public Sector	R.O. 82 million	R.O. 102 million
Private Sector	R.O. 22 million	R.O. 22 million

Source: JICA Study Team

ii. Maintenance cost

The annual maintenance cost for both alternatives has been estimated. The results are as follows. The items which have been invested in the capital by the public sector are to be maintained by the public sector, and the same approach applies to the private sector.

Table 9.4-14 Result of Preliminary Maintenance Cost Estimate

	Alternative A	Alternative B
Public Sector	R.O. 0.14 million	R.O. 0.34 million
Private Sector	R.O. 0.37 million	R.O. 0.37 million

Source: JICA Study Team

4) Engineering aspects

According to the result of numerical simulation presented in the Feasibility Study (Haskoning, 2004), $H_{1/3}$ at a depth of -20 m with a return period of 1 year is 3.0-3.5 m. Single point mooring buoys were planned to apply for oil pipe line system. The critical wave height for tanker's berthing to single point mooring buoy will be set at about 4.0m. Therefore, it is advisable that the working manual mentioned not only critical wave height but also wind velocity and current speed at each mooring buoy should be prepared to avoid the accident.

There is a big difference between the original and dredged depth in the port basin. Sediments are fine around the port. Therefore, sedimentation can take place in the port basin. With respect to site investigation, physical analysis such as sieve analysis has been proposed in Chap 4. If the critical water depth of sediment transport is deeper than that of present plan, breakwaters should be further extended to the deeper area in order to protect the intrusion of sediments inside the port area.

9.4.6 Shinas Port

Two pre-screened plan are considerable concerning the Long-term Development Plan at Shinas Port, as shown in Figures 9.2-15 and 9.2-16. The major facilities are summarized in Table 9.4-15.

Table 9.4-15 Size of Major Port Facilities of Alternatives at Shinas Port

	Alternative A	Alternative B
Breakwater	-	200m (replace)
Quay wall	-4.5m; L=323m	-6.5m; L=110m -4.5m; L=80m

Source: JICA Study Team

1) Preliminary design

i. Design criteria

Design criteria for new breakwater and quay wall at Shinas Port have been determined as shown in Table 9.4-16.

Table 9.4-16 Design Criteria at Shinas Port

Item	Description
Design Wave	Wave height; 5.2m, wave period; 12.0s
Tidal Levels	MHHW +2.72m CD MLHW +2.61m CD MHLW +1.67m CD MLLW +0.83m CD LAT ±0.00m CD
Water Depth	-4.5m (breakwater) -4.0m (quay wall)
Depth of Channel & Basin	Turning basin; -4.5m (Alternative A), -6.5m (Alternative B) Access channel; -4.5m (Alternative A), -7.0m (Alternative B)
Soil Conditions	Loose sand layer (within 5-7m beneath the seabed)
Design Vessels	Cargo vessel; Dhow (Alternative A), 3,000DWT (Alternative B)
Crest Elevation	+4.0m CD
Seismic Condition	Not considered
Service Life Time	50 years

Source: Master Plan Study (JICA, 1990) arranged by JICA Study Team

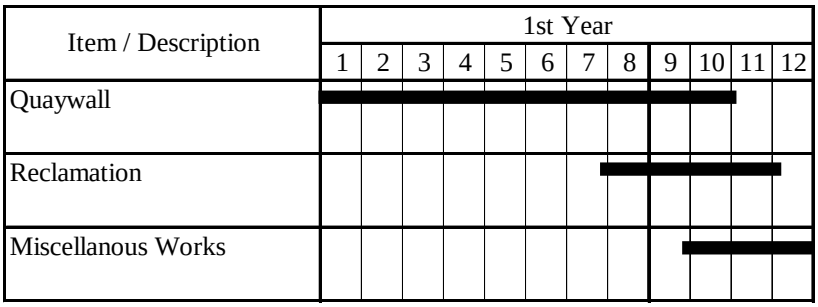
ii. Structural design

Preliminary structural designs for quay wall of both alternatives have been carried out based on the above design criteria. Pre-cast concrete block type has been selected for the berth structures. As for Alternative B, 200 m of the sub breakwater has been planned to replace to the edge of main breakwater in order to ensure the stop distance for vessels.

2) Preliminary implementation program

The quay wall work will be carried out at the beginning of Alternative A. It will be followed by the reclamation work, which is estimated at 110,000 m^3. Preliminary implementation program of major works of Alternative A is shown in Figure 9.4-8.

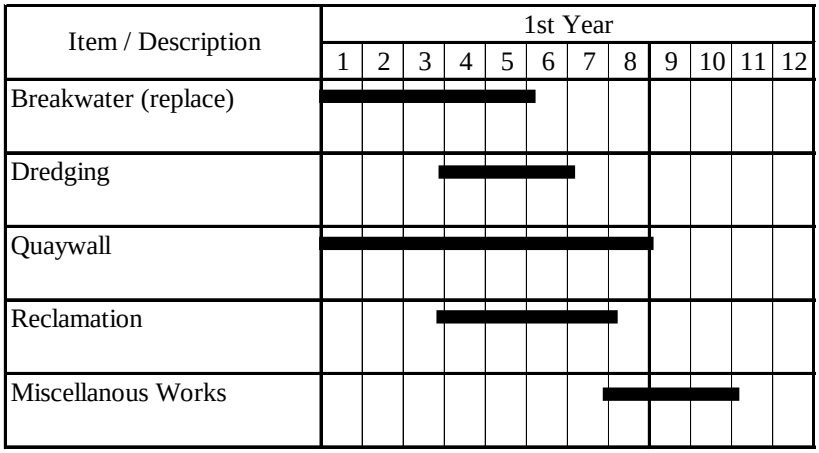
Figure 9.4-8 Preliminary Implementation Program of Major Works (Alternative A)



Source: JICA Study Team

The replacement of breakwater in Alternative B will be carried out by floating construction plant. It is considerable which is suitable dredger, grab dredger, pump dredger or backhoe on the barge with taking into account the replacement of breakwater as well. The dredging volume for turning basin and access channel has been estimated at 100,000 m^3. Preliminary implementation program of major works of Alternative B is shown in Figure 9.4-9.

Figure 9.4-9 Preliminary Implementation Program of Major Works (Alternative B)



Source: JICA Study Team

3) Preliminary cost estimate

i. Capital cost

Preliminary cost estimates have been conducted applying the unit cost of similar projects such as Sohar. The construction works are to be financed by the public sector. The results of estimate are approximate OR. 3.5 million for Alternative A and OR. 4.0 million for Alternative B. The annual maintenance cost are less than OR. 0.01 million for both alternatives.

4) Engineering aspects

According to geological data, a loose sand layer will be dredged. If this sand is unsuitable for reclamation, it will be necessary to transport the soil from another site for reclamation.

This proposed plan is to widen the port entrance to ensure the stop distance for larger vessels. If this plan does not provide enough calmness for the port operation, the breakwaters should be further extended.

9.5 Preliminary Management, Operation and Financial Scheme

In previous sections, port development alternatives are drafted as 2025 target, with the forecast of cargo and containers movement in the targeted year. In this section, project financing and management aspects are described based upon the above alternatives.

Before studying them on port by port, following matter should be noted as a common understanding (Also see 10.11):

- For major ports, the managing organizations have been established certain years ago, and are generally performing well. In case of Sohar port, as the operation has just started, and few materials to judge the behaviour exist. In the circumstances, it is reasonably assumed the existing body will continue their business for foreseeable future.
- For smaller ports, since they conduct virtually no activities except those carried by small crafts at present, the ports are run by GSO with a very few staffs. Privatization of port management is the fundamental strategy of Oman, and consideration is given in Chapter 10.11 considering the balance between privatization and the business difficulty, and direction of remedial measures.
- It is Oman's established port strategy that basic infrastructure is built by GSO with the view to developing port in the territory among the neighbouring competitive ports. While there might be slight modification of the strategy in future, GSO will continue its investment for basic port infrastructure.
- Structure and size of workers of the port managing organization is affected by a number of unpredictable factors, such as technology development of ship and port, business practice including outsourcing, labour legislation, practices and the market, accounting rules of the company, education system and education level, global security issues and so on. Several issues are now under rapid change. With change of these environments, it is too optimistic to come up to concrete proposals in terms of structure and employees of more than 20 years ahead.

With above points in mind, ideas in terms of financing and management of alternatives are studied below (Short-term aspects for major ports are shown in 11.5):

9.5.1 Sultan Qaboos Port

Existing arrangement in terms of sharing expenditure of port investment is very clear, that is; while immobile assets are born by GSO, mobile assets including gantry cranes are by PSC. This arrangement may be modified, and some immobile is likely to be built by PSC without lengthy public decision process (see 10.3). Even with the change of investment sharing, GSO invests the breakwater whichever alternative may be.

After the completion of the project, PSC will manage and operate under the concession agreement

assumed to be contracted in 2007. Items of services of Sultan Qaboos Port are likely to stay unchanged to 2025, and organizational structure might be same as it is. However, if the aforementioned environmental change occurs, the departments, sections etc. will inevitably be altered. At present, change of outsourcing, security requirements and IT utilization are the most probable, however, it is impossible to describe changes and degrees.

PSC has restructured the workers deployment and now the number is down to some 660 in 2004. This number may not be sufficient for carrying out the services under the existing equipment. This issue is studied in Chapter 10.8.5.

For the 2025, the forecasted container and non-container cargo is estimated to become 3.4 times and 1.4 times larger than those 2002, and 6 gantry cranes, 12 RTGs, and 24 yard chassis will be added. It is not possible to presume such factors as security requirement and outsourcing (Moore Stephens/Hyder Report 2001 recommended outsourcing but yet implemented) for a long time future. According to a rough calculation considering the offset of present staff shortage as a result of recent restructuring and technological progress in terms of handling equipment and information technology, workers' requirement may be a little more than double at target year. This figure also includes engineering, marine services, and administration and marketing.

Difference between two alternatives (shape of breakwater) will not affect operation of cargo handling, transport within the port area and marine services as well as the structure and workers' requirement.

9.5.2 Salalah Port

Existing Concession Agreement is effective by the end of October 2028. According to the arrangement of sharing investment between GSO and SPS under the concession agreement, basic infrastructures shown in two alternative plans will be provided by GSO. It is very few possibilities that new port facilities built after 5 and 6 berth completion are operated by a body other than SPS (see 10.11). This situation is same by both alternatives.

For cargo handling and other operational aspect, the Alternative B, namely conversion of bulk berths to a container berth is more contributing a smooth cargo flow without splitting the location of container facilities, but it will not affect the structure and manning of SPS.

SPS's secure management may not require restructuring of the organization, if not drastic environmental change occurs. However, the headquarters, which is now located in Muscat will have to move to Salalah following growth of related and ancillary industries in Salalah. In that case, a small liaison office will be placed in Muscat.

Number of employees is rapidly growing due to the increasing cargo and containers and new assets. It reaches to 1,300 in 2004, 1.5 times more than end of 2001. Traffic demands in the target year are estimated around 3 times more than present. Some 21 gantry cranes, 42 RTGs, 3 mobile cranes are planned to be added. With the increase of traffic and operating facilities, employees' requirement is roughly estimated to be nearly doubled, if the business practices and the environment do not change.

SPS examines a plan to establish its training school, but it is not certain at this moment. Difference of two alternatives will not affect the organizational structure and employment.

9.5.3 Sohar Port

SIPC, the concessionaire runs the port in a landlord type management. Besides overseeing the activities of cargo and marine service companies and tenants, it is responsible for maintaining the port in good order with such works as establishing and enforcing rules and regulations in terms of business, maintenance, health, safety, environment etc., providing essential logistic services and single window clearance facility.

Because of its starting up stage, the number of staff is some 20-30. In future, it is certain that the landlord type operation will continue through concession period, and a large increase of staffs is not required. Under this type of operation, cargo handling operations are conducted by the contracted stevedoring company, which is secured its status of continuous business carrying, or in case of cargos to/from factories located the industrial are handled by shippers/consignees. Marine services are also carried out by the contractor. SIPC will hire mainly management staffs. One of the uncertain factors is outsourcing of security staffs. However, even with the task being carried out by its own staffs, the number may not exceed 100 persons in the target year, and the structure is simple reflecting the business.

Since the difference of two alternatives is only the location of the container and bulk terminal, arrangement in terms of investment, management and operation is same.

9.5.4 Khasab port

While the construction work has just completed in 2004 and the 2nd phase is under way by GSO, customers are speed boats plying between Iranian ports and a few dhows, besides crafts of ROP and MHEW. GSO made clear its policy to ask for private participation, but is not clear what type of privatization is envisaged. It depends upon the result of negotiation with private sector candidate.
The result will also determine the characteristics of customers, demarcation of work among GSO, concessionaire and sub-contractors, as well as tenants behind the port.

At this moment, two things are probable, that is;

a) Because the region is remote and sparsely habited, lucrative management is not possible. GSO may bear a part of management cost for the future (even after privatization).

b) Since the port has been built together with industrial area, landlord type experienced by Sohar Port Concession might be applied.

At present, 12 staffs of DGPMA is working for administration and harbour master, and as studied in 10.11, GSO would have to operate the port for a while, however, too many uncertain factors make organizational prospect impossible.

9.5.5 Duqm Port

GSO has to provide all facilities except those used for commercial activities on land such as ship repairing facilities and petroleum storage. The main operation has to be carried out by GSO until such time appropriate concessionaire(s) is found. While there are some firms showing interest, due to uncertain prospect of the profitability, and lack of facilities and utilities (residence, airport, lifeline etc.) of the region, it will take certain time to privatize the port.

Since Duqm port is a complex of various functions, to wit commercial port, fishery base, ship repairs etc., it is difficult to assume that which functions are undertaken by each firms and how many firms participate the operation under concession agreement with GSO. Partly these arrangements depends upon the business environment of the time, however, GSO should give a detailed study on these issues before entering into the negotiation with interested firms, otherwise it might run a risk to award a piecemeal concession in disorderly manner. Considering very preliminarily, a single Sohar type landlord management may be suitable, in view of achieving clear and simple management (the Report of Posford Haskoning also recommends a landlord type port authority).On the other hands, single management of the complex has a risk to cause a lack of flexibility of each sector business. Anyway, it may take time to decide its shape of management.

Additional project in terms of oil refinery and storage facility in Alternative B may be built by PDO and/or an oil industry under the concession agreement, which is the most likely arrangement following the experience of Mina Al Fahl. One issue is that whether GSO should provide the site for oil industry to attract possible concessionaire. If so, financial burden in the initial stage increases in the Alternative B, however, the cost will be recovered in a long run. For the management of the additional facilities in Alternative B, because the site leases out to the concessionaire(s), neither GSO nor the port authority bears additional burden.

9.5.6 Shinas Port

Shinas Port is now operated by the GSO, with 5 staffs from MOTC and 3 staffs MOAF. The port was built as a fishery port, and still it is used as a fishery base and MOAF staffs are working for guiding fishermen. This feature of the port will continue for the future as a part of port activity.
At present, virtually no commercial vessels or craft calls the port, and even in future revenue from port operation is not expected enough for attracting private sector managing the port. GSO bears the cost of both building facilities and major part of operation.

Alternative B is a bit less costly, however, financial burden in terms of initial investment and management after completion largely depends upon customers' willingness to use the port. In this respect, Alternative B may be superior.

Presumably the port will be run by GSO for a while, organization should be simple with a view to saving management cost. Cargo handling will be arranged mainly by ship-owners, and in a few cases by shippers or consignees.

Table 9.5-1 shows the summary of financial and construction arrangements, as studied in previous subsections.

Table 9.5-1 Port Financing

Port	Financing		Construction	
	Infrastructure*	Superstructure*	Infrastructure	Superstructure
Sultan Qaboos	GSO Expenditure (loan by Financial Institutions)**	PCS loan by Private Banks/ Equity/ Own Funds	GSO	PCS
Salalah	GSO Expenditure (loan by Financial Institutions)	SPS loan by Private Banks/ Equity/Own Fund	GSO	SPS
Sohar	GSO GSO Expenditure	Tenants Private Banks etc.	GSO	Tenants
Khasab	GSO	GSO	GSO	GSO
(After privatization)	GSO	Concessionaire/ Tenants Private Banks etc.	GSO	Concessionaires /Tenants
Shinas	GSO	GSO	GSO	GSO
AdDuqm	GSO	GSO	GSO	GSO
(After privatization)	GSO	Concessionaire/ Tenants	GSO	Concessionaire /Tenants

* Infrastructure means break waters, basins, quays, piers and other basic facilities.
Superstructure means cranes, RTGs, sheds, shop and stores and other equipment (see 10.11).

** ( ) shows the alternative.

Source: JICA Study Team

9.6 Screening and Selection of Long-term Development Plan of the Study Ports

Pre-screened alternatives for each Study Port have been evaluated from various aspects such as environmental and social considerations, construction costs, and management and operation as shown in the previous three sections, that is from 9.3 through 9.5. In this section, best alternative as a long-term infrastructure development plan for each Study Port is to be screened and selected synthetically from a variety of aspects, which include other aspects such as economic & engineering viability, flexibility for future expansion, and effects to regional development in addition to three aspects explained earlier.

For Sultan Qaboos Port, Alternative B should reduce construction cost by O.R. 3 million in comparison with Alternative A. Regarding the environment and social aspects, Alternative A will have further potential impacts due to the connection of breakwater to the land such as deterioration of water and sediment quality. There exist no significant differences between the alternatives in evaluating from other aspects. Overall, Alternative B is selected as the long-term plan.

For Salalah Port, it is estimated that construction cost of Alternative B is lower by O.R. 4 million than that of Alternative A. In port operation and management perspective, Alternative B will contribute a smooth container cargo movement without splitting the container terminal. In Alternative A, a new container terminal is located far away from the existing one, and difficulty can be envisaged to achieve efficiency of container terminal operation. There exist no significant differences between the alternatives in evaluating from other aspects. Overall, Alternative B is selected as the long-term plan.

For Sohar Port, sole difference between the two alternatives exists in flexibility for future expansion. As explained earlier, Sohar Port is likely to require further expansion space to sustain economic growth under physical restriction at both northern and southern sides. Possibly prospective cargos are containers generated from expanded inland industrial areas. One option for the expansion space to accommodate increasing containers is to develop a new terminal near the northern breakwater by reclamation. In such a case, Alternative B is superior to Alternative A from the view point of smooth cargo flow and efficient port operation. There exist no significant differences between the alternatives in evaluating from other aspects. Overall, Alternative B is selected as the long-term plan.

For Khasab Port, expansion marine works of the first stage were completed in around September 2004, and construction of buildings has been progressing at the western part of the Khasab Bay. After completion these on-going projects, Khasab Port seems to have sufficient capacity, and unpredicted port traffic could be accommodated by constructing new quay walls at the northern part of the reclaimed area. JICA Study Team suggests careful monitoring on the trend of the port activities, and development plan shown in Figure 9.2-10 is advised as the long-term plan.

For Duqm Port, Alternative B having oil refinery and storage facility in addition to port and dry dock complex in the long run would be more socio-economically viable than Alternative A having port and dry dock complex only in the long run. The former could give favorable economic impacts to the region with larger extent than Alternative B while construction cost is naturally higher in Alternative B

than in Alternative A. There exist no significant differences between the alternatives in evaluating from other aspects. Based on the overall considerations, Alternative B is proposed as the long-term development plan for Duqm Port.

For Shinas Port, Alternative A has advantage in terms of construction cost by O.R. 0.5 million to Alternative B, and lesser degree of adverse environmental effects are assessed accordingly. However, facility layout does not meet the requirements for commercial vessels' maneuvering at the port entrance such as stopping distance. Alternative B is sound in engineering perspective and consequently will give more favorable economic benefits to the region than Alternative A. Overall considerations above give Alternative B superiority to Alternative A, and the former is selected as the long-term development plan.

Table 9.6-1 below summarizes the total required amount of investment for the selected long-term infrastructure development plans for the six major commercial ports. A total of O.R. 380 million is required as capital cost for the public sector, and O.R. 226 million for the private sector. Annual maintenance costs by port by sector for the period in use are estimated as shown in the table.

Table 9.6-1 Summary of Required Investment by Sector

(Unit: R.O.million)

	Public Sector		Private Sector	
	Capital Cost	Annual Maintenance Cost	Capital Cost	Annual Maintenance Cost
Sultan Qaboos Port	88.00	0.10	49.00	1.20
Salalah Port	122.00	0.20	121.00	3.00
Sohar Port	60.00	0.30	34.00	0.80
Khasab Port	4.00	0.01	0.00	0.00
Duqm Port	102.00	0.34	22.00	0.37
Shinas Port	4.00	0.01	0.00	0.00

Source: JICA Study Team

CHAPTER 10

LONG-TERM REFORM PLAN FOR PORT ADMINISTRATION & MANAGEMENT

10 LONG-TERM REFORM PLAN FOR PORT ADMINISTRATION & MANAGEMENT

10.1 Current System on Port Administration

10.1.1 Port Administrators

Presently, ports of Oman are managed by either GSO directly or by privatized port authorities.

(1) MOTC

MOTC is responsible for national port development policy and coordination of administration and management of ports. MOTC needs to establish a long term policy and strategy for effective investment, administration and management, and financial management as well as human resource development of the port sector.

Activities at Ports of Shinas and Khasab are now managed by MOTC directly. MOTC has resident officers at the ports and collects port dues. Cargo handling is arranged by vessel themselves or by cargo owners.

(2) Port Authorities

Up to the middle of 1970s, the Sultanate had only two major commercial ports – Mina Qaboos and Mina Raysut. The former was managed by Mina Qaboos Authority and operated by the completely government owned Oman Port Service Company, while the latter was managed and operated directly by MOTC. Mina Raysut was serving mainly for the local demand including traditional dhow trade, local cargoes and industries located in Dhofar Governorate to sustain the economy of the Governorate, while Mina Qaboos has been serving as a gateway of the nation as a whole.

Mina Qaboos was transformed to form a public joint stock company- PSC (Port Service Corporation SAOG) according to the privatization policy of the GSO in 1977.

At Salalah, a container transshipment hub port was constructed, adjacent to Mina Raysut, under the agreement between Sealand and GSO in 1998. Mina Raysut was managed by MOTC until 1999 then handed over to SPS.

Currently, PSC manages and operates Sultan Qaboos Port and SPS manages and operates Salalah Port. Both ports carry out all the port management and operation activities by their own staff except for catering of meals and cleaning of office buildings by sub-contractors. Therefore both ports can be classified as service ports. However, SPS has a management contract with Sealand (later altered as its owner company AP Moller) and the top management staff including CEO are on lend from AP Moller. In a way it can be interpreted that SPS is a kind of landlord and management is contracted out to AP Moller.

Sohar Industrial Port Corporation (SIPC) was established to manage the port including the industrial estate within the Sohar port area. SIPC frequently gets advice from Rotterdam Port Authority which

is a 50% shareholder in SIPC. Cargo handling operation will be carried out by each tenant. The general cargo terminal is leased to a Dutch stevedoring company “Steinweg”. Steinweg handles not only cargo at the general cargo terminal but also has an option to claim first refusal or to take part with 51% share to newcomers. This option excludes handling in liquid bulk terminals. As for marine service, a German company “Suitzer Weimuller”, this is an affiliate of a Maersk line, works for the customers.

Terms and conditions of concession of the ports are different from port to port and there is no clear standard or form to make concession agreements. Table 10.1-1 shows present managing organizations and respective functions.

Table 10.1-1 Role of Management

Function	Qaboos	Salalah	Sohar	Khasab	Shinas	Ad Duqm
Construction of Infrastructure	GSO	GSO	GSO	GSO	GSO	n.a
Construction of Superstructure	GSO/ PSC	SPS	User	GSO	GSO	n.a
Management	PSC	SPS	SIPC	GSO	GSO	n.a
Maintenance	PSC	SPS	SIPC	GSO	GSO	n.a
Repair	PSC	SPS	SIPC	GSO	GSO	n.a
Ship Handling	PSC	SPS	User/Sub contractor	GSO	GSO	n.a
Cargo Handling	PSC	SPS	User/sub contractor	GSO	GSO	n.a
Passenger	PSC	SPS	n.a	GSO	GSO	n.a
Marine Service	PSC	SPS	User/Sub contractor	GSO	GSO	n.a
Nautical Control	PSC	SPS	User/Sub contractor	GSO	GSO	n.a

Note: GSO is managing Khasab and Duqm on a temporary basis until a concessionaire takes over the functions.

Source: MOTC

10.1.2 Port Tariff System

Different port tariff systems are applied to the ports although that of Sultan Qaboos Port is fixed by MOTC, MOF and MOCI. Tariff at Salalah is not directly fixed by the government, but the level should not be less than that of SPS.

Even though the tariff at Salalah is set to above condition, SPS applies a discount tariff for transshipment containers variable to the annual volume per user. In effect the transshipment tariff received by SPS from its main user, Maersk Sealand, becomes considerably lower than the nominal tariff. This discount system is, however, widely practiced at similar transshipment ports such as Dubai and it will be difficult to abolish this system entirely without jeopardizing Salalah’s competitive position.

At Sohar port, the tariff for cargo handling was set by Steinweg and is relatively higher than that of at Sultan Qaboos. However, the port has not yet fully opened and the tariff level may change as traffic increases.

10.1.3 Revenue to the Government

Through port operation, the government receives a certain amount of revenue from the ports by means of direct fee and charges or indirect revenues according to the concession agreement, dividend of the Port Authorities and tax. In the case of SIPC, the Government receives 80% of the land lease fee as well as 100% of port charges from vessels for use of port facilities collected by SIPC. SIPC pays annual management fee and franchise fee to Rotterdam.

PSC pays to the government for its surplus after tax and also pays dividend. Due to this arrangement, the amount received by the government is higher than the retained profit in PSC.

SPS pays the government a fixed annual rental fee for the site, annual royalty fee which increases during the contract term and additional fee based upon its surplus after tax. However, the SPS pays a management fee to the "Manager" which varies according to the volume of containers handled at the terminal. In effect, the government receives less profit compared to the retained profit in SPS.

At Khasab port, MOTC receives only nominal charges from speed boats. Revenues are not sufficient to support salaries of MOTC personnel at the port.

10.2 Requirements for Port Administration, Management and Operation

10.2.1 Issues of Port Sector Activities

Reviewing the current situation of the port sector in the Sultanate, the Study Team identifies issues which require urgent attention as follows.

(1) Insufficient Port Capacity

1) Insufficient cargo handling capacities at the major commercial ports, i.e. Sultan Qaboos and Salalah.

2) Insufficient capacity can divert potential customers to outside of Omani ports, i.e. mainly to Dubai and other UAE ports.

(2) Slow Response to Urgent Matters

1) Current insufficient capacities at Omani ports stem from the slow decision-making process of the Port Authorities as well as the government.

2) Structure and function of port administration is partially responsible for the slow decision-making process.

3) Slow response by the Port Authorities is also related to the present control of public/private joint stock company by the government.

4) MOTC has failed to respond to port users' requirement by taking necessary measures in a timely manner.

Improvement of the ports' service efficiency is the central issue. Existing port administration system involving port authorities, MOTC, MOF, MONE and MOCI as well as Customs has to be reviewed in light of improvement in the business environment. Especially, the decision process for the development of basic infrastructures as well as superstructures and soft-ware needs to be streamlined for greater efficiency.

10.2.2 Lack of Long Term Comprehensive National Ports Development Plan

(1) Lack of Long-term Planning Policy in MOTC

Since development of port infrastructure still remain under the responsibility of the government, long-term and short-term development plans need to be established. For the existing major ports as PSC and SPS, budget request has to be delivered to MOF through MOTC and MONE.
Even though request for infrastructure investment is prepared by the Port Authority, interface between the Port Authorities and MOTC is not effectively functioning. This is partly because the timing of request from the ports is delayed and/or MOTC does not have initiative to formulate national port development plan.

(2) Implementation of Port Projects in the past Five Year Plans

In the past Five Year Plans, the port sector budget has been defined as one of the Civil Ministries' Investment Programs. The program includes basic infrastructure investment projects. Although GSO is responsible for providing infrastructure at ports, actual disbursement for the port development listed in the five year plans is seldom fully materialized and remaining parts are carried over to the next five year plan. On the other hand, some projects not initially listed in the Five Year Plan are carried out.

The Five Year Plans do not list investment programs financed by the private sector including port authorities which are basically managed by joint stock company under the concession agreement.

(3) Mobilization of Private Resources for the Port Development and Management

Since the funds available for port development are limited, measures have to be taken to introduce effective pricing system for the port development and management.

Although port infrastructures are provided by the government at present, the cost incurred for such investment should be reflected to the rates or conditions for the port operators or concessionaires not necessarily to be covered entirely during the determined concession period.

Nevertheless, their infrastructure pricing policies and regulatory system for oversight of operation and performance including data management may need review in light of a fair balance of benefit sharing among public and private sectors. In this connection, creating a "level playing field" for all the ports as well as considering degrees of development stages is necessary.

10.2.3 Necessity of Port Planning Coordination System

(1) Allocation of Functions among Ports

Allocation of functions and traffic among the major ports will be achieved through authorized comprehensive national ports development plan when it is reasonably and logically formulated reflecting correctly constraints and potentials of the ports.

Coordination at the early stage of project planning is not clearly established at present. Many cases are discussed among ministries other than MOTC or by ad hoc discussion between MOTC and other ministries and agencies. The steering committee for the project is often held at the time of commencement of construction work.

(2) Need for Close Coordination between Infrastructure and Superstructure Development

Major development projects of the port sector must have close coordination among infrastructure and superstructure investments. While port infrastructures are invested by GSO, most of the investment program for the superstructures by the port authorities can be decided by the Board of Directors without further consent of the MOTC or MOF. However, when a port requires urgent development to meet the demand, the government is not quick to respond or does not immediately understand the situation.

- Taking Salalah port expansion project as an example, additional two berths were listed in the sixth five year plan and expected to be completed by the end of 2005. But it took more than three years to approve implementation; the tendering process finally began in late 2004. Salalah is suffering from a shortage of berths and has lost several customers.

Even for superstructure investment, there remains indirect control by the government through the Board which has government officials in the key positions.

- Executive branch of Sultan Qaboos port planned to expand and renew its cargo handling equipment and to introduce IT system into port operation. These projects were delayed due to indecision of top management.

The MOTC has failed to convince MOF, MONE and other related government agencies of the importance of port development well before the capacity comes to saturation. While project implementation takes several years, traffic increase to the limit before projects gets approval.

10.3 Reform Plans for Effective Project Implementation System

Present project implementation system of port projects requires reform in respect of entire port efficiency.

10.3.1 Present Project Implementation Procedure

(1) Planning

1) Formulation of conceptual plan

For infrastructure development, many government agencies and other parties play their role at each stage from conceptual plan formation to implementation of the plan to the operation.

In Oman, a port development project is not always proposed at the initiative of the MOTC. Many project proposals come from other ministries or results of political, social and economic evaluation at high levels. To formulate a conceptual plan, the Minister of the MOTC consults with the relevant Governor, then the Governor talks with relevant Sheiks and Walis to obtain provisional consent. These procedures are a form of hearing stakeholders' opinion.

2) Planning and budgeting phase

At this phase, various government agencies are involved according to the nature of works and the agencies' functions. For example,

➢ Supporting infrastructures	Road by MOTC Road Sector Electricity by the Ministry of Energy Telecommunication by OMANTEL Water by MRMEWR
➢ Estate for industries	MOCI
➢ Housing/Clearance	Supreme Committee of Town Planning, Ministry of Housing
➢ Environmental/Security Issue	MRMEWR, ROP

MOTC, which is the major player in port development, prepares projects based on consultants' study. Projects are proposed by the port authority based on the feasibility studies of the consultants.

The project shall be examined by MONE, and in case of a new site, Supreme Committee of Town Planning. After consultation between these inter-agencies, the plan is sent to MOF for evaluation.

After the evaluation, MONE and MOF determine inclusion of the project in the coming Five Years Plan and later in the national budget.

(2) Implementation

It is the practice of Oman that an inter-agency committee is created to discuss each infrastructure project. The member of the committee consists of officials from relevant government agencies. The

machinery functions as a forum for coordination of each ministerial interest.

Except for large scale projects like Sohar, a steering committee for coordination with the regional interest will be held after MOF appropriates the budget for the project. After budget appropriation, MOTC puts them into tenders according to the rules of tenders. After the contractors are selected, the Governor concerned creates the steering committee for coordinating interests of sheiks, local business circles and residents. Although MOTC officials are not in a position to hold a meeting directly with the stakeholders, requests and complaints will be heard through the Governor. MOTC will consider these requests and complaints while implementing the projects.

10.3.2 Issues

Customers have been inconvenienced or missed an opportunity to earn profit due to project delays. The reasons of delays are varied, such as cumbersome decision-making process within the corporation and/or prolonged inter-ministerial adjustment of the interests.

Common issue at the planning stage is the lack of a coordination mechanism among concerned government agencies and other parties at the appropriate timing.

Discrepancy between port projects and industrial estate projects has been observed. For example, Sohar has 2000 ha industrial area. For the potential industrial output, the planned quay length is insufficient, and water area enclosed by two break waters restricts the room for further expansion of quays. At the planning phase, MOTC and MOCI should have cooperated to a greater extent. There are some coordination machineries in the administration, and also a specific ministerial committee has been created, however, the coordination activities of staff level seem not to be sufficient.

Another example is Sur Industrial Estate located near the LNG plant. The Estate is already developed and ready to receive tenants. Strangely, the Estate has no gate to the sea even though the estate is located at the seaside and will produce export oriented products. MOTC was not informed at the planning phase.

10.3.3 Necessary Reform Plans for Effective Project Implementation Procedure

In improving the port development process, it is important to bear in mind Oman's basic policy practices.

- Basic infrastructures to be constructed by GSO,
- Policy to encourage privatization,
- Special inter-ministerial committee is established for each project,
- MOF and MONE are responsible Ministries for Five Year Plan and annual budget proposal,
- Project plans are initiated with line ministries and the line ministry of port projects is MOTC.

Since the government of Oman has adopted and developed the policy practices for the past 30 years as a best-mix of strategy, it is reasonable to consider that the above paradigm will continue to work for

the foreseeable future.

Having said that, and as pointed out in the previous section, issues related to the slow decision-making process need to be urgently resolved. Belated action within the government may be mainly due to lengthy adjustment process among relevant ministries. For each project, special inter-ministerial committee is created for adjustment of interests. Machinery for the purpose is perfectly provided, nevertheless, it may not be functioning well. As GSO invests a large amount of money in port projects, it is easy to understand why relevant ministries are careful about the implementation. However, at least for projects already included in the Five Years Plan, decisions should be expedited.

Considering the coordination activities takes time, coordination works including creation of the machineries should be commenced before the project's implementation.

10.4 Reform Plans for Effective Participation in Development Management, and Operation of the Port

10.4.1 Players in the Port Management

The main players involved in port administration, management and operation are;-

- Government
- Port Authority
- Private operator
- Private developer

(1) Government

In the Sultanate of Oman, the Government in the national level, MOTC has the jurisdiction to directly or indirectly manage common-user ports. Besides MOTC, Ministry of Finance and Customs are closely related with financial and foreign trade matters. Ministry of Agriculture and Fishery is responsible for quarantine of foods and animals, and for security aspects ROP has an important role.

Newly built ports as Khasab and Shinas are presently managed by MOTC directly.

No local government is directly involved in port management at present in Oman.

(2) Port Authority – Service Port

In the Sultanate, three major ports have a port authority system under a private sector participation scheme. Port Authorities of Salalah (SPS) and Sultan Qaboos (PSC) are responsible for port management and operation. They have their own staff for not only cargo handling but also for marine aspects including towage, pilot and navigation control in the port. Therefore, they can be categorized as service port.

Difference exists, however, between PSC and SPS in terms of management structure. The Board

members of PSC consists of three government representatives and four other members from the Omani private sectors (mostly from financial circles). In both ports, the executive director (President) has status of the Secretary to the Board of Directors but he has no member status in the Board of Directors.

The Board members of SPS consists of two government representatives, two from Omani private sector and two from Maersk Sealand group which has a management contract in the concession contract. The CEO is nominated from the private management group.

This difference in the board structure seems to have significant influence in the decision making process.

(3) Port Authority – Landlord Port

Sohar port authority is established as a landlord type port and manages infrastructures and land assets within the port area. Most of the land in the port area is going to be let to industries. Cargo handling activities are carried out directly by the tenant or by the private stevedore. Marine aspects are also contracted out to a private contractor.

The board member of SIPC consists of 7 directors (4 from the Government and 3 from Rotterdam Port Authority) of which the Minister of MOTC as the Chairman, one representatives from the MOTC, one representative from MOF, one representative from PEIE (Public Estate & Industry Establishment) and three (3) from Rotterdam which include one CEO, one civil engineering and one marketing director. Duration of the contract is 25 years with optional extension for additional 15 years.

According to the Sixth Five year Plan, the management of newly built Khasab port will soon be privatized. The form of management is not yet determined. However, the type of management may be similar to the system in Sohar which is a landlord model.

(4) Private Operator

Under the landlord type authority, port operation will be carried out by private operator(s). The multipurpose berth at Sohar is operated by a private stevedore.

Proposed port at Duqm is expected to be managed by a private sector. The core port managing body may be the ship yard operator alone or other port users jointly. In any case, the GSO intends to construct infrastructures including breakwaters, reclamation of port area and dredging of harbor basin.

10.4.2 Selection of Types of Port Management

In the competitive environment of the Middle East where all port infrastructures are developed by the government, the Sultanate of Oman has little choice but to provide port infrastructures. Therefore, types of port management may be limited within the categories of existing types with some variations.

(1) Service Port by Public-Private Joint Stock Company (PSC type)

At Sultan Qaboos Port, PSC was established as a public-private joint stock company (SAOG). One of

the advantages of the public-private joint stock company is that its procurement procedure within the port can be decided without going through Government Tender Board, which obviously delays the process. However, PSC has excessive internal audit practices built in the Board applicable for both before and after the important disbursement. PSC undergoes frequent audit from the State Financial Audit of the government as well as regular examinations of the Auditing Committee of Directors and an outside auditing firm. Consequently, the results of these practices have lost some advantages of privatization.

(2) Service Port by Public-Private Joint Stock Company (SPS type)

At Salalah, the original intention of Sealand was to create a purely private terminal. However, after negotiations with the government, SPS was created as a public-private joint stock company similar to PSC. In order to retain common users' interests, the concession agreement stipulates that SPS should operate the port without discrimination to all the users. However, since SPS is managed by Maersk-Sealand, and it has incentive tariff structure in which a shipping line gets more discount if the greater the number of containers is handled. In fact the berths are almost all reserved for Maersk-Sealand group and little room is left for outsiders.

(3) Landlord Port (SIPC type)

At Sohar, SIPC was established to manage the industry port under a landlord type authority.

The port operation is contracted out to a private terminal operator and tenants of the industry lots. Similar to the other precedents, the port is under the private and government joint stock system. The government has its own share and presence in the Board. The government receives lease on the land, quay walls, oil and liquid bulk berths as well as port dues (wharfage). The management is let to the Port of Rotterdam and the government pays management fee and franchise fee to Rotterdam under the contract. Annual land lease fee is set to the comparable land lease rate at the vicinity of the land, and it reflects neither the value of the waterfront site nor the cost of infrastructures to the fee. Therefore, the government is not expected to recover its investment directly from this system but indirectly through activities of the tenants.

(4) Landlord Port (general type)

In port administration systems throughout the world, there has been a general shift to landlord type. Although SIPC can be classified as a landlord type, other types of landlord port may be considered.
A port under BOT system in other countries often forms a landlord type authority. The port authority provides a site for a terminal operator as a tenant and the operator builds and manages the terminal and the port receives fees according to the concession agreement. This system results in a wide variety of advantages and disadvantages to the government.

The shift in the role of the public sector from port services provider to landlord and regulator will require that the public sector to develop new skills, institutional capabilities and practices. These include regulating unfair or anti-competitive practices; designing and negotiating contracts with

private providers of port services; monitoring performance and enforcing compliance with general standards; and creating processes for wider participation in developing and implementation of transport policies and programs.

(5) Government Direct Management

The ports of Khasab and Shinas are operated under direct government management. Since small scale local ports are not usually commercially viable, unless the port has steady activities (not necessarily a large volume of traffic), it is difficult to support regular workers under a commercial system.

GSO, however, is contemplating the privatization of these ports. At Khasab port, fees collected from ships and speed boats are far from sufficient to support the limited number of staff at MOTC branch office. Therefore, even after those ports are privatized, certain financial support by the government will be necessary until the port can become more self sufficient.

10.5 Reform Plans for Public-Private Partnership in Investment of Ports

10.5.1 Public-Private Partnership

(1) Form of Joint Corporation

The Privatization Law 2004 provides that the privatized project should take a form of joint stock company (SAOG), but after approval of the Cabinet's Ministers it may take the form of SAOC or LLC. According to the Law, it is possible that foreign capital reaches 100% of the company's capital. However, in many cases, GSO retains a considerable percentage of stocks.

Present three major ports, PSC, SPS and SIPC all fall under this category. With the above mentioned government policy, this framework is not expected to change in the near future.

(2) Financial Contribution for Port Investment by the Port Authorities

Under concession contracts, present port authorities contribute certain amount of shares from their profit after tax to the government in addition to the dividend paid to the government as the share holder.

However, the amount generated by this system is not sufficient to reimburse the government for its investment in infrastructures.

As the ports expand their activities, financial positions of port authorities will be improved and gradually they should be able to accumulate reserve for future investments. The government may be able to ask for some direct contribution to the construction costs for infrastructures in the future.

In this regard, concession contract of PSC expires in 2006 and the GSO will have the opportunity to request that port bear some of the infrastructure cost. At SPS, however, the GSO is obliged to provide infrastructures at least to cover the berth No. 5 and 6 in the Sixth five year plan. After that investment cost for the infrastructure may be subject to negotiation between the port and the government.

At SIPC, GSO is obliged to provide infrastructures until 2007. After that, the cost for the infrastructures may be subject to negotiation between the port and the government.

However, under the competitive environment in the Middle East ports, infrastructure provision by the government can not be entirely eliminated.

10.5.2 Private Developer – BOT/BOO

So called BOT or BOO type private sector participation is increasing in other countries in the world. Under this system, a part or major part of infrastructures is constructed by the private sector. However, up till today, there has been no such case applied to a commercial port in Sultanate of Oman.

Introduction of BOT or BOO scheme may be attractive because the public sector can avoid capital investment for infrastructures. However, this system can only be applied where potential for commercial port business is relatively high and where it will be possible to attract a multiple numbers of applicants to carry out operations. At the same time, existence of alternative public facilities for general public use is another pre-requisite to this system. The government can impose a condition to the concessionaire to operate the port without discrimination to the common users.

Ports in Sultanate of Oman may not belong to this category because of its limited population/market size and existence of strong competitors in neighboring ports where almost all the infrastructures are provided by the public sector.

Therefore, in order to induce private operator involvement in Omani ports, government capital investment for the infrastructures seems to be inevitable in most cases.

10.6 Reform Plans for Oversight of Management and Operation of Ports

10.6.1 Present Practice of Oman

Oman is pursuing privatization policy in a wide range of industries including port/terminal operation. Under the Privatization Law 2004, only joint stock company is qualified as concessionaire.

At least three Ministries take part in the awarding procedure, namely Line Ministry (Ministry with jurisdiction of the infrastructure, sometimes one more than Ministries), Ministry of Finance and Ministry of Legal Affairs. Normally relevant Ministers establish a committee to examine the agreement.

Performance of concessionaire is monitored and regulated in three facets; Internal auditing, Commercial Law and Capital Market Authority, and the administration (Line Ministry, MOF and the State Financial Audit).

Internal auditing is carried out in two tiers, internal auditors (or the auditing department) and an auditing committee under the umbrella of the Board of Directors. The Auditing Committee consists of a few directors, and the terms of reference are as per the guidelines set out by CMA and include

overseeing financial reporting process and reviewing regularly the internal controlling environment of the company. The Committee's activities are governed by Commercial Companies Law and CMA's rules. They shall interact with senior management, internal auditors and Board of Directors on their findings. Ordinarily, Chief of the internal auditor is also act as the secretary to the Auditing Committee.

The requirement of the Law and rules are in the line with international standards, and as such to strictly regulate companies' activities in terms of accountability including risk factors and the mitigants, compliance of laws and rules, corporate governance. Financial statements are required to be disclosed based on international standards. Companies are required to hire a reliable auditor to be inspected records of finance and corporate governance. These requirements could motivate the companies to maintain a high level of discipline in their financial affairs. The treatment under the Commercial Companies Law is unchanged whether a part of the stocks is owned by the government or not.

While the concession agreements vary port by port, provisions are made for the administration's oversight covering a wide range of activities of port authority. The examples are plan of investment, tariff fixing, business plan, financial situations and appointment of top management.

Administration's tools are receiving reports and approval. The objectives of the administration's economical oversight are:

- To curb port authority's excessive profit maximization to the extent consumers feel strong dissatisfaction,
- To promote competition among and within ports, and prevent port authority's unfair conduct in terms of licensing, pricing, providing services etc.
- To encourage appropriate investment for keeping and upgrading quality of services to pursue customers' convenience, and
- To verify that the designated concession fee are calculated correctly.

Another important agenda for GSO is the management of facilities. Since GSO provides basic infrastructures, buildings, quayside gantry cranes (at 1st phase PSC) and retains ownership. These assets are operated and maintained by terminal operators, but GSO has a responsibility to keep them in good condition as the circumstances permit. These tasks are primarily conducted by the Line Ministry. MOTC has responsibility to carry out a yearly inspection and makes ledgers of these assets, and reports to MONE and MOF as national property. For the purpose, it is recommended that DGPMA makes and periodically renews the ledger of GSO assets.

Concession agreements often include performance parameters to measure the success of the operator in managing the port or terminal. The Government may want to highlight performance indicators and incorporate certain factors into the agreement. These parameters can relate to: 1) Realization of an agreed (minimum) number of ships calls; 2) An agreed (minimum) quantity of cargo passing through the terminal; 3) Efficient utilization of the terminal; and Service quality. However, if the parameters

are too much detailed, they require extensive control and limit an operator's flexibility.

To establish measures for oversight by administration, the objective of port privatization needs to be observed. One of the main objectives for the privatized port is to survive and to grow up among the competitive market, thereby creating and expands employment and contributes to economy of the region and the nation. Intervention from administration may erode a company's competitiveness by forcing it to slow down its decision-making function. This point is discussed through next section.

As has been mentioned, the commercial law regime of Oman regulates the company's behavior in terms of financial accountability and compliance. Administrations' intervention should not duplicate any aspect covered by this regime including general commercial rule. Undue duplication is also a burden on a port authority.

Administrative oversight should be minimal, and focus on:

- To monitor rather than control,
- To advise or recommend rather than intervene or restrict.

In executing regulatory functions, the government needs to pay great care not to interfere in the day-to-day management of the port. For example, it is the government's task to monitor whether stated performance standards (e.g. minimum handling volume) are met. It is the operator's task to decide what technical measures or operating practices are needed to meet the standard.

10.6.2 Certain Issues on Oversight

(1) Price Fixing

Regulating prices at private ports is controversial. Due to their diverse activities, port operators can apply many kinds of fees, charges, rates and so on. It is unrealistic to regulate all port prices, however, there is a prevailing view that mooring fee and cargo handling charge should be approved by the Administration, because if an unreasonably high or low, a charge would have a harmful effect on both clients and general public. However, it is very rare for a port to be in such a strong monopolistic position that it can levy an inordinately high price. Since ordinary ports are facing competition not only from other ports but also from land transport, prices cannot be unduly high. Therefore, general regulation covering all kinds of port is neither realistic nor desirable, because such price control by the Administration may adversely affect free competition.

If a port serve as a distribution center for food and other life necessities, then excessive high port price will critically affect living of residents, the Administration may have a reason to intervene the prices. Even in this case, the Administration should first try to set a maximum price (a price cap scheme) so as not to control the routine business to a large extent.

For other cases, particularly of transshipment, price fixing should be under the discretion of the appropriate organs within the company, taking into account the cost, pricing history, market environment etc. Since customers are sensitive to price change, some form of consultation with

customers is inevitable. A public announcement is also required through the media and internet.

(2) Financial Audit

The Line Ministry and Finance Ministry may be necessary to oversee a port authority's financial condition, for the following reasons; 1) to make sure whether the port authority is able to continue its service, 2) to verify the rent and fee is collected as agreed, and 3) to support the Government executing shareholders right. As stated above, Oman has a commercial company law of international standards requiring adequate accountability and compliance of relevant rules and provisions. These steps are enough for serving for the above purpose, particularly for item 3), and undue duplication of regulation will harmfully affect the company's business.

These steps are more than enough for scrutinizing the authority's financial performance in terms of its ordinary activities. Nevertheless, the State Financial Audit dispatches officials to inspect the Port Authority's business in very detail. The inspection work takes several months. While the inspection is mandated under the State Finance Law, the way it is carried out adversely affects the privatized port authority's business. In the case where the State Finance Audit may find the need to inspect a port authority since fiscal money is invested, it should inspect the Line Ministry or Finance Ministry, which actually bear the expenditure. In this way, the Auditor can fulfill the responsibility without hindering day today business. (National Accounting Auditor of Japan works in this way).

10.6.3 Responsible Organization

(1) Approach

In this Section, the team tries to draw up the future shape and functions of the responsible organization in order to meet change of the infrastructure and service requirement of port sector. For the work, it should be born in mind that since any organizational structure has its own characteristics based on the history and culture and, any reform cannot entirely override what is at present. Even if a department or division will be removed and another department or division will be added, work flow will not be changed drastically since it tends to trail existing practices, which has been formed in long period and among the related structure. Also administration is affected by political, social, technological and economical development of the time, which is almost impossible to forecast, and it is neither workable nor useful to predict detailed organizational structure and functions for a long future, say more than 5 years time.

With these situations in mind, the work start with analyzing present condition of the organization and identifying the issues, then showing future direction of remedial measures to the extent to be foreseen in the light of technological and social development.

(2) Identification of the Issues on MOTC

MOTC has jurisdiction over all port aspects, not only of planning, development, management and preservation of commercial ports, but also regulation of industrial private port construction. In MOTC, DGPMA is conducting port matters supported by Directorates General of Administration of Finance,

Legal Department, Planning Department, Contract and Commitment Department and so on (see Chapter 2.1).

Following two points are significant to be examined:

1) DGPMA is divided in two sectors, namely Port sector and Maritime sector. These two sectors are different in nature both in terms of regulatory and technical aspects. Although the two have some common points such as prevention of pollution and security, and recent development in the international maritime legislation requires closer cooperation between two sectors, still they have more different points than common points.

2) Staff number of DGPMA is nearly 60. Professionals engaging port affairs are less than 20, but these seem to be a few qualified experts at Headquarters, since more than 10 staffs are working in local port offices. According to the Team's calculation there are only seven professional staffs engaging in technical matters of port at Headquarters except DG and ex-DG. Due to the short staff available, some Departments such as Development and Marketing Department are totally vacant, and may not cover all the functions vested to the Directorate. Therefore, the personnel have inevitably to work on an affair by affair basis or project by project basis. This working arrangement may be sensible to keep flexibility of work, since request for work may occur in different timing port by port.

Further to the above issues, followings are required for DGPMA to effectively carry out its function, particularly those relating to planning future development and overseeing the performance of the port authorities

1) To carry out routine activities properly, in particular collecting data in terms of port performances and compiling them into cross-sectional statistics, and inspecting regularly the actual condition of national port property in situ. At present, DGPMA collects data from each port by mail, but does not collate the data properly.

2) To study and draft basic issues in terms of port planning, implementation and management, and to communicate and coordinate with other organization within and outside MOTC. Capability of communication with other organization is important for persuading relevant agencies to realize its projects timely.

(3) Outline of Agenda

1) Organizational reform

Safety and environmental requirement to vessels, and anti-terrorism measure involving ports and vessels are governed by international legal instruments. Since Oman is under way to build its commercial fleet, implementation of international requirement as well as attending the international forum deliberating such requirement is vital for the future maritime state. In the environment, Oman should be represented in IMO, ILO and GCC meetings by a higher ranking officer of the Directorate-General.

It is envisaged that the task of DGPMA will increase both in port sector and maritime sector, and it will become unmanageable for one Director-General to oversee the work of two sectors of two different characteristics.

It may be recommended to split DGPMA into port sector and maritime sector, and create Directorate General of Port and Directorate General of Maritime Affairs.

In light of above observations, the structure of port sector in DGPMA should be strengthened fairly extensively. Rough estimation of required structure concerning port sector of GDPMA around five year period is shown in 11.5. At this stage, it is perceived that port sector administration is required to be strengthened by a wide range of expertise, which includes but not limited to: a legal expert, experts for information technology, a statistician and civil engineers.

Section 3 of this Chapter recommended creation of Port Planning Committee within MOTC. The Secretariat will be placed in MOTC, possibly in DGPMA. It will require additional professional staffs.

2) Civil service training

While DGPMA is required to be supplemented by certain numbers of staffs with expertise, it may be difficult to recruit qualified staff, nevertheless, effort should be made for required staff deployment.

The Ministry of Civil Service, together with the Institute of Public Administration (IPA) has various schemes for upgrading the quality of civil service, e.g. job classification, training programs for senior and the lower level civil servants, scholarships, introduction of early retirement rules and so on. With this means, GSO tries to recruit the high caliber of candidate for civil service positions, and enhance the capability of the civil service, pursuing the Omanization. In view of upgrading the quality of port administration, MOTC should positively participate in the civil service training programs.

MOTC is implementing several training plan with the cooperation of Civil Service Ministry, however, as for the port, no training plan has been drafted, except technical training abroad.[1] Number of personnel for port matters within MOTC is limited, and thus it is difficult to establish its own training course. Nevertheless, since future development of works for port matters, such as planning, evaluation of design, supervision and inspection at the site may require more experienced staffs, MOTC should consider the creation of a more advanced training scheme, including training abroad [see 10.8.5 (2)].

10.7 Reform Plans for Regulating Port Authorities

10.7.1 Possible alternative systems for regulating Port Authorities

(1) PPRC (Port Planning & Regulatory Council) in Each Port Authority

The first option is to strengthen control by the government by creating PPRC on top of the Board of Directors. Thus the government representative within the Board can liberally pursue companies'

[1] JICA carries out Port Technical Course training. Several Omani officials attended the training.

profit-making objectives and eliminate its contradictory situation as both investor and supervisor by granting supervisory function to the PPRC.

The presence of Government officials as Board members implies that the government intends to assert its position in the management policy of the port including protection of public interest and common users' rights. There are many similar public-private joint stock companies in other sectors and competition among such companies is not rare. As far as the presence of Government officials in the Board is interpreted as the protector for the public interests, there is no discrepancy in the system.

(2) PPRC at National Level

Creation of PPRC at each Port Authority may effectively relay investment requirement of the port to the GSO. On the other hand, port development policy or format, including determination of administration system and concession contract conditions as well as port planning standard, needs to be formulated from the viewpoint of nationwide development. Therefore, creation of PPRC at the national level becomes one of the options. At the same time, as multiple port authorities emerge in the country, establishment of PPRC in every port may become cumbersome. Consequently establishment of unified PPRC under the MOTC to control all the port corporations can be considered.

However, additional policy making system will only add more unnecessary steps to the entire decision making procedures.

In order to create PPRC at MOTC, an additional administration arm or secretariat may become necessary. If PPRC is to oversee all the important policy matters of the ports, work load will certainly exceed present organization structure of the DGPMA. Nevertheless, creation of additional bureaucracy hierarchy on the existing system will run counters to the general trend of rationalization of administration.

(3) PPC both at Local and National Level

Since existing administration structures already have sufficient regulatory steps, creation of PPC (PPRC minus Regulatory element) at the Port Authority level as well as at MOTC might be more practicable. With this system, the PPC will mainly concentrate on determining port development planning. Most of the regulatory functions may be delegated to the Port Authority level.

Only special important policy matters such as basic conception on concession agreement at the establishment of a new port administration body or at the extension or renewal of the contract may be discussed in the PPC.

With the local PPC, the Port Authority can involve local interests including the Governor, industries and other port users to reflect opinions in the planning and port activities.

Composition of the PPC members at the government level also should not be limited to government officials but involve representatives of port users from the industrial and commercial sectors.

Unlike PPRC, PPC will discuss mainly port planning and special important policy decision. Therefore PPC will be necessary to hold meeting once in a year or two and will not require full time attendance of the secretariat.

10.7.2 Legal Instrument

A Port Authority is established by a legal instrument, either as a public or private entity (including public-private joint stock company). The instrument provides the legal status for the Port Authority. It also indicates which public organization has the power to establish a Port Authority. This might be the national government, or a region, province, city or some combination. Generally a Port Authority exercises jurisdiction over a port territory.

In the case of privatized port authorities, as has been said in 10.6.1, the company is also governed by commercial rules of the country.

In addition, lawmakers or administrators tend to consider that practices and activities of port authorities may be regulated in a form of legal instrument. Some activities of other bodies conducted in the port territory may require statutory grounds. Main issues are identified below.

(1) Issues Identified as Subject of Instruments

Following issues are considered to be possible subject of legal instrument.

1) Level playing field

Port authorities must ensure a level playing field among many terminal operators and service providers and shops located in the domain. Powers and duties of a landlord port authority with respect to land management may require specific attention in a legal instrument. A landlord port authority may own the land or have a perpetual or time-specific right to use the land. Powers to act as a landlord may need to be specifically elaborated, and provisions may be required for restrictions of such powers, such as the interdiction of sale of the land.

2) Means to Government control

The government, be it national or local, intends to influence the privatized port authority directly or via its shareholder's rights (e.g., the nomination of the Chairman of the Board or CEO). In many countries, the government may want to retain the right to determine major agenda of the port authority. This requires the possession of the majority of the voting shares or of "golden shares." This measure is effective when the government wishes to influence the port authority's decision-making process or action in the early stage. In Oman, since a concessionaire is only awarded to joint stock company and GSO retains a certain share, several representative from related agencies participated in the Board of Directors [see 10.7.1 (1)].

3) Relationship between port authority and port service

One issue is the relation between a port authority and port services providers, in particular the cargo-handling companies operating in the port's territory. Some consider it is undesirable for a port

authority to be directly involved in cargo-handling services or terminal operations. This view is on the ground that a port authority=cargo handling service provider might treat other service providers unfairly. It may be the case for the giant port with many service providers in the domain.

In ports of Oman, even in case of major commercial ports like Sultan Qaboos and Salalah port, only one terminal operator is enough at the present stage. Moreover, concession agreement can take care of this issue by providing such clause as prohibiting unfair treatment, and commercial arbitration should be first tried to utilize to resolve the dispute rather than direct intervention by the administration.

The port authority may be authorized to issue licenses or set conditions under the lease or rent contract to operate terminals or to carry out marine and port services. It should be studied whether a uniform rule for the license or condition is necessary in a form of legal instrument. In the team's view, the uniform rule under the legal instrument is not necessary and practical, because among the limited number of ports in Oman, individual port authorities carry out services or extend contract to the third party according to the concession agreement or their own discretion. In this regard, much difference is observed among port authorities, particularly between PSC and SPS on the one side and SIPC on the other side. This situation cannot be covered by a single rule.

4) Settlement of claims and disputes

There may be many claims to the port authority from the various interests engaging in and with respect to the port activities. Conflicts between port authority, investors (including public sector), service providers, lessees and customers will inevitably occur. In most cases, an amicable settlement will be possible through discussions among interest parties, but arbitration procedure by a neutral body should be provided in case of need. Since a port authority has the power to regulate activities in the port, it is sensible that the disputes involving the port authority be subject to compulsory arbitration.

5) Maritime affairs in the port

The tasks within the port territory in terms of marine safety, protection of marine environment are listed as follows:

- to regulate and control navigation within the limits of the port and the approaches to the port;
- to disseminate nautical and other relevant information to ships and all other involved parties;
- to control maritime transport, loading and discharging of dangerous or hazardous substances;
- to exercise regulatory functions with respect to protection of the marine environment;
- to regulate to discharge of ship wastes and tank cleaning water into port waters;
- to take measures for the safety of persons who work at or visit the port;
- to combat or to provide for combating marine accidents in the port including fire fighting and ambulance services; and

- to take protective measures for the port area both of land and water from unlawful assault.

2004 SOLAS Convention gives a government as well as a port authority or a terminal operator a new responsibility for maritime and port security. Stringent ruling of US government in terms of the border protection, if not observed, may lend to a loss of competitiveness of the port, and lead to economic disadvantage to the nation. While the Conventions regulate individual ship owners and operators, the government primarily has overall responsibility for the enforcement in its territory including territorial waters.

One issue is the demarcation of above duty between the government and the port authority. Often a harbor master (referred as "port captain" or "port master" in some port) is a part of the port authority's organization. The harbor master executes the function shown in the above, pursuant to provisions included in the port by-law. As far as this responsibility can effectively and fairly be executed, a port authority can retain such function. Although most steps taken in the port are the responsibility of the port authority, as requirements of restrictive or preventive measure in terms of safety and environmental protection increase, some steps may be financially burdensome for the port authority. Construction of an oil residue reception facility, deployment of guards, and fencing and lighting of a wide area are examples. Government should retrieve responsibility under direct jurisdiction, and bear whole or part of the cost, since these are also for the general public interest. For the administration of a number of ports the demarcation might be better dealt in a uniform rule, however, in case of Oman, it will be determined on a case by case basis.

6) Jurisdiction on water and land

Since coastal and adjacent water area is a precious resource for human activities including fishing, tourism and environmental conservation, in the area many interests, activities and functions are crossing and overlapping. Rights and jurisdictions are crisscrossing on one place. For example, a port authority has a jurisdiction in terms of port and ship activities, nevertheless, it is subject to several statutory requirements (e.g. labor standard, workers' safety, fire protection requirement and so on).

Activities in the vicinity of port may affect port including safety of navigation, customs and immigration control, security of the area, land traffic and environmental protection.

In this respect, attention should be drawn following structures, which have been built in coastal and adjacent water area;

i. Ports of oil and gas facilities – These belong to joint venture companies with the Ministry of Oil and Gas under the jurisdiction of MOOG.

ii. Jetties for loading gravels and minerals – These jetties are used for berthing and handling of foreign trade vessels and cargo.

iii. Marinas – Two marinas have been built in the vicinity of Sultan Qaboos port. No jurisdiction has been established for the construction.

At present, DGPMA has the statutory power to approve or disapprove construction of piers or other port facilities. Other government agencies also conduct jurisdictions. It might cause confusion, and applicants might feel inconvenient, and some coordination among agencies might be required.

To certain extent, GSO has the schemes to regulate activities and to coordinate jurisdictions in the area, such as powers and responsibilities of the Supreme Committee for Town Planning and MRNEWR. The Supreme Committee has powers to give advice to land facilities, but no powers to advice building in water area. It is making a national master plan of land use zoning. It will include coastal area, but not cover water area. For water area, only Coastal Zone Management Plan (CZMP) of MRNEWR covers from the viewpoint of conservation of environment. However, activities conducted in the coastal and adjacent water area should be examined more wide perspective than environmental issue. With this in mind, a machinery of inter-ministerial level may be useful for coordination in terms of utilization of coastal and adjacent water area.

Since MOTC, especially DGPMA has many responsibilities in terms of ports and maritime matters such as future planning, safety of navigation, port and maritime security etc., MOTC should be a leading agency to start and implement above-mentioned scheme together with other interested Agencies.

If the Supreme Committee of Town Planning expands its jurisdiction to the adjacent area and increase the personnel accordingly, GSO as a whole will strengthen its capability for managing coastal and adjacent water. An alternative is to create a new specialized inter-ministerial committee under Article 56 of the Basic Statute of the State. However, creation of a new organization will take time to be decided by the government.

Even for getting advice or coordination from the Supreme Committee, line ministries have to take initiative what action is adequate for the particular construction. For port matters, DGPMA should first take action. Statutory it has the function, and it is required to have the capability to fulfill the function.

7) National port authority

It is generally said that a National Ports Authority, comprising all ports of a country, is not a preferred option. A National Port Authority requires its own financial resources, if not covers total operation cost. Ports have to contribute to the authority's expenditure, and this may add to the financial burden of individual ports. Also, a bureaucratic procedure may be attached to the decision process. Occasionally, a National Ports Authority is established where there is only one major port in a country as well as a number of smaller ports with a regional function. However, even in such a case, a more effective system could consist of a port authority for the major port, and a ports directorate within a ministry responsible for transport or public works for the operation of smaller ports. In Oman, port system is managed in this way, and at present there is no reason to change the system.

(2) Form of Legal Instrument

Among the above issues, some items could be resolved under one or more legal instrument. Possible

options are as follows:

- Comprehensive national port law,
- Special legislation at each project,
- Provision of concession agreement
- Rules as a guideline of relevant organization, and
- Code of practice of port authorities.

(3) Evaluation of Legal Form

1) A single national law

Japan has a comprehensive port law that provides functions and duties of the port authority as well as relationship between the government and the port authority, particularly regarding the financial arrangement for port construction. Recently, some archipelago countries with numerous ports have also been planning to promulgate such a law.

In many cases, a law is not merely a policy declaration or promulgation of rules by the government, but tries to force or restrict certain acts. Law should be implemented by the targeted persons or legal entities, otherwise general public would lose their respect for the government. Thus, law may be accompanied by a penalty to defer would-be offenders. Legislation is introduced only when urgent needs are revealed and take sufficient support from relevant circle as well as general public.

If there is any firm reason for all ports in Oman to be placed under uniform rule, a single national law may serve the purpose well. However, major three ports of Sultanate are governed by each decree and have their own code as shown in next subsection. It is dubious that a new legislation would have significant advantage.

2) Special legislation at each project/Internal rule for relevant organization

Three port authorities are created by each Royal Decree, and pursuant to the provisions of the Royal Decree, concession agreements are contracted between the government and port authorities. These agreements cover a wide range of powers and duties of both parties, to wit:

- Transfer of Assets
- Rent/royalty fee/taxation or exemption
- Procedure of price fixing
- Demarcation between GSO and the port authority in terms of expansion, maintenance and repair
- Functions of the port authority including harbor master’s function
- Dispute settlement and arbitration

- Establish of internal plans and report to the government.

Concession agreements provide for structure and function of Board of Directors as the supreme executive body. Also, they have provisions of internal organizations such as Auditing Committee. Share of Equity by each sector and capacity of members is also provided, but share of PSC and SPS were later changed without revision of agreement.

3) Rules as a guideline of organizations

At this moment, MOTC manages Khasab and Shinas. About ten personnel work at the port for collecting, accounting, making statistics and conducting harbor masters function. Also, Duqm Port may be operated in these ways at its starting stage. Internal rules of each function may be enough for their work.

4) Code of practice

A Code of Practice is not a statutory legal instrument, but occurs where a group of companies in the same field make a resolution binding certain common practices. For instance, major three ports may declare the mission and principles of corporate governance, and refrain from unfair treatment, unusual tariff reduction, extending abnormal benefit rewarding to the possible client etc. It is possible to make this kind of resolution, but this is at the discretion of relevant companies.

(4) Recommended Form of Legal Instrument

For the port authorities, the Team observes that the current scheme, which is a combination of single legislation with concession agreements work well, and contribute to port authorities fulfilling the mission assigned to them. The combined legal scheme of specific legislation and concession agreements for individual ports began some 30 years ago (1976) when PSC was established, and as a whole, if not entirely, the scheme has established and worked well to treat matters of relationship among GSO, port authority and customers.

From the Government point of view, government has means to oversee the behaviors of concessionaires through concession agreement together with shareholder's status, at the same time legally retains flexibility to handle the matters lying between the government and port authorities. The commercial law and rules also require that companies maintain a certain standard of performance. It is our conclusion that the present scheme in terms of government regulating port authorities should be maintained as it stands.

10.7.3 Recommended Oversight and Regulation/Deregulation Scheme

Since the privatization of port management works has been successful so far, this policy should continue in future. One of the advantages of privatization lies in the quick decision making process of the private sector. However, external and internal decision procedures tend to be duplicated and too complex to make timely investments.

To improve this situation, the following steps are recommended:

1) Some of the Government's regulatory function is necessary for ensuring port authority's performance in good order, however, in order not to impose an excessive burden on port authorities; the degree of oversight should be minimal. The government should "monitor" rather than "control," and "advise" rather than "intervene".

2) Procedure of the Financial Audit should be reviewed so as not to hinder the port authority's day to day activity. Since the Audit's purpose is to inspect fiscal expenditure, the relevant ministry can be audited rather than the port authority.

3) Explicit and implicit government regulations exist under the current system. Naturally, some of the regulatory functions cannot be totally eliminated even in the case of private port operation. However, for a port to be more competitive with neighboring ports, efforts must focus on expediting the decision making process in the port.

It is recommended, therefore, to review decision making procedure within the port as well as among government agencies concerned, so that the necessary action to strengthen competitive ability of the port can be taken without delay.

In this respect, the Board structures in the Port Authorities need to reduce multiple steps for auditing at every stage of program implementation.

4) In order to make timely investments in port infrastructure, (infrastructure already accommodated in Five-Year Plans), DGPMA should be given more authority, and the examination procedure of relevant ministries should be streamlined.

10.8 Strategy Alternatives for Human Resource Development

10.8.1 General

For a port to be internationally competitive, it must have within its organization three well-functioning and balanced components:

- decision maker/top management,
- management,
- labor

Top management (Board of Directors, CEO etc.) should make decision for investment of infrastructures, contract term with customers, major expenditures, and so on. Strategy on labour issue is also the top management's responsibility. Decision should be timely, because any delay will have a risk to be defeated by competing port.

A manager is a bridge between top management and workers, at the same time he himself is an expert in his field. He should try to upgrade the quality of the work with his expertise.

Port labor-from crane operators to stevedores to harbor pilots -is a key to the success or failure in

today's competitive port. Hiring and bringing up reliable workers with a reasonable salary level is what the most of the port desire but hard to achieve.

In developing countries, and sometimes in industrialized countries, it is difficult to get able and experienced top and middle management. Concession to, or management contract of foreign terminal operator is extensively utilized for the solution.

Port of Sultan Qaboos is a pure national company, while the other two ports get the management skills from world's famed terminal operators through concession agreements and management contracts, and these ports are able to receive guidance the above terminal operators. Qaboos has to judge by itself and this might cause difficulty to obtain and retain middle management experts.

Following subsections tries to analyze the current port labour issues. For the moment, this issue can be limited to ports of Sultan Qaboos and Salalah. Port of Sohar is a landlord port, employees of which are very small. After full operation of the port, the number will be well under hundred even including security staffs. Khasab and Shinas are small, and MOTC conducts administrative and harbor masters' work with a few personnel. Cargo handling is carried out by ship owners or cargo owners.

Port labor issues should be examined in the context of practices of world ports as well as whole labor and vocational training scheme of the Sultanate.

10.8.2 Present Port Labor in Oman

(1) Sultan Qaboos Port

Table 10.8-1 Employee of Sultan Qaboos Port

Year	1999	2000	2001	2002	2003	2004*
Number	746	730	727	703	679	661
Index(1999=100)	100	97.8	97.5	94.0	91.2	88.6

Note: As of December

Source: Annual Report, Sultan Qaboos Port; *as on September 2004.

Total number of employees stood at 679 as of December 2003, and is now at 661. The number of workers has been dropping since 1999. Table 10.8-1 shows the trend in the number of peoples engaged at the port.

More than 30 years has passed since PSC established, and employees from the early years cannot follow the technological evolution of work in port. As a number of workers reach the retirement age, PSC set a policy to reduce the total number of workers by a retrenchment scheme (stated later in this subsection). Now, average age is 48.

Table 10.8.2 Number of Personnel and Positions as of 2004

Number of Personnel			
Operation Division			438
Operation section		339	
Manager with Secretary	2		
Superintendent	13		
Gantry crane operator	21		
Heavy Equipment Driver	21		
Forklift Operator	36		
Tractor driver	41		
Labors	113		
Others	92		
Plant maintenance		56	
Manager with Secretary	2		
Gantry mechanics	17		
Light Equipment Workshop	30		
Store Clerk	7		
Claims and Tally		43	
Harbour and Marine			73
Administration and HR			95
Finance and Accounting			28
IT (Information Technology)			11
Marketing			5
Audit			4
President Office			7
Total			**661**

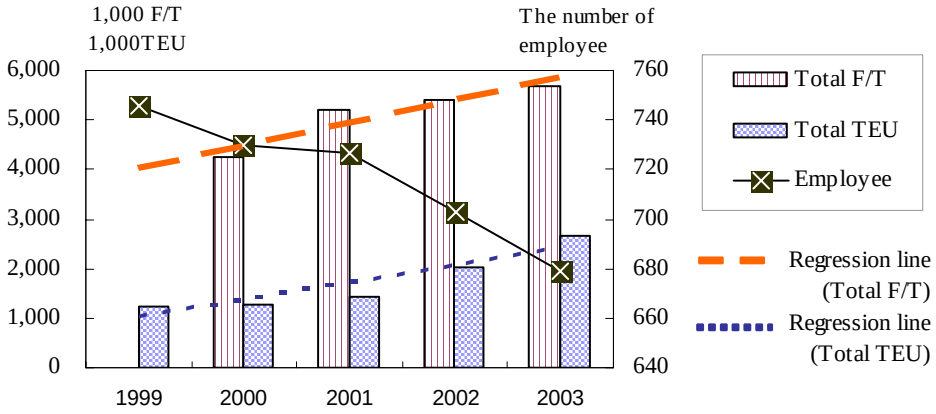
Source: PSC

The number of personnel and positions as of 2004 is shown in the table 10.8-2.

In recent years, traffic volume has been growing, and as a result of reduction in the work force, some areas in the operation are suffering from a shortage of workers. The recruitment of younger aged workers is not workable immediately since various skills are required. PSC needs to take some measures to strengthen its work force.

A comprehensive study of the human resources requirements of Sultan Qaboos port by Moore Stephens/Hyder was completed in 2001. It is understood that the main recommendation of the report is implemented including the reduction in the size of the Board and revision of its membership to better reflect the current share ownership, the establishment of a business development and marketing department, and a revise of tariff structure (effective of May 2003).

Figure 10.8-1 Comparison of Traffic Volume and Number of Employee at Sultan Qaboos Port



Source: JICA Study Team

The operations and engineering departments are most suffered from under-manning. The Moore Stehpens/Hyder Report recommended a staff level of 850 to effectively maintain the port operations under present conditions.

From October, 2003, the Board of Directors inaugurated a structural change with the objective of streamlining reporting process, and a scheme to develop individual staffs by furnishing them with multi-skills and to upgrade productivity of the works. The skill gaps at various levels were identified and training programs were designed.

The scheme also includes retrenchment by unfulfilling retirees,[2] however in view of refreshing work forces, the port recruited 12 new employees in 2002, 15 in '03, 18 in '04,[3] and in 2005 more number of employees are planned to be hired. Relocation and promotion of younger workers will give them the motivation of work in the Corporation. These schemes will create useful human resources for the future; however, staff level of PSC is far from satisfactory quantitatively as well as qualitatively in the competitive environment of ports in the area.

In PSC, Training and Career Department is responsible for training of employees. According to the Department, while training is mainly on-the-job training in the PSC domain, for English education and advanced training, PSC uses many outside institutions. PSC trainees learn at British Council, port of Salalah and other training institute. In absence of adequate training opportunity, PSC sends staff abroad, e.g. Dubai, Alexandria AMTA, Singapore, Rotterdam, New Orleans, Malaysia and UK.

However, for aged workers, training tends to be unfruitful, because they lack motivation to learn since they will only working a few more years, and because they have not received a fundamental education.

PSC allocates a budget to send supervisor class workers abroad, middle management and top management to seminars and meetings with a view to giving these people interest with a wide range of knowledge that goes beyond simply port matters.

[2] Age of retirement is 60 years old.
[3] Applicants must have high school graduate degree.

There are many problems in terms of performance of workers. For example, in frontline, the work shift is three without break; nevertheless workers frequently leave for prayers and meal. The practice of irregular break interrupts works to harm flow of handling works.

Also, it is frequently seen that younger frontline managers are not willing to take responsibility, and tend to pass the issue to someone else.

The report of the Expansion of PSQ Physical Planning Study by Halcrow (2004 Oct.) recommended seminars and workshops designed to promote the company's aims and to explain the importance of the individual workers. The report says that personnel should be made to feel that the company is a unified entity with a common focus and is ready to listen to their concerns.

It is a far reaching task to upgrade the workers' morale and motivate them to perform their jobs with a high level of professionalism; nevertheless, workers' morale is the first requisite of a successful port. PSC should continue with its present efforts.

(2) Salalah Port

Total number of employee was 1,147 as of December 2003, 785 as of the December 2002, and 829 as of December 2001. The number is increasing due to the growing company's activities、and in 2004 the number of employees will reach 1,300. Since SPS is a young company, more than 70% of the employees are under age 40. Retirement age is 60 years old for male and 55 years old for female.

One of SPS's corporate missions is to create local jobs. Unemployment in the Dhofar region is the worst in Oman. One calculation said some 5,000 unemployed there, and that the most of them are in Salalah. Under the circumstances, despite of the rapid increase of staffs, the required new workers can be found without difficulty.

The issue is the quality. Many people are not educated in English, which is seriously required for terminal work. The level of vocational training is not sufficient for the demand of SPS. On-the-job-training is definite factor in the company's success.

In the latter half of 2000, SPS established a Training Department to meet the challenge of a dynamic environment and to enhance employee skills to serve customers. The services of the Department includes 1) survey of training needs, 2) development of course outlines, 3) development of in-house trainers and instructors, 4) assessment and monitoring of external training providers, 5) development of suitable training procedures.

At this moment, safety aspects of the service are the most important agenda of training. Whenever an incident occurs, PSC reviews the course and curriculum. To promote safety, training focuses upon bringing-up of maintenance skills, emphasizing that workers be responsible for cost awareness, and that they consider themselves to be owner rather than employees.

SPS has training courses on the extensive subject. Nearly 200 employees attend at more than 10 courses monthly. The cost is shared by GSO and the port (same as Sultan Qaboos port).

Since special job such as engineering, tug master and electronics requires license for international business, SPS sends trainees to India, Srilanka and AMTA.

Aside from the above, the high level training standard attracts many trainees from abroad. SPS receives trainees from Suez Canal, Aqaba, Burnei, Sudan for mechanical maintenance, Shanghai for supervisor. Also, SPS trains domestic port workers, and convenes a Summer Internship aiming at acquainting students with ports work environments, and giving SPS an opportunity to view potential future employees.

10.8.3 Global Trend of Work Force

Since middle of 1980s, year by year trade restriction came to be relaxed everywhere in the world, and regional agreements for freer trade were introduced. These changes in the trade market support the increase of commodity flow, and result in larger size container vessels being introduced in shipping market. Bigger size container vessels cause a hub- spoke competition among the world ports. The competition stimulates a huge port investment pursuing more efficient port services than competitors. The terminal operators, be it public or private, wish to catch up with the technological progress in cargo handling service, and invest in required equipment.

It is natural to suppose that the modern equipment will bring about labor redundancy, if not drastic increase of demand. In fact, many ports reduce the number of a gang by one third or a quarter. However, in the late 80s till early 90s, surprisingly large number of ports kept their gang scale as it had been. According to World Bank [4](WB), within 30 ports surveyed, 20 ports had maintained the same gang size or even increased it.

Although each port's situation is unique in terms of productivity and employment number, some figure comparing staff number and port activity may be useful to judge whether a port may be overstaffed or whether its productivity is significantly lower. Table11.8-3 shows a benchmark to judge whether a port is significantly overstaffing or not.

[4] Module 6. Port Reform Toolkit.

Table 10.8-3 Port Staffing Benchmarks

TYPE OF CARGO	PERFORMANCE
CONTAINERS (Including operational, administrative and Management staff) Source: Drewy Shipping Consultants: World Container Terminals	1000TEUs of staff per year (for a large array of yearly throughput, from 150,000 up to 600,000). (Comments: also here there are economies of scale- 150,000TEU=150people/600,000TEU=500 people
BULK GENERAL CARGO Boxes on 2-ton pallets built in the hold (fruits, frozen goods etc.):	40 ton per hour 2.5 ton/h/docker
Pre-Palletized boxes, handled with Cargoes: Gang about 13, incl. transfer (excluding storage crew/crane driver/Maintenance staff). Gang 15 to 17 dockers (excluding transfer and storage crew, Crane driver, maintenance staff)	100 ton per hour
Exotic wood in logs, handled with slings: Gang 12 to15 dockers (excluding transfer and storage crew/ Crane driver/maintenance staff	80 ton per hour 6ton/h/docker
Exotic wood in logs, handled with Hydraulic cramps: Gang 10 dockers (excluding transfer and storage crew/ crane driver/maintenance staff	140 ton per hour 14 ton/h/docker
SIZE OF THE PORT AUTHORITY (INDIRECT SERVICE)	RECOMMENDED STAFFING LEVEL
Average Port: a few million tons: Large port:10 to 20 million tons:	About 50 From 150 to 200 100,000 ton per staff per year with large variations according to the scale

Source: WB Port Reform Toolkit Module 7 (Edited by JICA Study Team)

10.8.4 Labor and Education Policy of Oman

Oman has a comprehensive Labor Law (Decree 34/73). Provisions ranging from creation of regional labor offices, registration of job applicant, prohibition of child's labor, minimum wage, prohibition of hiring temporary workers over one year, employment of the handicapped, employees right to leave, prohibition of strike, dispute solution measures. This law applies to port labor, and generally port authorities (service port) do not hire temporary workers.

One of the major policies of Oman is the education including vocational training. The Ministry of Social Affairs, Labor & Vocational Training has stipulated a target Omanization ratio in six areas of the private sector. In transport, storage and communications sector, the Omani participation ratio is set as 60%. In 1995, National Vocational Qualifications (NVQ) and General National Vocational Qualification (GNVQ) were introduced to promote Omanization and to provide well-trained Omanis to strengthen the private sector's role in the economy. GNVQ syllabus is conducted at government technical college for 3 years. NVQ syllabus is conducted at private training institutions for 2 years. These training systems are financed by the GSO.

Despite these efforts, as is mentioned above, both Qaboos and Salalah ports are not able to find

enough new recruits with the skills necessary to perform technologically advanced port jobs. Workers for lashing, operation and maintenance of cranes and RTGs are particularly difficult to obtain. It is inevitable to hire expatriates for these jobs. A sustainable and effective system of securing necessary employment of labors and managers with the necessary level of skills should be urgently materialized to meet the increasing demand created by the new developments of ports. In this context, policy of Omanization has to be mentioned.

Current Omanization policy has fairly long history, and the share of Omani nationals of the employees is fostered from time to time by the policy. This policy is sensible, because renaissance of Oman is very recent less than 40 years ago. Since then GSO has made strenuous efforts to modernize all the aspects of society and the economy, though it still has a long way to go before it catches up with advanced countries. In the environment, it is crucial to enhance Omani employment.

PSC and SPS have registered Omanization plans. Since 1998, a 'green card' has been awarded to companies that meet their Omanization target and comply with requirement for labor relations. The names of the awarded companies are published in the press and they receive preferential treatment in their dealings with the Ministries. Both PSC and SPS have achieved its target (60%).

Having said that, the policy to pursue Omanization causes some difficulties to the port sector. As previously mentioned, under the competition among ports, port authorities have shifted their operations toward container handling. It requires skilled operators and engineers for sophisticated and costly handling equipment, to wit, gantry cranes and RTGs. These equipments have to be utilized effectively with fewer intervals to recover the investment. With all the effort now carried out by PSC and SPS, it will be difficult to hire sufficient number of skilled Omani employees. These workers can only be supplemented by overseas.

10.8.5 Agenda for Human Resource Development

(1) On-going Project

As described in the previous sections, individual ports as well as GSO are making efforts to develop human resources. The plans now being considered by the major ports are described below.

Port Sultan Qaboos has a three shift system without break. However, services are abruptly interrupted when workers take a meal or stop for prayer. The management is contemplating a change to a two shift system with fixed break time. Break time is set to match with the prayer and meal time.

Port of Salalah is trying hard to convene training courses and seminars not only for the employees but also workers of other ports as well as local students. The port has a plan to build a training house near the Administration Building. This will be useful for effective training, and it may be possible to furnish with simulators of advanced equipment.

Ports of Qaboos, Salalah and Sohar are creating Port Sector Committee to exchange information and discuss manpower and employees issues, in particular to nurture staff with advanced techniques.

(2) Establishment of an Institution for High Level Education

Despite these steps by individual port authorities, it is clear that due to port expansion and Omanization of port employees, port workers, particularly those with sophisticated or specific technique become short in near future. GSO should include an agenda to meet marine and port industry's needs in terms of education and training in the policy.

It is said that Department of Civil and Architectural Engineering College of Engineering, Sultan Qaboos University with collaboration with the College of Agricultural and Marine Sciences and several Department of the University recently proposed a Marine Engineering Program (20 students). The proposal includes marine environment, marine engineering, harbor engineering and electrical engineering. However, even this proposal would be materialized, it is not precisely matching requirements of port industry.

Very recently, GSO and the Netherlands' educational institution of shipping and transportation concluded the agreement to establish a college for higher vocational education and training in the fields of port and transport management, operations and administration, petrochemical industry operators and managers, deck officers and marine engineers. The Netherlands' institution is an eminent non-profit organization with a long experience for education and training of maritime field.

The college recruits some 240 students from graduates of high schools, and about one thirds of the students will be port and shipping management course. Considering future expansion of port industry and Omanization, yearly about a hundred employees are envisaged to be required in a long run, and the planned college will fulfill the industry's requirement to a large extent.

The college is scheduled to open on September of 2005. It is said that the education and training plan is excellent in terms of school facilities, equipment and tools. If the curriculum and lecturers/instructors would be satisfactory for developing marine sectors' manpower, port and maritime industries as well as high school students will have a large benefit from the institute. Also, Oman will become acknowledged as a progressed maritime nation in international shipping circle, if it becomes capable to issue higher grade STCW-95 certificate as proposed, and to execute adequate inspection in the territorial sea.

While whole plan is not revealed, some issues are considered for the success of the project.

1) Initial investment cost is considerably high, and it is said that GSO has decided to bear 70% of total cost. Remaining cost is born by the institution and the affiliate.

2) The success depends upon whether the college attracts sufficient number of high school

graduates in a long run. The planner is aware of this point, and it is a plan that GSO will pay up to 75% of the tuition fees. Also it provides scholarships via social security.

3) The college is also useful to cultivate staffs in DGPMA engaging ship and seafarer's certification and inspection, as well as overseeing port activities and assets. The graduates may be hired by maritime sector but also port sector of DGPMA, which in turn should be further involved to establishment and management of the college.

4) As mentioned in 10.6.3 (3), staffs in DGPMA have no opportunity to get training, except JICA's Port Technology Course. MOTC may consider to make their staffs attended to a short-term education and training.

It is the Team's conclusion that both proposals particularly of the marine college are justifiable with a view to satisfying requirement of human resources in the fields both proposal targets, and GSO should positively be involved in the preparation of the plans' materialization.

(3) Other Agenda on Human Resource

It has already mentioned that Omanization causes to the port industry some problem. Transport and storage industry's target of Omanization (including port operators) is designated to be 60%, while targets of finance, insurance and real estate are 45%, industry 35%, hotels and restaurants 30%, wholesale and retail trading 25%, and contractors 20% (at the end of year 2004). GSO is tightening Omanization year by year. As has been said, progress .of port technology is very rapid and now requires value added service, and a port authority needs to stay abreast of the latest technology if a port is to survive. Accordingly, it is crucial to hire experienced and knowledgeable workers as well as middle management in certain areas of port operation such as cranes and RTGs. Furthermore, function and value to the national economy of transshipment is quite similar to the export industry. Shortage of skilled workers has to be supplemented by expatriates. Both industries earn foreign currency and propagate Oman's achievement abroad. With these situations in mind, hastily imposing a higher ratio on port industry employees should be avoided until such time as effort for enhancing skills of Omani nationals.

10.9 Enhancing Information Technology Development in Port Sector

In recent years, port management, particularly those container port relies on information technology (IT), not only for container handling and slot planning, but for staff management, invoicing, accounting and asset management. Also from administrative perspective, development of IT enables the speedy transmission and collation of data and information from operators. Relevant government agencies should need to keep pace with the IT revolution.

10.9.1 Present Situation of Statistics Information

(1) Ports

As Sohar port is still under construction, and Shinas port has no significant activity, collected data is available for ports of Sultan Qaboos, Salalah and Khasab.

Since June 2004, PSC compiles the Sultan Qaboos reports in the form of monthly statistical report, including total number of calling vessels, total volume of import and export cargo and containers.

PSC also publishes a wide range of annual statistical data. It includes commodity wise cargo discharged, type and tonnage of arrived vessels, total number of vessels and dhows, export container by country, laden container discharged, company wise containers received and container vessels by flag. Neither Salalah nor Khasab publishes statistics of this kind.

SPS makes monthly statistics report of Salalah including items of number of calling vessels, total volume of import, export and re-export cargo and containers. Monthly statistic report of port Khasab includes movement of vessels and cargo as well as of Iranian boat.

(2) DGPMA

DGPMA makes the annual statistical report. Analyzing 2001-2003 report, items and terms vary by port, and it is impossible to compile the original figures into one statistical document for all nationwide port. The statistics in 2001 only show cargo movement comparison (weight ton basis) between Sultan Qaboos and Salalah port. The Year Book of 2002 shows vessel movement (container and general cargo vessels) and monthly cargo movement through Sultan Qaboos and Salalah ports.

In DGPMA Statistical Report, there exist following commodity wise statistics;

- Detailed list of import goods (2001) of port Sultan Qaboos
- Detailed list of export goods (2001) of port Sultan Qaboos
- Type and volume of goods (2002) of port Salalah

Monthly statistics are not available after September 2003 (not compiled) due to absence of staff in DGPMA.

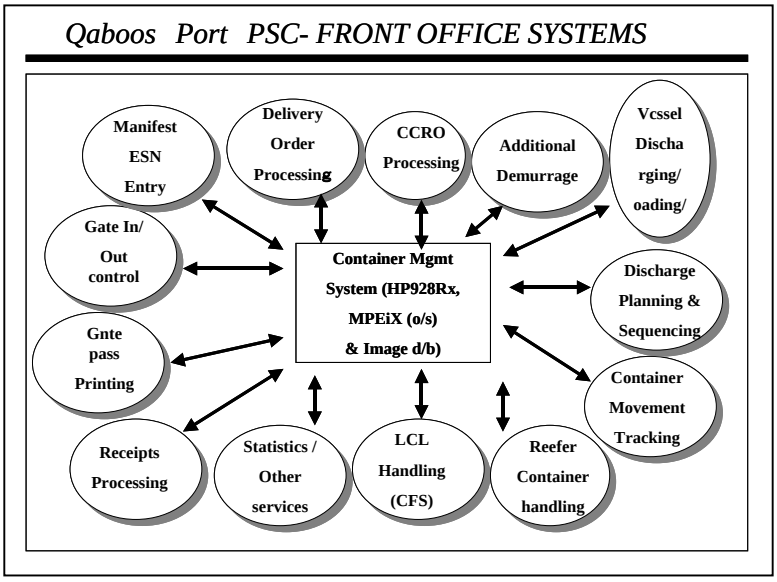
10.9.2 On-going Project in Terms of Information Technology

(1) IT Strategy of Sultan Qaboos Port

While SPS port has already exploited information technology for their operation and management, PSC trails in computerization of planning of container handling and slot allocation. In 2002, PSC has drawn up an IT utilization strategy covering various areas of port operations including berth and yard planning, cargo stacking, documentation and EDI facility with ship agents and other authorities. Various statistics based on cargo type handled, port of origin/destination, vessel types and other type of parameters will assist planning of PSC as well as other related industries. The statistics will, in future, be transmitted to MOTC and agencies concerned to assist administration's policy planning. Implementation has started on August of this year, and the completion is expected to be toward the end of 2005.

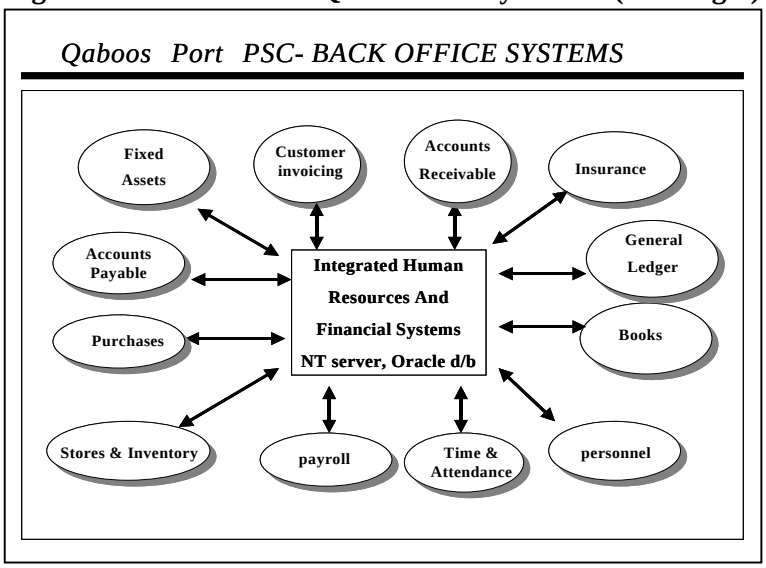
The information system of the Qaboos is divided into two facets; Front Office Systems and Back Office Systems (Figure 10.9-1, Figure 10.9-2).

Figure 10.9-1 Sultan Qaboos Port Systems (Existing)



Source: PSC

Figure 10.9-2 Sultan Qaboos Port Systems (Existing-2)



Source: PSC

Table 10.9-1 Sultan Qaboos Port Systems (Future)

Qaboos Port SCOPE IN A NUTSHELL ***-B2B Portal services***

PHASE1	PHASE 2	PHASE 3	PHASE 4
EDI or any other mode of electronic transfer of inward data and filing of outward reports. WEB based connectivity to various port users,consignees, various types of agents.ROF-Customs shipping lines and others. High Tech back office supporting the above within PSC	Remote printing of invoices,bank to bank transfers On demand services including gate pass. Operational management Info to port users. what-if analysis support to PSC management Implementation of security systems for phase 3	Planning info to port users,more activity integration with agents,consignees, Connectivity to Gov agencies,ministries, Payment gateways,financial info automation,Implementation of firewalls for phase4.	Complete integration of all services on port net Strategic management information to port users through WEB virtually all port functions - planning,operations, strategic management and service functions enabled through WEB
12 months	+4 months	+3 months	+3 months

Source: PSC

The works consist of four phases, and the contract of this time covers first 3 phases. The term of work is estimated 70 weeks. Contents of each phase are shown in Table.10.9-1. Since Arabic interface is only introduced at the 3rd phase, connection to government will be delayed.

(2) DGPMA Ship Registry System

DGPMA has proposed to build a system for ship registry. This system intends to operate ship registering works in ports of Sultan Qaboos, Salalah and Khasab by establishing local server. The system provides administration and other relevant entities via the internet. A firewall is set on the Website and users are controlled by the password.

10.9.3 A Strategy for Effective Port Information System

Information technology changes very rapidly in less than 2 or 3 years term, as seen in version-up interval of operation soft and lease term of electronic devices. Therefore, it is not adequate to drawn up a development plan with a long-term application program. On the other hand, a data-base should be examined as a long-term plan, in which data and information are accumulated and compiled for a long period. This section describes the establishment of a database and its technological environment.

(1) Objectives and Development Items

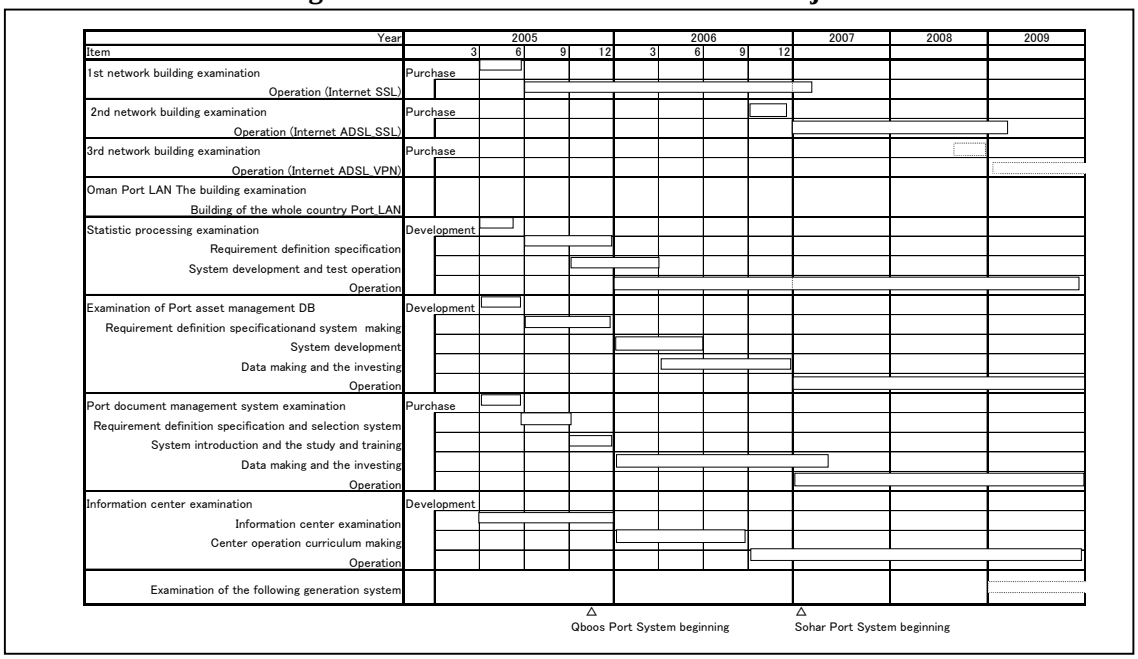
DGPMA, in view of more elaborate port planning and oversight of port management, should immediately start the study to build up a system for management and utilization of information and data accompanied by a network connecting relevant agencies and port authorities. Followings are the items to be studied for building up information system of administration.

1) Oman port LAN
2) Statistics information system
3) Database of port assets owned by government
4) Management and compiling system of port documents
5) Recruit and training staff for information system
6) Port information centre

(2) Schedule for System Building

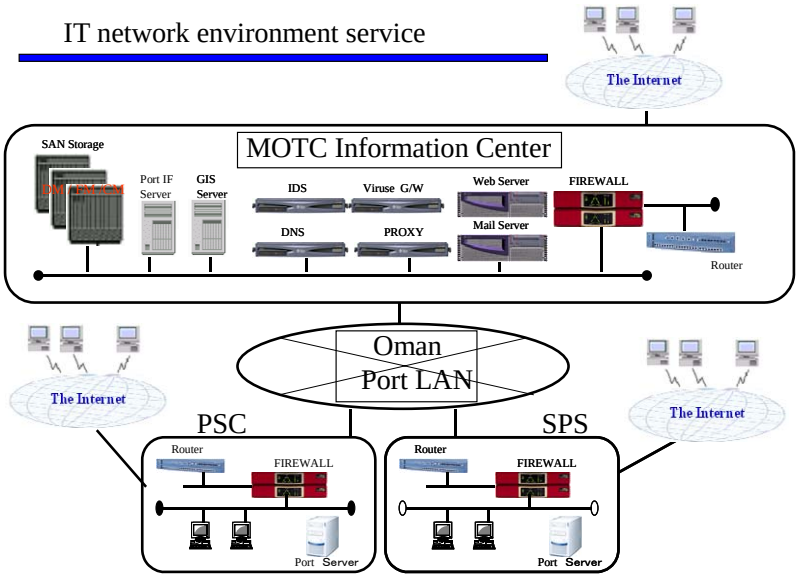
Considering the expeditious progress of the technology, development period should be limited to 5 years (Figure 10.9-3). This period takes into account the timing of the introduction of the new system at port Sultan Qaboos and the inauguration of port Sohar, as well as the connection between them.

Figure 10.9-3 MOTC Information Project



Source: JICA Study Team

Figure10.9-4 Oman Port LAN – 1



Source: JICA Study Team

i. Figure 10.9-4 shows outline of the best system, which is a high-speed, large capacity infrastructure providing firewall for connecting other agencies. By building a basic server, it is possible for DGPMA to establish an environment for its home page and electronic mail. Extent of network service is different due to security, speed, capacity and cost. Table 10.9-2 compares some of the costs of this ambitious system.

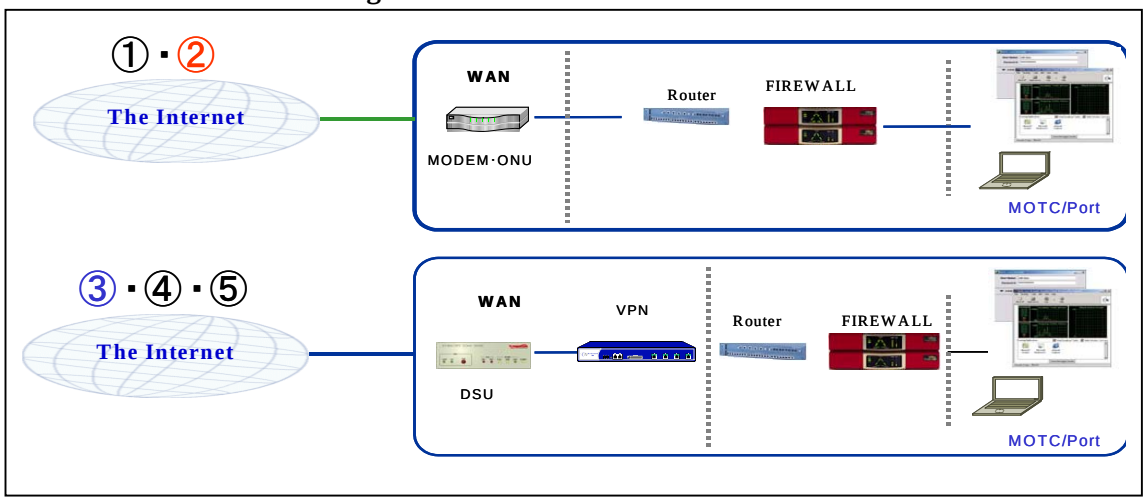
Table 10.9-2 Cost Comparison by Category

	Category	Speed/Capacity	Numerical data	Picture/ Video	CAD data	Security	Cost	Oman Real
①	Internet (Modem SSL)	64KBMS	○	×	×	×	◎	0.01/minutus
②	Intetnet (ADSL SSL)	1.5～40MBPS	◎	△	△	×	○	10～18/month
③	Internet (SSL-VPV)	10～100MBPS	◎	◎	◎	○	△	770/month
④	Wide area Etheenet	10～101MBPS	◎	◎	◎	○	△	1000/month
⑤	IP-VPV	10～102MBPS	◎	◎	◎	◎	△	1600/month

Source: JICA Study Team

ii. Practical approach to build a Oman port LAN is shown in Figure 10.9-5. Environment appeared as ① in the figure is adopted by the Ship Registry System. It is possible to apply to transmission of small data file such as text and CSV (Comma Separated Values) data by WEB system or E mail. While ② of Internet can normally transmit data of 8Mbps, considering security level, the Team wishes to advise to adopt ③ (SSL-VPN) at its final phase. However, ADSL-SSL may be adequate for its initial phase, with rules of operation watching to prevent breaking of security.

Figure 10.9-5 Oman Port LAN - 2



Source: JICA Study Team

1) Statistics information system

In view of improving the administration's planning and oversight activities, it is desirable to standardize both monthly and yearly report form of ports, building up a real-time database and making output available at any requested time. It is also desirable for data renewal in real-time that the system be directly accessible to the data base set in DGPMA, which manages the system. Considering, however,

environment of connecting line, the system is based on the means of local systems for statistics management and transferring to DGMPA the file downloaded by a change of format. Introduction of local system to ports has an advantage to allow each port utilizing statistics data or its own data processing. DGPMA should take initiative to unify statistics code of both vessel and commodity.

Basic data necessary to be in the port statistics are listed in the table 10.9-3.

Classification of cargo commodity in the ship manifest is different from customs statistics code. In order to facilitate efficient management for both port and customs, a new cargo commodity classification system, which unifies the coding of custom and port statistics, should be introduced.

Table 10.9-3 Basic Data for the Port Statistics

I. Ships entering a port

1	Data of entering vessels	Type of vessel, Date & time of arrival, Duration of stay, Foreign trade, Coastal trade, Number of vessels, Tonnage, Flags of registry, Liner or Tramper
2	Utilization of berths by vessels	Type of vessel, Berth/anchorage used
3	Number of passengers	Number of passengers embarked/disembarked, foreign/domestic

II. Data on cargo

1	Foreign trade cargo	Commodity, tonnage import/ tonnage export
2	Foreign trade containers	Types (20', 40', 45') number/TEUs import, number/TEUs export
3	Coastal shipping cargo	Commodity, tonnage import/ tonnage export

Source: JICA Study Team

2) Management of infrastructure property

Since GSO constructs port infrastructures and leases them to a concessionaire, GSO has a duty to follow up the national property's condition from time to time. For building up the database concerning ledger of infrastructures, following matters are required.

- Property is categorized,
- Detailed item such as dimensions, materials, water depth, duration, current value etc. is determined,
- Regular inspection is conducted.

3) Document management

It is useful for the operation and management of a port facility to have quick access to documents related to planning, design, construction works as well as present condition of each facility. At present, although many documents are drawn by electronically, some of them are on papers. For unified management of electronics documents, a system should be introduced utilizing application software in terms of document management and civil engineering document management, and after testing them DGPMA should develop its own port system.

4) Personnel for operation of system

Two personnel are required for operating the information system in DGPMA; a) an IT manager and b) an assistant.

IT manager should have knowledge and experience on following matters;

- Planning work and basic design of the system,
- Determining definition of factors and system design book,
- Inspection and purchasing of system and instruction of operations,
- Data analysis requested by DGPMA.

Assistant should have experience on following matters.

- Design, building and operation of LAN,
- Set-up of Windows application environment,
- Management of server environment,
- Judgments and restoration of default,
- Maintenance of database.

(3) Creation of Information Centre

While it is hardly practicable to create a specific organization for port information at the early stage of the IT development, study for the practicability should be commenced to match the growing demand of information and to integrate electronic skills. The functions of the organization are as follows:

1) Management and operation of information system
   i) Management and renewal of data,
   ii) Maintenance of system devices and software,
   iii) Management of application software,
   iv) Security and accident remedy.
2) Training and development of skills
   i) Personal computer
   ii) Applications
3) Research and investigation
   i) Utilization of database
   ii) Supervision technology
   iii) Communication with outside agencies

Since data and information integrated to the organization is occasionally confidential information, security is critical issue. Devices should be placed in a special room and entering and leaving to and from the room should be controlled strictly. In view of cost effectiveness, outsourcing of total works

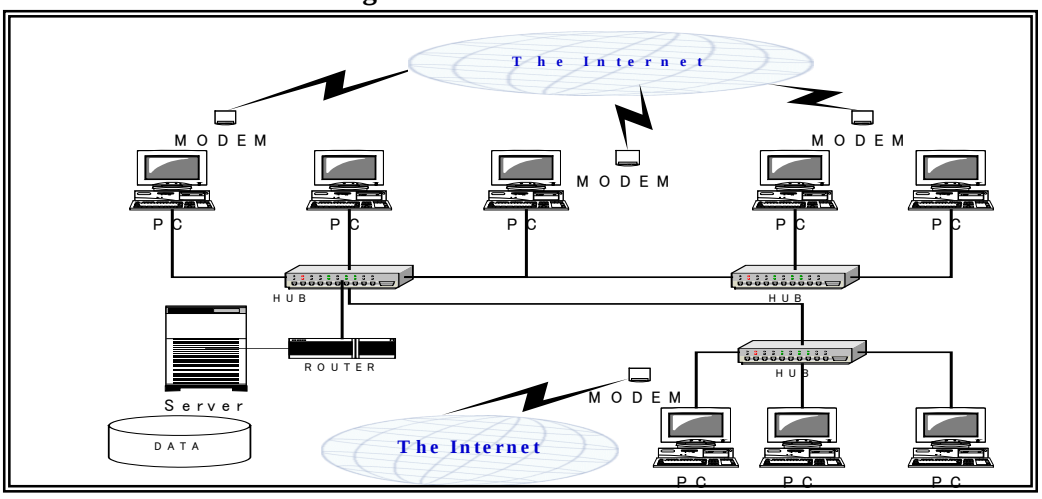
may be considered, but in that case its appointment should be under strict examination, and monitoring of the work should be required.

10.9.4 Short Term Scheme of IT Arrangement

Two issues should immediately be studied and started to work, namely, 1) creation of DGPMA network, availing mainly existing facilities, and 2) standardization of code for reported data.

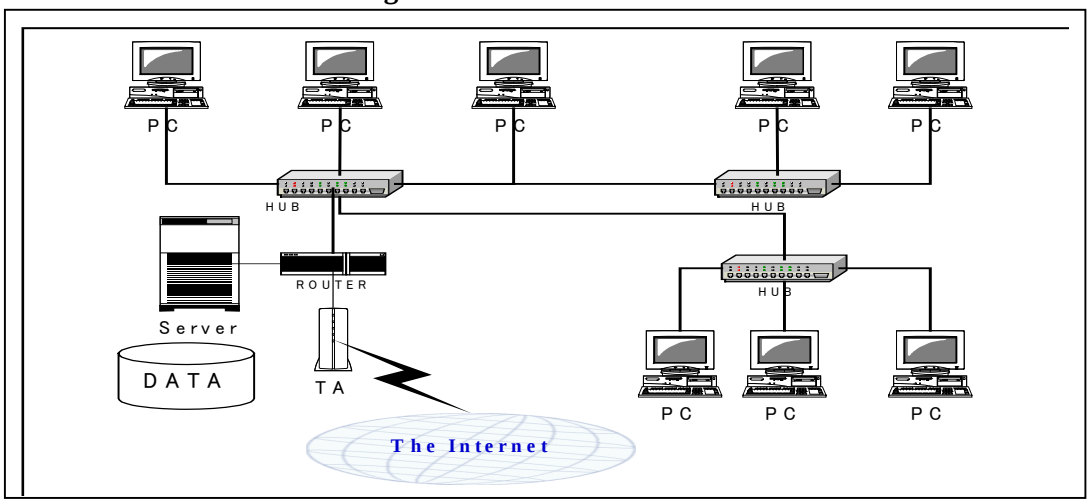
(1) DGPMA Network

Figure 10.9-6 1st Phase Network



Source: JICA Study Team

Figure 10.9-7 2nd Phase Network



Source: JICA Study Team

For the sake of practicability, creation of the network should be separated into two phases. In the 1st phase, it is proposed that under the existing modem system, aiming at set-up the LAN environment in DGPMA, a common file server is established to create a statistical database and to manage documents,

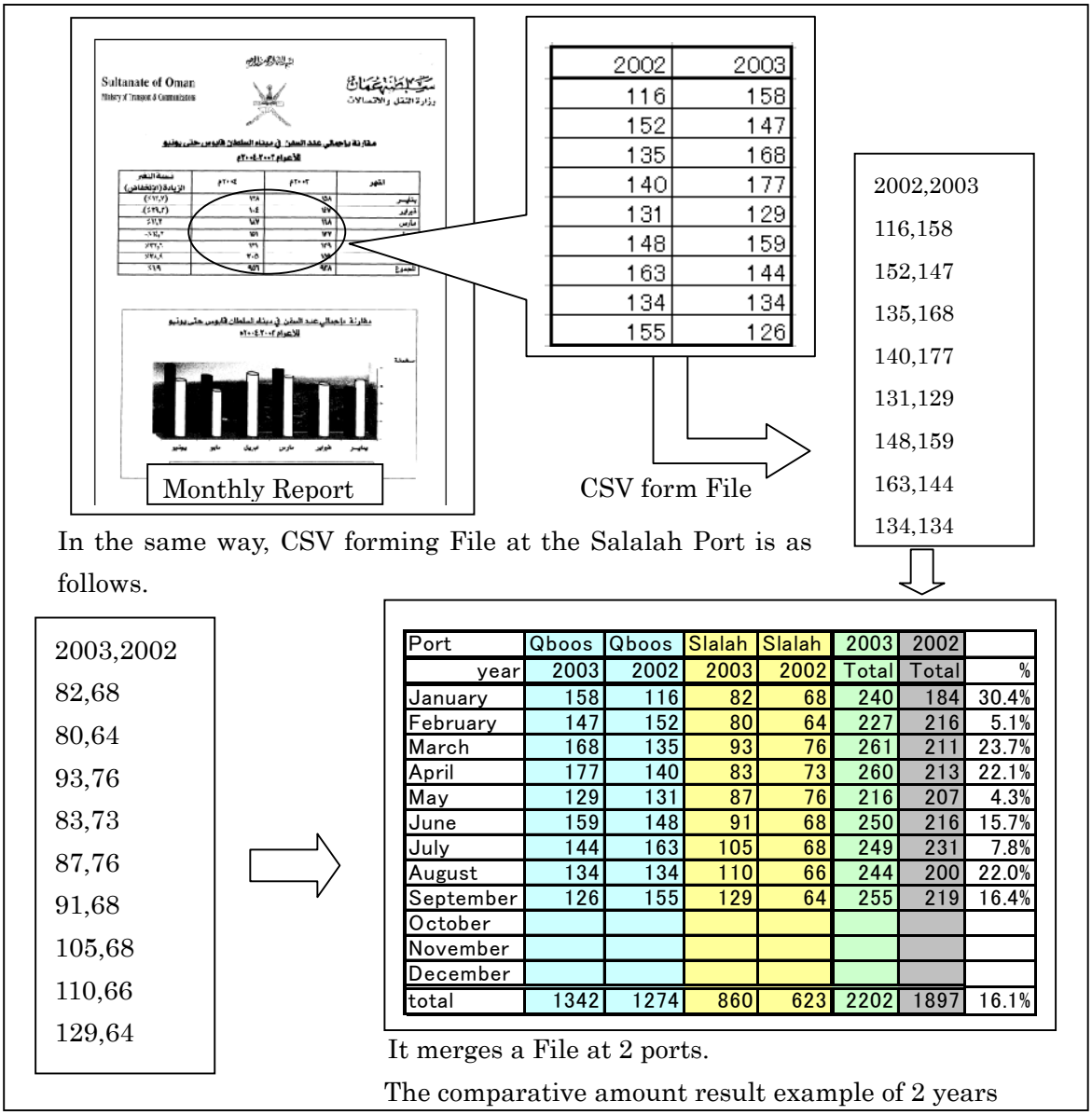
back-up books and facilitate communication among the Directorate (Figure 10.9-6).

The 2nd phase aims to upgrade the speed and capacity by introduction of ADSL, and to enhance better communication with outsiders by set-up of infrastructures (Figur10.9-7).

(2) Standardization of Statistic Data and Data Processing

According to 2003 Annual Report, 7 items of statistic data (except cargo statistics) of PSC and SPS can be compiled in one unified form of monthly data. Thus, DGPMA requests PSC and SPS to transfer existing data in a file of CSV via e-Mail, allowing DGPMA to edit electronically the transferred data to compare both ports in one table. This transference is possible by using 64Kbmp internet. The procedure is shown in Figure 10.9-8.

Figure 10.9-8 Data Processing Procedure



Port	Qboos	Qboos	Slalah	Slalah	2003	2002	
year	2003	2002	2003	2002	Total	Total	%
January	158	116	82	68	240	184	30.4%
February	147	152	80	64	227	216	5.1%
March	168	135	93	76	261	211	23.7%
April	177	140	83	73	260	213	22.1%
May	129	131	87	76	216	207	4.3%
June	159	148	91	68	250	216	15.7%
July	144	163	105	68	249	231	7.8%
August	134	134	110	66	244	200	22.0%
September	126	155	129	64	255	219	16.4%
October							
November							
December							
total	1342	1274	860	623	2202	1897	16.1%

Source: JICA Study Team

As for cargo statistics, since two ports categorize commodities by their own, and commodity name and unit are different, data processing is not possible for nationwide ports (Table 10.9-4).

Table 10.9-4 Commodity Categorization

PORT SULTAN QABOOS — Salalah Port Servise General Cargo Termina

CALSSIFICATION OF DISCHARGED CARGC

1	CONSTRUVTIONMATRILAS	1.1	1.1 CEMENT	1.1.1	bageed
				1.1.2	bulk
		1.2	STEEL	1.2.1	Structual
				1.2.2	Renforce bars
				1.2.3	Pipes and others
		1.3	TIMBRE		
		1.4	MISCELLANEOUS BUILDING MATERIALS		
		1.5	ASSEMBLED EQUIPMENT		
		1.6	CONSTRUCTION EQUIPMENT 37 UNITS		
		1.7	HAVY DUTY TRUCKS 29 UNITS		
		1.8	BULK BITUMEN		
2	FOOD-	2.1	CHILLED AND FROZEN STUFF		
		2.2	GRAINS:	2.2.1	Wheat
				2.2.2	Rice
				2.2.3	Maiza
				2.2.4	Barley
				2.2.5	Sorghum
				2.2.6	Other grains
		2.3	ANIMAL FEED		
		2.4	SUGAR		
		2.5	LIVESTOCK:	2.5.1	Sheep 14396 HEAD
				2.5.2	Goats
				2.5.3	Camels
				2.5.4	Cows
				2.5.5	Calves
				2.5.6	Horses
				2.5.7	Buffalos
		2.6	ANIMAL GHEE & VEGETABLE OILS		
		2.7	DRY & CANNED FOOD		
		2.8	FRUIT JUICE & WATER		
		2.9	BULK VEGETABEL OIL		
		2.10	OTHER FOOD TUFF		
3	CARS	3.1	HEAVY TURCKS		
		3.2	BUSES AND MINI-BUS 11 UNITS		
		3.3	CARS 3248 UNITS		
		3.4	SPARE PARTS		
		3.5	OTHE VEHICLES 322 UNITS		
4	CONSUMER GOODS	4.1	LONG LIFE		
		4.2	SHORT LIFE		
5	BULK CLINKER		BULK CLINKER		
6	OTHER CARGO		OTHER CARGO		
	BULK MARIN OIL		BULK MARINE OIL		
7	BULK CHEMICAL		BULK CHEMICAL		

1	Fuel	
2	Bulk Baryte	
3	Iron Ore Bulk	Bulk
4	Cooking Oil	
5	Bulk Cement	Bulk
6	Bulk Wheat	Bulk
7	Cattle Feed Bags	Bags
8	Building Material Bulk	Bulk
9	Bintonite Bulk	Bulk
10	Bazalani Rocks Bulk	Bulk
11	Fly Ash Bulk	Bulk
12	General Cargo	
13	Steel Pipe	
14	Cement Bags	Bags
15	Cement Jambo Bags	Bags
16	Timber	
17	Steel	
18	Vehichels	
19	Wheat Bags	Bags
20	Flour	
21	Rice	
22	Suger	
23	Food Stuff	
24	Cattle Feed Bulk	Bulk
25	Frozen Food	
26	Live Stock	
27	Dry Fish	
28	Limestone	

Source: PSC and SPS

Effort should be made to unify category of commodity and the unit and to examine items and layout of the report. Both ports report cargo data on the basis of cargo manifest, and considering extensive utilization of EDI in future, port sector may embark upon drawing-up its own commodity code consistent with customs code.

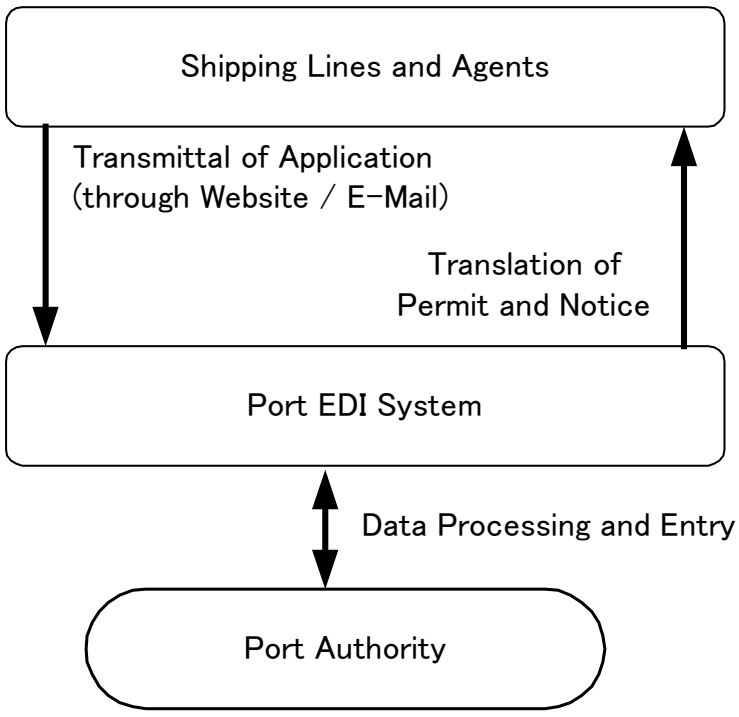
In any case, since two interfaces are required for codes of processing two ports' cargo statistics, and customs code, discussion with port authorities and customs should be commenced as early as the circumstances permit.

10.9.5 Objectives of Next Generation of Port IT System Development in Oman

(1) Concept of Port EDI

After introduction of first generation IT system in major ports in Oman, next step will be to establish integrated IT network to connect major ports as well as related agencies by EDI.

Figure 10.9-9 Image of Port EDI System (Electric Application Subsystem)



Source: JICA Study Team

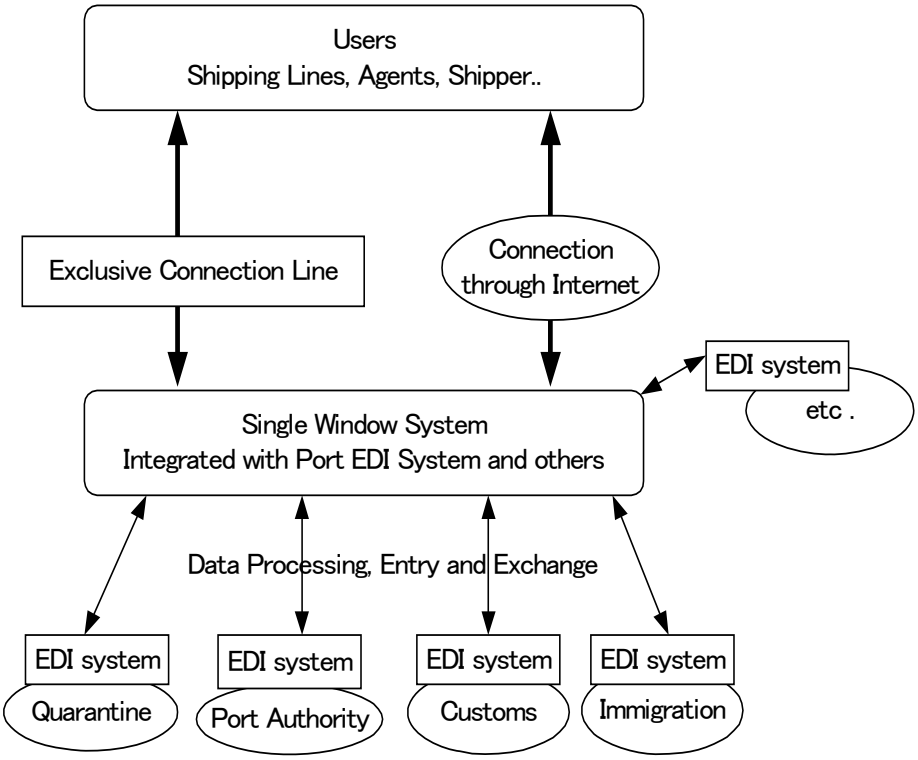
Major ports in the world including Asia and Middle East ports have already introduced EDI systems as a tool for effective management and operation as well as business promotion. Ports of Sultan Qaboos and Salalah have developed their own EDI systems and Sohar port will also introduce an EDI system when the port becomes fully operational.

By the time EDI systems are introduced at all the major ports in Oman, there may require a nation wide EDI network system among major ports to facilitate port users particularly for those ships calling multiple ports in a voyage. In order to serve for such users, as well as government agencies and DGPMA, a difference of EDI system or different user-interface at each port will be inconvenient.
Therefore, establishment of a Port LAN in DGPMA with unified EDI interface will be necessary. With this system, DGPMA can obtain up-to-date port management data and statistics from all the major port authorities.

(2) Integrated EDI System

The schematic diagram of the integrated EDI system is shown in the figure 10.9-10.

Figure 10.9-10 Integrated EDI System



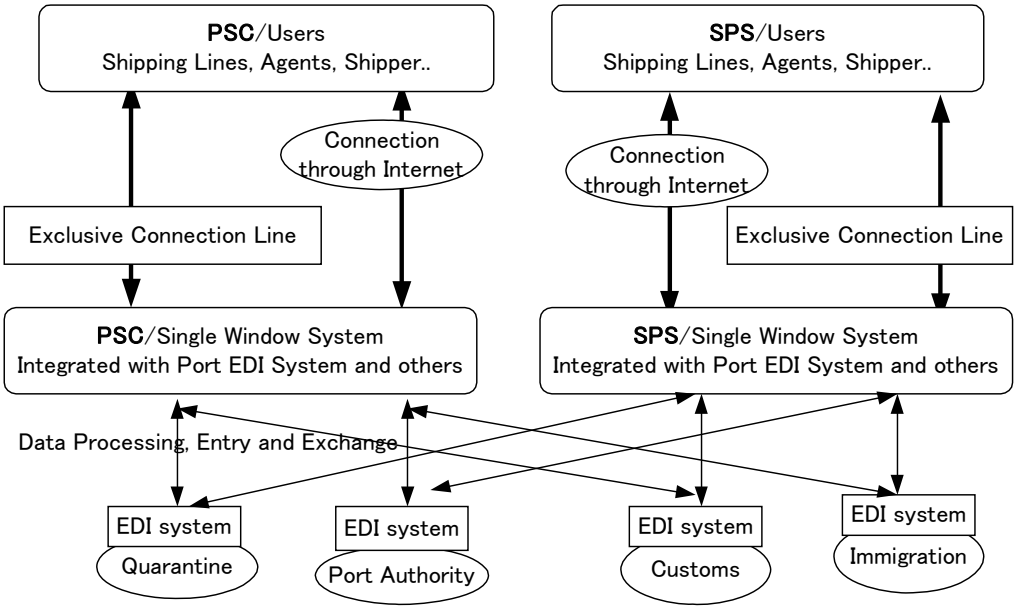
Source: JICA Study Team

Introduction of IT system in the port will be useful for not only within the port but also for port users and related agencies. Port users are required to submit information to various organizations such as Customs, Immigration, and Quarantine besides Port Authority. Usually the forms required by each agency are different from one another, resulting in a time-consuming process for port users.

So called “Single Window” system using EDI connects all the related agencies electronically and allows each organization to collect and exchange data through the network. A port user needs only one unified format document for submission to a convenient window and the entered document will be delivered to all the necessary agencies automatically.

Figure 11.9-11 shows the situation if different EDI systems for each port are developed without unified interface. Under this situation, port users have to submit applications at each port even if a ship calls two ports consecutively. After introduction of a unified EDI system, the port user can simplify his application after the first port of entry.

Figure 10.9-11 Incomplete Unified EDI System among Ports



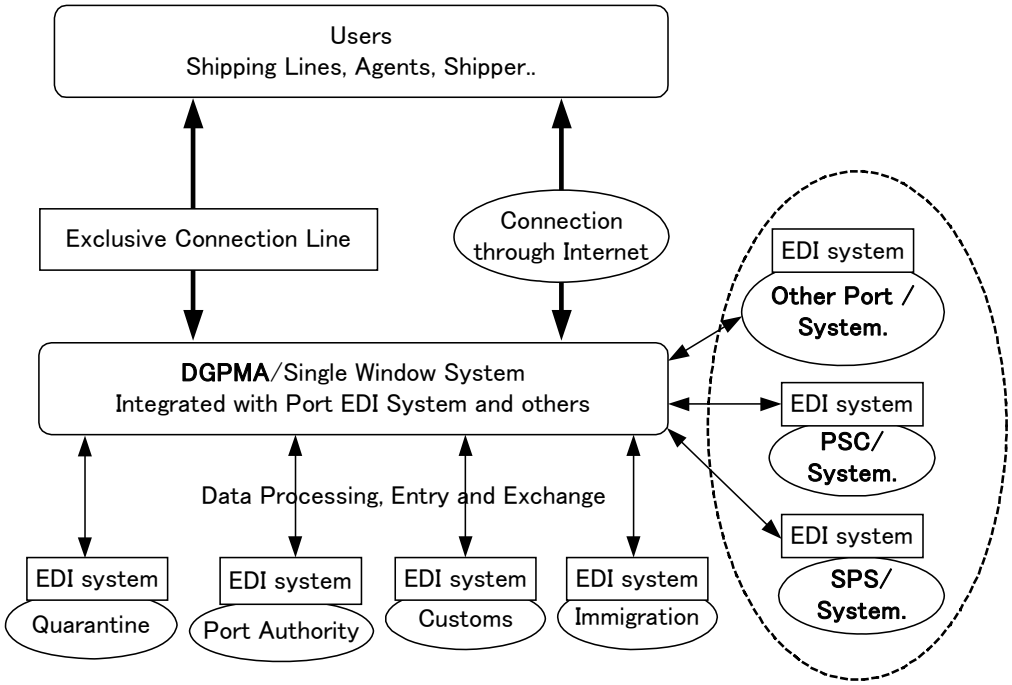
Source: JICA Study Team

(3) National Port EDI System

If an integrated EDI system is established to connect individual port system through universal interface EDI at DGPMA information center will simplify process for all the users. This unified system is shown in the figure 10.9-12.

Establishment of the national EDI system to connect major ports in Oman at DGPMA information center will facilitate easy access to ports and government agencies and port users as well as MOTC. One of the most important elements for establishment of EDI is in the coordination among related government agencies, i.e. Customs, Quarantine, Immigration and the Harbor Master. For that purpose, establishment of a new organization or center that will plan, design, develop and operate the port IT system is necessary. In order to support port activities of both public and private sectors throughout the country, the center should have 24 hour system support capability.

Figure 10.9-12 Integrated EDI Center at DGPMA and Single Window System



Source: JICA Study Team

(4) Required Budget for National EDI Center

The cost required to establish the national EDI center at DGPMA is estimated as follows.

- Hardware:- R.O. 300,000
- System development cost:- R.O. 1,000,000
- Total R.O. 1,300.000

Annual maintenance cost:-

- Maintenance of hardware and software:- R.O. 150,000
- IT manager (1) and staffs (4):- R.O. 150,000

Time required for the system development will be approximately 17 to 19 months including preliminary design, coordination among related agencies, detailed design and test run period.

10.10 Preliminary Consideration on the Effects of the International Ship and Port Facilities Security Code (ISPS Code)

(1) Background

The Diplomatic Conference on Maritime Security held in London on December 2002 adopted a series of amendments to Safety of Life at Sea Convention SOLAS) 1974 (ISPS), and a number of Resolutions with the purpose to strengthen maritime security and to prevent and suppress acts of terrorism against maritime transport sector. The amendments include Chapter X-2 and the International Ship and Port facility Security (ISPS) Code.

ISPS Code spells out in detailed security-related procedures and requirements for the Contracting Governments, port authorities and shipping companies. It is a significant result of intensive works at the IMO just over one year since the September 11 incidents in the United States, in which many government agencies as well as concerned NGOs proactively took part throughout the process.

Resolutions adopted by the Conference indicate further amendments pertaining to maritime safety and security, which will be deliberated by IMO and other organizations.

(2) Outline of the ISPS Code

The purpose of the Code is to provide a standardized and consistent framework for evaluating risks enabling governments to offset vulnerability for ships and port facilities. The Contracting Government has to ensure the completion of port facility security assessments.

The security assessments will have three components. First, they must identify and evaluate assets and infrastructures that are critical to the port facility as well as those areas or structures that, if damaged, could cause significant loss of life or damage to the port facility's economy and environment. Then, the assessment must identify the actual threat to those critical assets and infrastructures in order to prioritize security measures. Finally, the assessment must address vulnerability of the port facility by identifying its weakness in physical security, structural integrity, protection systems, procedural policies, communications systems, transportation infrastructure, utilities, and other areas within a port facility that may be a likely target. Once this assessment has been completed, government can evaluate risk.

The Code embodies a number of minimum-security requirements for ships and port facilities. For port facilities, the requirements cover:

- Port facility security plans
- Port facility security officers
- Certain security equipment

In addition, the requirement will include:

- Monitoring and controlling access
- Monitoring the activities of people and cargo
- Ensuring security communications are readily available

In order to communicate the threat at a port facility or for a ship, the government will set the appropriate security level. Security levels 1, 2 and 3 correspond to normal, medium, and high threat situations. Port Facility Security Assessment is fundamentally the risk analysis of all aspects of port facility operation to determine which parts of it are more likely to be the subject of attack.

On completion of the analysis, it will be possible to produce an overall assessment of risk level. Based on the Assessment, government or port authority will appoint a Port Facility Security Officer and to prepare a Port Facility Security Plan that should indicate the operational and physical security measures that the port facility should take to ensure that it always operates at Security level 1 (normal).

(3) Responsibility of Government

Contracting governments have various responsibilities including setting the applicable security level, verifying the compliance of ships with the provisions of the Convention and ISPS Code, and issuing the security certificate. Contracting governments should also determine which port facilities are required to designate the Port Facility Security Officer. Port security assessments and port security plans are carried out by the designated port authorities, and submitted to the Contracting governments. The governments approve the assessments and plans and any subsequent amendments. The governments are responsible for communicating information to IMO and to the shipping and port industries.

(4) State of Compliance by Ports

Given a period of only 18 months since the Conference's adoption of the new SOLAS Convention, the world port community has made enormous efforts to comply with all the requirements for port security. International Maritime Organization (IMO) reported on 30 June 2004 that about five,000 Port Facility Security Plans, which was equivalent to more than half of the total, had been submitted to their Contracting Governments.

According to the International Association of Ports and Harbors (IAPH), more than 130 ports out of about 230 worldwide major ports, which collectively handled nearly 90% of the world container throughputs, reported to the headquarters in Tokyo at the end of June 2004 that all of their port facilities were in the state of compliance with the ISPS Code. It seems that ISPS Code has been put into practice in due course so far.

(5) Port Security in the Sultanate

Both of the major commercial ports which has been engaged in international container transport in this country, namely Sultan Qaboos Port and Salalah Port, submitted Port Facility Security Plans to the government and have been in compliance with the ISPS Code since 01 July 2004. Budgets have been allocated to Sultan Qaboos Port for the renovation of the port gate in order to tighten port security although actual works are yet to be commenced.

On the other hand, Port of Sohar is an industrial port, and a couple more years will be required before full industrial operation is visible in the port area. SIPC has a plan that permanent security arrangements are to be in place by the beginning of 2005. The plan includes designing of the main security gate, construction of fences and control of traffic flow.

(6) Port State Control

Port State Control is the control of foreign flag ships in ports within the territory. The primary responsibility to control ships, which are not fulfill the requirement in terms of ship safety, marine pollution prevention, security measures and so on, lies with the flag state. However, recent experiences have revealed that in many cases flag states fail to meet that responsibility and many sub-standard vessels are plying, and port state control system has been introduced. The earliest workable regional scheme of Port State Control is Paris Memorandum of Understanding on Port State Control (Paris MOU) signed by 13 European countries in 1982. Following Paris MOU, 7 Regional Agreements are signed and these have a total of 123 member countries. The Memorandum of Understanding for the Indian Ocean was signed in 1998, of which Oman is a member. The United States does not take part in any of the regional agreements. It undertakes control measures on a unilateral basis.

Port State Control is carried out by a Port State Control Officer (PSCO). PSCO should be an experienced person qualified as a marine surveyor. MOUs establish the criteria and procedure of control, and these are reviewed timely.

A PSCO may impose the following course of action on a ship:

- Rectification of deficiencies prior to departure,
- Rectification of deficiencies in the next port, under specific conditions,
- Rectification of (minor) deficiencies (only) within 14 days,
- Detention of the ship

10.11 Optimum System for Port Administration, Management and Operation

10.11.1 National Plan for Port Development

(1) Long/Short Term National Port Development Plan

For timely port investment, better understanding and close cooperation among relevant government agencies, local governments, port authorities and related business are indispensable. Oman has some coordinating machineries such as the Supreme Committee for Town Planning, the special committee for each infrastructure project and/or steering committee for project implementation.

However, no policy or plan for nationwide port development exists in the context of long-term national economic development frame work. With such a plan, more concerted action for port investment could be achieved.

(2) Port Planning Council

In order to effectively establish the above policy and plan, creation of a Port Planning Council (PPC) in MOTC is recommended.

The function of PPC is to authorize the long term and short term port development plans by coordinating opinions and interests of related government agencies.

A major port authority is responsible to prepare original long term and short term port development plans and submit to PPC. Except for minor alteration, any revisions to the plan also need to be sent to PPC for approval. Some important/fundamental policies on port development and management matters may also be discussed.

All decisions or conclusions are reached to the higher supreme committee for transport network system through MONE. After being authorized by the supreme committee, the plan should be widely respected by all departments of government and related organizations. A model for such councils can be found in the Japanese Port Council.[1]

The Council will consist of representatives of MOF, MONE, MOMWER, MOCI, MOAF, ROP (Custom, Immigration and security), Hydrographic Department, relevant Port Authority's CEO, as well as related local governor, representatives of port users and learned persons of port and shipping business.

The powers and functions of the Port Planning Council are to some extent similar to those of Supreme Committee of Town Planning in the area of town planning and land use plan. The proposed Policy and Planning Department in DGPMA may be assigned to the Secretariat of the Council.

[1] Japanese port council discusses matters concerning to port development, long term national port development plan and port fundamental policy of development, development plan of individual ports and others. The members are composed of all ministries concerned, experts on port aspects, and stakeholders from the private sector. Recommendations of the council shall be submitted to the Minister of Land, Infrastructure and Transport.

Usually review of the short-term development plan begins three years after start of the plan and formulation of a new plan follows the review, while review of the long term- master plan begins nine years after the start of the plan and formulation of revised plan follows the review. However, if socio-economic situation changes drastically, review may start in shorter period of time.

10.11.2 Administration and Management Aspects

(1) Oversight and Regulation/Deregulation by Government

Since the privatization of port management works has been successful so far, this policy should continue in future. One of the advantages of privatization lies in the quick decision making process of the private sector. However, external and internal decision procedures tend to be duplicated and too complex to make timely investments.

To improve this situation, the following steps are recommended:

1) Some of the Government's regulatory function is necessary for ensuring port authority's performance in good order, however, in order not to impose an excessive burden on port authorities; the degree of oversight should be minimal. The government should "monitor" rather than "control," and "advise" rather than "intervene".

2) Procedure of the Financial Audit should be reviewed so as not to hinder the port authority's day to day activity. Since the Audit's purpose is to inspect fiscal expenditure, the relevant ministry can be audited rather than the port authority.

3) Explicit and implicit government regulations exist under the current system of public-private joint stock company. Naturally, some of the regulatory functions cannot be totally eliminated even in the case of private port operation. However, for a port to be more competitive with neighboring ports, efforts must focus on expediting the decision making process in the port.

It is recommended, therefore, to review decision making procedure within the port as well as among government agencies concerned, so that the necessary action to strengthen competitive ability of the port can be taken without delay.
In this respect, the Board structures in the Port Authorities need to reduce multiple steps for auditing at every stage of program implementation.

4) In order to make timely investments in port infrastructure, (infrastructure already accommodated in Five-Year Plans), DGPMA's should be given more authority, and the examination procedure of relevant ministries should be streamlined.

(2) Legal Instrument

Since the current schemes (i.e. individual port management, a combination of specific legislation and concession agreements) have functioned well in general, the schemes should continue although some modifications will be needed on a case by case basis. From the government point of view,

government has means to oversee the behaviors of port authorities through concession agreement with flexible manner. The commercial law and rules also function to keep companies performance standards. These schemes should in general be maintained.

Among the Omani legal system, comprehensive management scheme for coastal and adjacent water areas may be reviewed. While these areas provide a precious resource for human activities including fishing, tourism and environmental conservation, in many countries it proves difficult task to take balance between utilization and preservation in the area. Without adequate regulatory schemes, these areas rich with valuable resources will be facing the threat of disorderly utilization. It is desirable, therefore, to set up an inter-governmental machinery with coordinating and advisory functions.

One issue concerning port and maritime activities is building and operating of non-commercial ports, such as oil and gas terminals at sea, jetties for loading gravels and minerals, and marinas.

These facilities might affect marine and port circumstances such as security of port and coastal area, customs and emigration control, safety of navigation and land transport of cargo. MOTC has statutory power to approve building of non-commercial structures serving for loading/unloading certain commodities, and MOTC should try to execute the power more positively with a view to maintaining orderly usage of port and maritime environment.

Also, it may be recommended that measures should be studied to formulate a comprehensive policy of coastal and adjacent water area management and to draw up the area's utilization planning, as well as drafting the implementation guideline. For these far-reaching works, machinery may be required, and it may be one idea to expand the function and resources of the Supreme Committee of Town Planning, which has similar experience on land.

(3) Cultivating Skill of Omani Nationals

While major ports currently satisfy the target of Omanization with strenuous efforts, it may be difficult to reach higher ratio in future due to the high skills required for operation, and it is therefore desirable that current Omanization target stays at present level in order to supplemented by skilled expatriate workers.

Major port authorities draft and implement schemes to strengthen their workforce, for example by changing work shift, training for multi-skills and expansion of IT utilization.

It is clear, however, that even with these steps, port industries' requirement for human resources may not be satisfied. Recently two plans to create educational organizations in terms of port management, maritime officers, civil and maritime engineer etc. has been proposed. These are beneficial for both relevant industries and younger generation of Omani nationals, and it is recommended for GSO to assist the establishment of these institutions.

(4) Enhancing Nationwide Port IT Network

In the environment of widely utilized information technology, for port sector it is required to build up

information system of administration including, in particular statistics information system, database of port assets owned by GSO and management and compiling system of port documents including design data. Considering rapid progress of the technology development, and also timing of introduction of the new systems of major ports, development period should be less than 5 years.

After introduction of the first generation of IT system in the sector including major port authorities, next step is to establish an integrated IT network to connect major ports as well as related agencies by EDI. In order to serve for users, namely, relevant agencies, port authorities, shipping agents, forwarders and land transporters, establishment of a port LAN in DGPMA and unified EDI interface is required for the first phase of the network development.

So-called "Single Window" system connects all the relevant agencies electronically and allows each organization to collect and exchange data through the network. Port users will submit only one document with unified format, which will be delivered to all agencies automatically.

An integrated EDI system will connect each port at DGPMA Information Center, and all relevant agencies will have access to required information. Therefore, it is recommended that MOTC take the necessary steps for establishing the IT port network.

Ensuring stability of operation and keeping secured equipment and data management, it is desirable that port IT system is operated in the durable building with redundant facilities.

The DGPMA Information Center will require a certain sized staff including personnel with specialized skills. Staff increase may be a burden to MOTC; however, the network system will not work properly without the right staff. It is recommended that MOTC hire and train an adequate member of employees including expatriates where necessary.

(5) Participation of Private Sector in Financing Port Infrastructure Development

Furthering the private sectors role in financing additional investments is one of the objectives of the Sixth Five-year Plan, however, for the moment, GSO bears all expenses of basic infrastructure development. Since the modern Oman was born private sectors' economic power has been fostered and investment capability has been accumulated in the 30 years that have elapsed.

Under these circumstances, in near future port authorities may have the financial strength to bear a part of investment costs, or attract investors to the basic infrastructure in the Omani financial market.

Since terms of Agreement between GSO and port authorities differ from one another[2], and this management backgrounds and styles also differ, it is not appropriate to establish a uniform ruling. And before requiring port authorities to share infrastructure investment costs, consideration should also be

[2] While concession Agreement s are not open, the terms of Agreements said to be following:
1) Concession Agreement of PSC shall terminate toward the end of 2006.
2) Concession Agreement of SPS continues until 2028 with no modification clause. It provides 'first refusal' for SPS. However, there are views that the existing Agreement is applicable to the construction of berths No.5 and No.6, and no more. If this is the case, GSO is legally free to choose another concessionaire.
3) Concession Agreement of SIPC said to provide GSO bear the infrastructure investment only until 2007.

given to the degree of public investment in port infrastructure of competing ports in the neighboring countries.

At present and in the near future, it is not expected that Sultan Qaboos and Sohar port have the financial capability to bear part of the investment cost of basic infrastructure. The situation of Salalah port will be discussed in 2) iii of 10.11.5 (2).

10.11.3 Agenda for DGPMA

Number of staff engaging in port affairs in DGPMA is very limited. According to the Team's calculation there are only seven professional staffs engaging in technical matters of port excluding marine aspects at Headquarters. Due to the shortage of staff, some Departments such as Development and Marketing Department are totally vacant, and a staff assigned for compiling statistics has been vacant more than two years. Accordingly all the functions vested to the Directorate are not adequately covered.

(1) Short Term Measure

1) Strengthening of DGPMA staff

For MOTC to effectively carry out its functions, particularly those relating to planning future development and overseeing the performance of the port authorities, it is recommended to strengthen the staff in DGPMA headquarter by adding at least 10 technical staff to complement the present 7 professional staff. Other than above, a legal and technical advisor, a statistician, IT experts should be recruited [see11.5.5 (3)].

2) Creation of assistant DG for Maritime Affairs

Because of the nature of maritime administration which involves various international conventions and control over merchant marine shipping, the staff requires special expertise which is different from port engineers. Moreover, the recent increase in the workload necessitates frequent attendance to many matters by DG. Therefore, as a short term measure, it is recommended that the position of an Assistant DG for Maritime Affairs be newly created. (See (2) 1) below)

3) Creation of PPC & its Secretariat

As has been recommended in (2) of the preceding section, PPC should be created to formulate the long-term port policy as well as the Five-Year Plan. The Council members consist of representatives from the relating Ministries, Agencies as well as members from relevant public and private sectors including academe, Chamber of Commerce, Association of Shipping Lines/Agents. They are basically similar to these assigned in the Steering Committee for this Study and some attendants of the Seminar in January 2005 for this Study.

When the Committee discusses a plan of a port, representative of this particular port authority will invited as a guest member for the Committee.

The Council will meet a few times a year to deliberate on major policies on port development.

In order to prepare Council meetings, one of the policy and planning experts in DGPMA should be

assigned to the Secretariat for the Council.

(2) Long-term Reform of DGPMA

1) Separation of Maritime affaires from DGPMA

It has been recommended as a short term agenda to create an Assistant DG for Maritime Affairs, however, in future the creation of national merchant marine fleet, international requirement for security and environment, coastal and water area management will increase the responsibility and function of DGPMA. To meet the increased work load, separation of Maritime affairs from DGPMA is recommendable in the future.

2) Enforcement of maritime rules

Presently the port authorities are entrusted to manage maritime affaires such as harbor masters function and port security and environmental protection. Although enforcement of international rules in this regard is the responsibility of the government, many of the works are carried out by terminal operator/port authority.

Such works vested by SOLAS 2002 as Port Facility Plan (PFSP) and appointment of Port Facility Security Officer (PFSO) should be endorsed and reported to the relevant international organization by the government.

Some of the measures to prevent the pollution or to maintain security are a financial burden to a private terminal operator.

In the light of above situation change, both port and maritime sector of DGPMA should be more involved in the enforcement of maritime rules.

3) Creation of National EDI Center

Creation of the National EDI Center in MOTC will facilitate not only the collection of port and maritime statistics from the Port Authorities but the exchange of data among Port Authorities, Customs, Immigrations, Quarantine, Shipping Agents, Traders and DGPMA.

10.11.4 Reform of Customs Procedures

Out-dated customs procedures need to be overhauled in the light of modern transparent custom procedures. One of the most urgent remedies will be to introduce IT system into the customs procedure. At the same time, simplification of documentation, customs duty assessment system and re-training of customs officers adaptable to more international business. (Even though official language is Arabic, international business documents are written in English. Acceptance of English documents through EDI may be necessary for efficient customs).

10.11.5 Agenda for Port Authorities

(1) Major Ports

Present port administration systems at PSC, SPS and SIPC are generally following the basic principle of GSO's privatization policy in which public-private joint-stock companies act as port authorities. Although the detailed forms of private sector participation differ by ports, general principle of the above system will be continued for the foreseeable future.

Degree of public presence and share of profit from the operation among public and private sectors vary by ports. While PSC contributes the highest share of its profit to the government, SPS is producing fewer earnings relative to its size of the facilities and activities. SIPC is still at the preparation stage and actual financial performance will be made available after tenants in the industrial area begin operations.

1) PSC

PSC has improved its financial position remarkably by restraining expenditures by reducing more than 10% employees during passed four years and extending replacement period of over-aged equipments. During the same period, total cargo through the port increased more than 34% in freight tons and 1.9 times for total container volume.

However, its cargo handling efficiency is not comparable to the international standard (see 2.2.4). The responsibility for the present relatively low efficiency does not entirely rest with the present management but is partly due to the layout of the port and partly due to the government regulatory system including budget approbation and auditing procedures [also see 11.5.1(1)].

The present concession contract of PSC will expire in 2006 and the operator and the form of concession are not yet determined. Renewal of the contract may be the good opportunity to review present management system of PSC. Several options for the new concession forms can be considered.

However, because the port has a workforce of over 600 and its high financial contribution to the government, and the port must continuously be operational during transition period of the contract, there is no reason to change the present concessionaire.

2) SPS

i. Financial aspects of SPS

The present concession period lasts for 22 more years. Although the detailed conditions of the concession contract have not been made public, the basic contents of the agreement should not be altered unless any significant discrepancy or major change in the government policy arises.

When comparing the financial contribution to the government against PSC, SPS generates less revenue for the government. This is partly due to its relatively early stage of operation, but also due to its volume discount tariff system which it applies to its largest client, Maersk Sealand line vessels. Because of more than 70% of vessels calling Salalah port belong to Maersk Sealand line, actual receipt to SPS is considerably low. This situation might be interpreted as a violation of the concession

agreement that prohibits SPS from setting its tariff lower than the level of PSC's.

Moreover, SPS contracts out its management to AP Molar (Parent company to Maersk Sealand) and pays management fee and franchise fee. SPS is exempt from income tax for the initial 5 years of the concession contract and that has been extended for another 5 years.

Although extension work for berth number 5 and 6 will require additional expenditure to the port, it should be able to afford to pay tax considering its recent favorable financial performance.

Therefore, following measures may be recommendable as long as such alteration does not conflict with basic conditions of the concession agreement between SPS and GSO.

- Present volume discount to the tariff should have a certain limitation so that the discount of additional volume of containers handled by a shipping line should not be lower than 50% of the normal tariff level.
- Present tax exemption, (extended after the initial 5 year exemption) should be terminated as soon as possible.

ii. Raysut terminal

In 2000, SPS took over management of Raysut terminal which had been under control of MOTC. Raysut terminal was built to serve for local cargo such as cement, minerals and other local products for export and some import from neighboring countries. Due to recent growth of transshipment container handling at the container terminal, some of the feeder vessels use conventional cargo berths at Raysut terminal. Because of this situation, some of the non-container vessels and cargoes have difficulty of reserving a berth or a yard space. This is one of the reasons that it has been difficult to attract tenants to the Salalah industrial estate.

Even though handling of non-container cargo is less profitable than containers, SPS should manage Raysut terminal and take care not to disturb local cargo handling capacity.

iii. Financing of infrastructure development

According to the Concession Agreement, it is the duty of GSO to build the basic infrastructure of the port, and following the provision, decision has been made to build No. 5 and 6 container berths funded by GSO.

In general terms, GSO should bear the burden to build further container berths, however, there are views that the existing Agreement is applicable to the construction of berth No. 5 and 6 and no more. If this is the case, GSO is legally free to ask SPS to share a part of infrastructure investment, or to choose another concessionaire among certain candidates.

As one way to obtain a suitable terminal operator, GSO invites new private investors for new infrastructures on the condition that the government will bear a certain portion of the cost. This way of infrastructure development is a kind of BOT or BOO, of which there are many examples for port development throughout the world.

However, although a new concessionaire may be theoretically possible, a newcomer would be hesitant to compete with SPS especially if it does not receive the same benefits (i.e. GSO bears all basic infrastructure costs).

3) SIPC

The major source of revenue for SIPC is generated by leasing land to industries in the Sohar Industry Area. Eighty percent of the received rent has to be paid to MOF while twenty percent can be retained by SIPC. Even though the total industry area is 2000 ha, 500 ha have to be set aside for roads and other infrastructures. The power station, the oil refinery and the sea water de-salinization plant pay rent directly to the government rather than through SIPC.

Therefore, the revenue obtained by SIPC is not very large. The management contract to Rotterdam Port Authority requires payment of management and franchise fee. Cargo handling charges become revenue to the stevedore in the port which pays only land area rent to SIPC.

Considering the amount spent on the infrastructure development, the expected receipts from leasing the land may not be sufficient. Although the GSO expressed its policy that no direct infrastructure cost will be paid by the government after 2006, it may be difficult to pass on the cost of additional infrastructures to the new tenant or otherwise, to charge all the tenants according to the area occupying.

(2) Other Commercial Ports

1) Khasab

According to the previous Five-Year Plan of GSO, Khasab port is planned to be privatized. Although the port construction work is near its completion, MOTC manages the port directly at present. Considering the limited potential of extensive commercial operation in the port, port management by any party may not be profitable. The government may ask a private manager to manage the port but will have to provide certain subsidies until it becomes self supporting.

2) Shinas

Similar to Khasab port, Shinas port is not expected to generate sufficient revenue by its management and operation. Therefore, if the management has to be handed to a private sector, MOTC may have to subsidize it for some period in the future.

3) Ad Duqm

Duqm is a ‘greenfield port’. GSO decided to provide the port and other infrastructure. While it is premature to predict what form of management will be adopted, under the present business environment in Oman, operation will likely be conducted by the private sector(s). Since it is envisaged that port activity alone cannot enough earn revenue to meet the management expenditure, management should be limited to a landlord type authority similar to SIPC. Within this scheme the Port Authority leases the land and waterfront to the ship yard, fishing port and other terminal user/operator(s).

CHAPTER 11

PHASED DEVELOPMENT PLAN AND SELECTION OF PRIORITY PROJECTS

11 PHASED DEVELOPMENT PLAN AND SELECTION OF PRIORITY PROJECTS

11.1 Formulation of Phased Development Plans of Major Ports

11.1.1 Qaboos Port

1) Port traffic

As explained in Chapter 9.2.1, a total of about 900,000 TEUs of containers and about 3.5 million tons of conventional cargos are forecast to pass through the capital port for loading and unloading in 2025.

On the other hand, cargo handling capacity of Sultan Qaboos Port is both physically and socio-economically limited even after capacity expansion is realised at Shutaify Bay because Sultan Qaboos Port is the national gateway port and is expected to act multifunctionally including as a passenger friendly port.

In view of the urgency and a need to sustain the economic growth in the Sultanate, it can be suggested that national gateway function for container traffic remain at Sultan Qaboos Port and its handling capacity be expanded while conventional type of cargos such as breakbulk cargo be shifted to a New Port at a suitable occasion.

Table 11.1-1 shows the forecast port traffic of Sultan Qaboos Port in the base case after some portion of conventional type of cargos is shifted to a New Port. Sultan Qaboos Port is expected to handle 900,000 TEUs of containers and 1.7 million tons of dry bulk cargos such as flour in 2025.

Table 11.1-1 Allocated Port Traffic of Sultan Qaboos Port (Base Case)

		2003	2010	2015	2025
Break-Bulk	(1,000 ton)		766	782	0
Dry Bulk	(1,000 ton)	2472	1,498	1,706	1,716
Liquid Bulk	(1,000 ton)		458	557	0
Im/Ex Cntr	(1,000 teu)	151	232	312	524
Transship Cntr	(1,000 teu)	114	170	230	376

Remarks: TEU of container includes both laden and empty.

Source: JICA Study Team

2) Container handling capacity

Main problem of Qaboos Port is originated from the fact that this port has been developed basically to handle general cargoes while majority of the cargoes presently handled at Sultan Qaboos Port are containerized. In order to solve this contradiction, it is necessary to build a dedicated container terminal equipped with modern technology.

Container handling capacity has to be evaluated from both quayside capacity and yard capacity, and the smaller one of the two defines the handling capacity of the port. In the case of Sultan Qaboos Port, the yard capacity is smaller than the quayside capacity, and existing container handling capacity of

Sultan Qaboos Port is estimated at around 300,000 TEUs per annum. As container throughput at Sultan Qaboos Port is 265,000 TEUs in 2003, this analysis indicates that this port is operating for container traffic at its nearly full capacity.

As shown in Table 11.1-1, the container traffic demand at Sultan Qaboos Port shall go beyond the existing handling capacity in around 2005, and potential demand will reach 400 TEUs in 2010. Based on the demand forecast, it can be said that expansion of container handling capacity is an urgent need and a must for sustainable economic growth of the Sultanate. As development of a new port is likely to take more than ten years until it becomes operational, other options but for Sultan Qaboos's expansion for short run are not recommendable.

3) First phase development

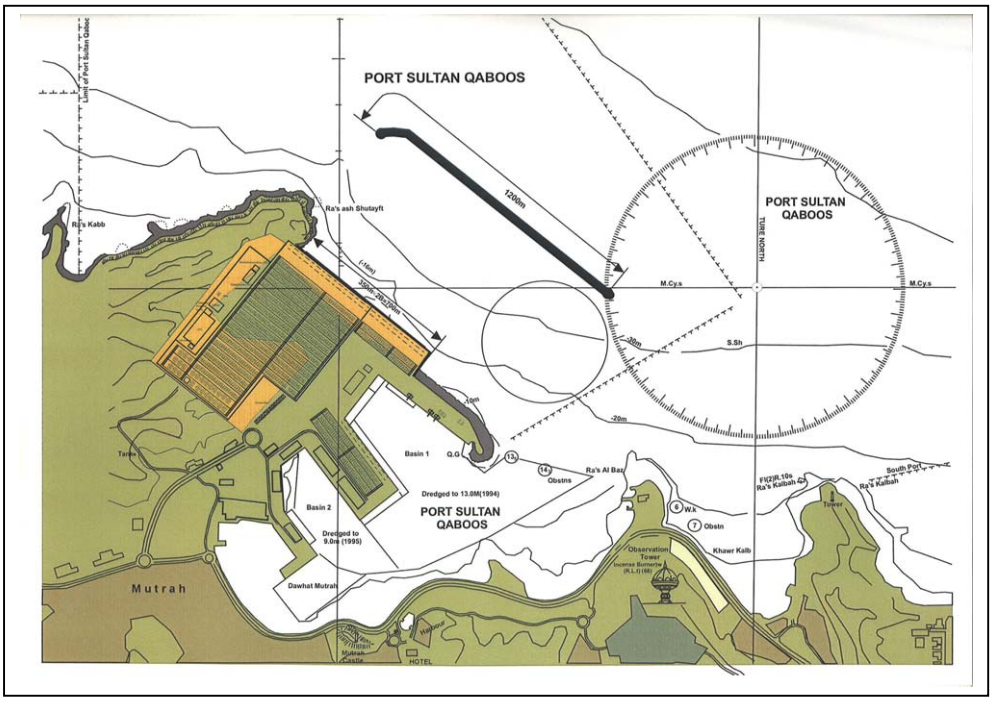
First phase development is to build a new container terminal with two deep berths as shown in Figure 11.1-1. Outer breakwater has to be constructed prior to the construction of the quays. Construction of breakwater and quays as well as reclamation will require very large quantities of filling. Hill behind the grain silos between the main port area and Shutaify Bay is a suitable source for the filling materials. After taking rocks and filling required for the civil works from the hill, levelling the site of hills would create yard space needed for the expanded port activities. About 24 ha of yard space will be created at the first phase development.

Increase of quayside capacity by installing 3 gantry cranes per berth can be expected at around 240,000 TEUs per annum per berth in case of BOR being 0.6 and 300,000 TEUs per annum per berth in case of BOR being 0.75. However, creation of additional 24ha of yard space by levelling the quarry sites will provide additional stocking capacity of 380, 000 TEUs, which restricts the terminal capacity. Container handling capacity of Sultan Qaboos Port depends on availability of yard space even after the first phase development is realized.

After completion of the first phase development, the installed total container handling capacity will go up to 680,000 TEUs per annum while anticipated container traffic in 2010 is about 400,000 TEUs. Although it is theoretically possible to construct a container berth at the Shutaify Outer Harbour one by one, JICA Study Team propose to construct two container berths as the first phase plan because Sultan Qaboos has rich potential as a regional container hub port, and because excessive subdivision of construction works will become hindrances to efficient container operation at the Shutaify Container Yard due to close proximity of excavation sites for rocks and filling.

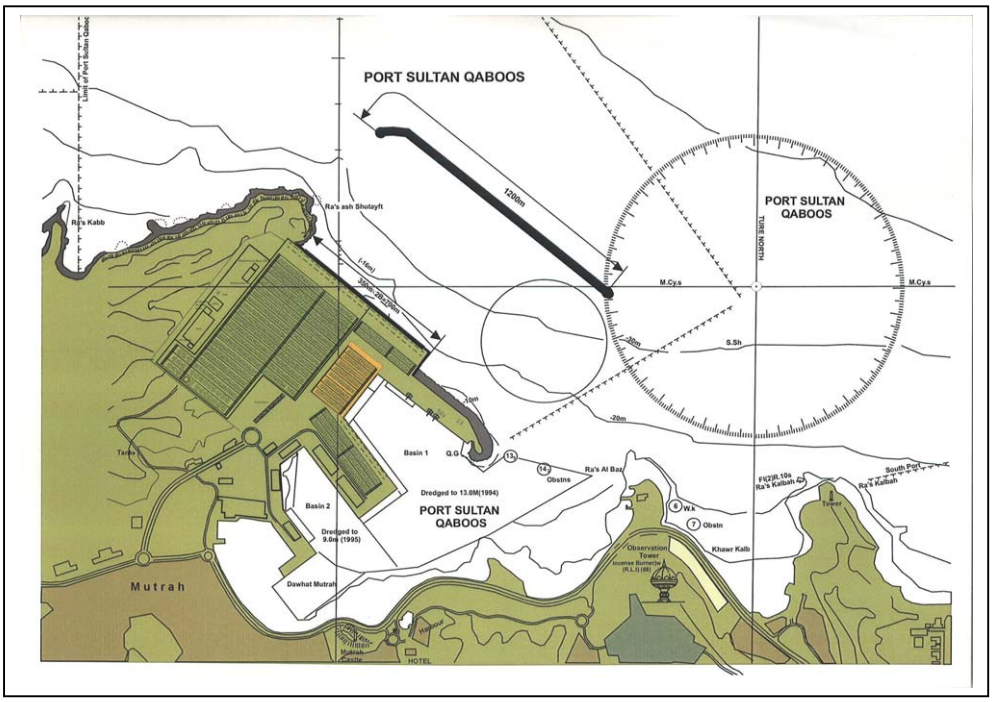
Figure 11.1-1 shows the first phase development plan of Sultan Qaboos Port.

Figure 11.1-1 First Phase Development Plan of Sultan Qaboos Port



Source: JICA Study Team

Figure 11.1-2 Second Phase Development Plan of Sultan Qaboos Port



Source: JICA Study Team

4) Second phase development

After the first phase development, rearrangement of storage areas, demolishing of transit sheds and warehouses, relocation of workshops, and conversion to a container stocking area should be implemented as well as enhancement of the port's equipment inventory. This sort of arrangement would produce additional space and assist the port to improve operational efficiency.

Conversion of transit shed area just behind the No.3 conventional berth into container stocking yard would create additional about 100,000 TEUs capacity. This creation of additional container handling capacity can trigger the rearrangement of berth allocation, and will allow cement handling operation to shift from No.8 berth to No.4 and No.5 berths. The second phase development should be completed by the middle of the 9th 5-Year Development Plan, preferably by the end of the 8th Plan. Figure 11.1-2 shows the second phase development plan of Sultan Qaboos Port.

5) Final phase development

Final phase development, facility layout plan of which is shown in Figure 11.1-3, is to add one more container berth at the outer harbour. Civil works of this phase also involve extension of the breakwater by 300m and creation of additional about 10ha of yard space by leveling site of the quarry. The newly created yard and berth space will provide another container handling capacity by 200,000 TEUs. This final phase development should be implemented by 2020 to cope with traffic demand.

Overall rearrangement of berth allocation can be implemented at this phase in association with commissioning of a newly developed port which would handle conventional cargos. Cruise terminal would be shifted and extended from No.6 berth to No.7 berth. A portion of the port area and its adjacent area should be converted to a port-initiated amenity zone for tourists and the public in general. Land use planning in and around the port area should be well coordinated with city planning.

Especially Muttrah is one of the most favourite tourist destinations. Ships moorings along the berths are attractions for tourists, especially at night. Viewing platform for the portscape should be provided at proper places. Public relation is one of the most important issues for the port in recent years.
Overall container cargo demand and installed handling capacity are summarized in Table 11.1-2.

6) Flexibility to demand

Container traffic which is forecast to pass through Sultan Qaboos Port is summarized by each case, i.e. Base, High, Low case in Table 11.1-3. In the High Case, the second phase development should be realised by 2015, and the third container berth at the Outer Harbour be constructed by the middle of 9th Plan. If the High Case scenario continues, capacity shortage of container handling may happen. In such case, measures to reduce dwell time in the container terminal may be required. Close monitoring on port traffic is recommended.

On the other hand, if Low Case of container traffic is realized, implementation timing after the second phase developments should be adjusted accordingly.

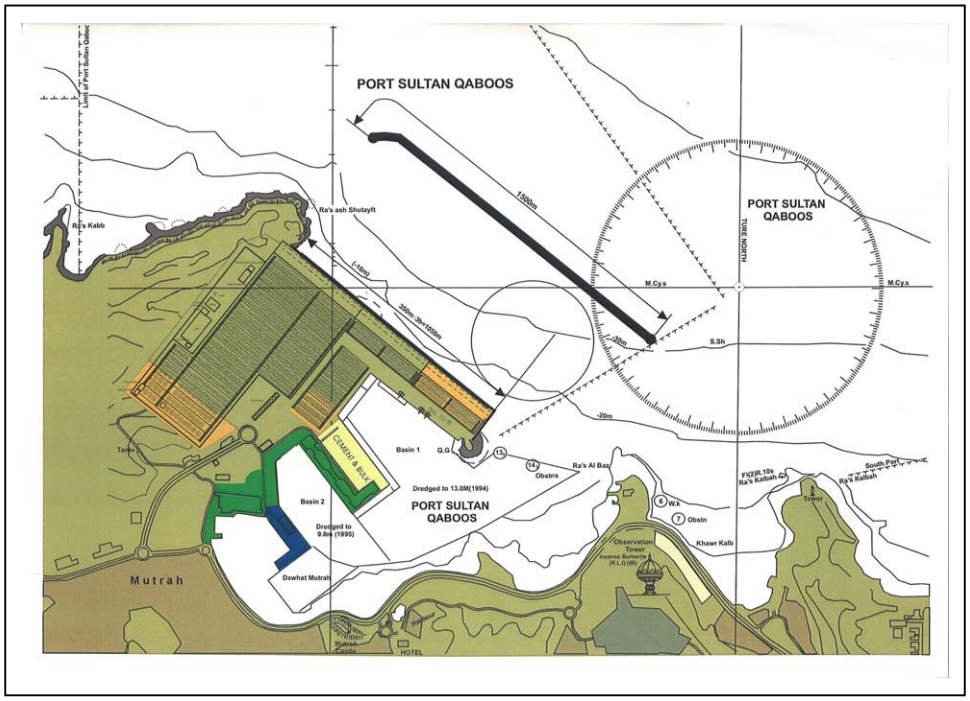
Table 11.1-2 Container Demand and Installed Capacity of Sultan Qaboos Port in Base Case

(Unit: 1,000TEU)

5-Year Plan	6th		7th	8th	9th		10th	
Year	2003	2005	2010	2015	2018	2020	2023	2025
Capacity (Existing)	300	300	300	300	220	220	220	220
Capacity (Priority Proj.)	0	0	380	380	380	380	380	380
Capacity (No.3 Shed Conversion)	0	0	0	0	100	100	100	100
Capacity (Outer New No.3 Berth)						200	200	200
Installed Total Container Handling Capacity	300	300	680	680	700	900	900	900
Container Cargo Demand (Base Case)	265	304	402	542	649	721	828	900

Remarks: After completion of the Priority Project, No4 & 5 berths will be converted to Bulk Berths.
Source: JICA Study Team

Figure 11.1-3 Final Phase of Development Plan of Sultan Qaboos Port



Source: JICA Study Team

Table 11.1-3 Forecast Container Throughput by Case of Sultan Qaboos Port

(Unit: 1,000 TEU)

Year	2003	2010	2015	2025
Base Case	265	402	542	900
High Case	265	490	692	1,252
Low Case	265	331	435	711

Source: JICA Study Team

11.1.2 Salalah Port

1) Port traffic

Table 11.1-4 shows the forecast traffic of Salalah Port at selected years by cargo category for the Base Case. Salalah Port is expected to handle about 3 million TEUs of containers in 2010, about 4 million TEUs in 2015, and about 7 million TEUs in 2025. Salalah Port also handles conventional cargos and their total volume will be 2.5million tons in 2010, 3.1 million tons in 2015, and 3.3 million tons in 2025. Among the conventional cargoes, dry bulk cargo accounts for more than 80%.

Table 11.1-4 Port Traffic of Salalah Port (Base Case)

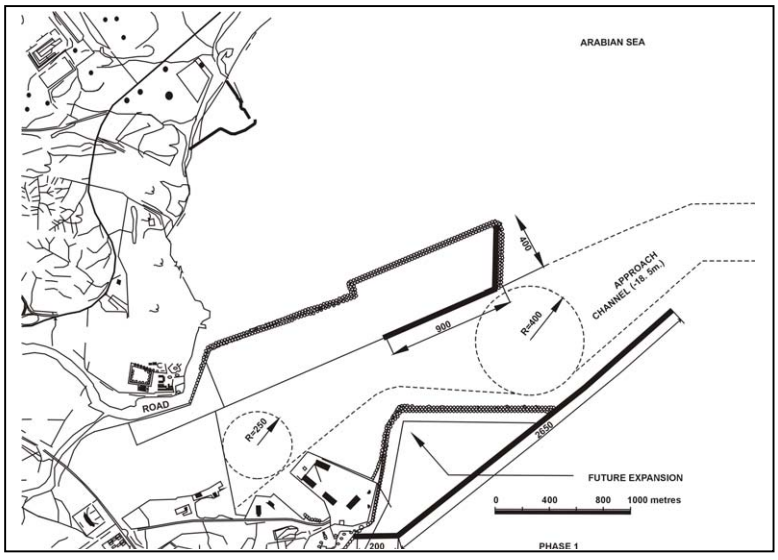
		2003	2010	2015	2025
Break-Bulk	(1,000 ton)		131	136	120
Dry Bulk	(1,000 ton)	1347	2,123	2,722	2,755
Liquid Bulk	(1,000 ton)		214	264	416
Im/Ex Cntr	(1,000 teu)		64	114	430
Transship Cntr	(1,000 teu)	2,001	2,972	4,029	6,571

Remarks: TEU of container includes both laden and empty.

Source: JICA Study Team

2) On-going project

Figure 11.1-4 On-Going Project of Salalah Port



Source: JICA Study Team

As shown in the above table, Salalah Port handled more than 2 million TEUs in 2003. Installed container handling capacity of the Port is estimated at around 2 million TEUs. Therefore, this port is operating at the maximum capacity presently. It was observed in 2003 the terminal was saturated with containers, and overflowed to conventional terminal.

The government of the Sultanate understood a need of the terminal extension and approved the project in the intermediate step of the sixth 5-Year Plan, and construction works of this project is on-going and under floating as of January 2005. The project is expected to complete in 2007.

This on-going project is an extension of container berths by 900m with alongside water depth of 18m. Extension and new alignment of breakwater, deepening and widening of the entrance channel and ship

turning basin together with reclamation works by the dredged materials are included in this project. After the completion of this project, Salalah Port will hold additional container handling capacity by more than one million TEUs. Facility Layout of Salalah Port after completion of the on-going project is shown in Figure 11.1-4.

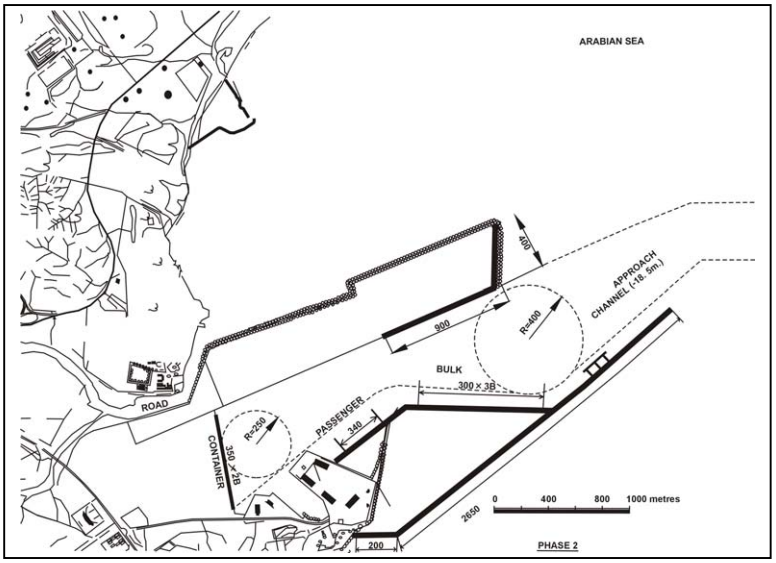
3) First phase development

Even after the completion of the on-going project explained above, Salalah Port will be saturated again with containers by the middle of 8th Development Plan. To cope with future container traffic, JICA Study Team proposes an extension of the container terminal to No. 30 and 31 berths which have already been utilised as container stocking yard, and paving of the yard was implemented in 2004. Because No.30 and No.31 berths adjoin the container terminal, efficiency of container terminal operation can be realized.

Salalah Free Zone Company was established with 100% of Government share to develop, manage, and operate the Free Zone. Phase I of FZ development will provide customers with approximately 40 ha of distribution, logistics, freight forwarding and manufacturing facilities. To develop and promote the FZ, deep water berths with sufficient backup area which should be easily accessible are inevitable.

First phase development of Salalah Port aims to promote regional economic development by providing sufficient area for cargo handling as well as to provide extra container handling capacity after the on-going project.

Figure 11.1-5 First Phase Development Plan of Salalah Port



Source: JICA Study Team

Dry bulk cargo volume is forecast at 2.1 million tons in 2010 and 2.7 million tons in 2015. As explained in detail in Chapter 9.2.2, three berths are required to load and unload bulk cargos such as cement and lime stones. New bulk terminal with three berths will be built at the north end of the new reclamation area.

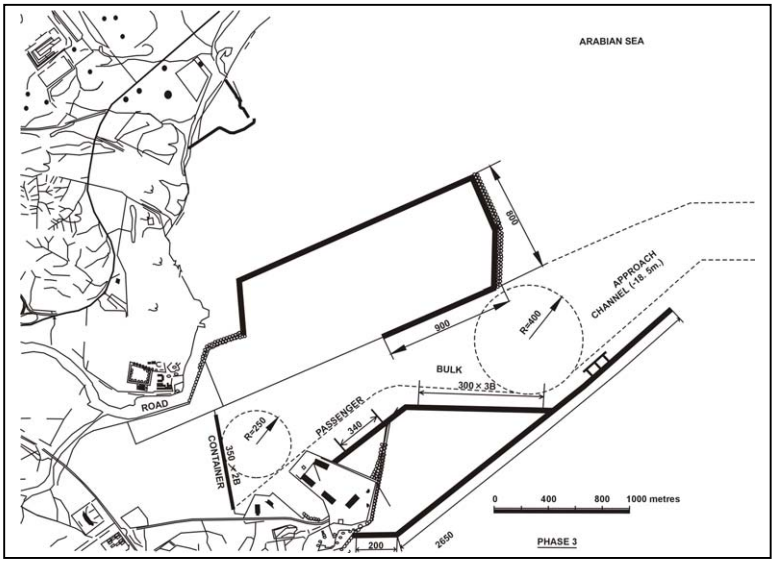
A new passenger terminal will be built on the reclamation area facing the existing container terminal. The government proposes economic diversification、deviation from oil-led industrial and financial structure to multiple and diversified structure. Tourism has been deemed one of the most prospective

new industries, and DGPMA/MOTC initiated construction of cruise terminals at Sultan Qaboos Port and Khasab Port. Salalah is also one of the favourite tourist destinations in the Middle East. Government vessels can also utilize the passenger berth with careful scheduling and coordination. Oil jetty has to be relocated at the back side of the newly built breakwater.

It is proposed that the first phase development be implemented during the seventh 5-Year Development Plan in order to avoid capacity shortage for dry bulk cargo handling at the existing bulk terminal. Further, providing sufficient capacity for handling every type of cargos is necessary to develop adjoining Free Trade Zone and to attract prospective investors. Figure 11.1-5 shows the first phase development plan of Salalah Port.

4) Second phase development

Figure 11.1-6 Second Phase Development Plan of Salalah Port



Second phase development is the widening of the existing container terminal to the north by reclamation and construction of total five berths from No.7 to No. 11 with a total length of 1,750 m as the demand increases. Total width of the terminal will become 800 m.

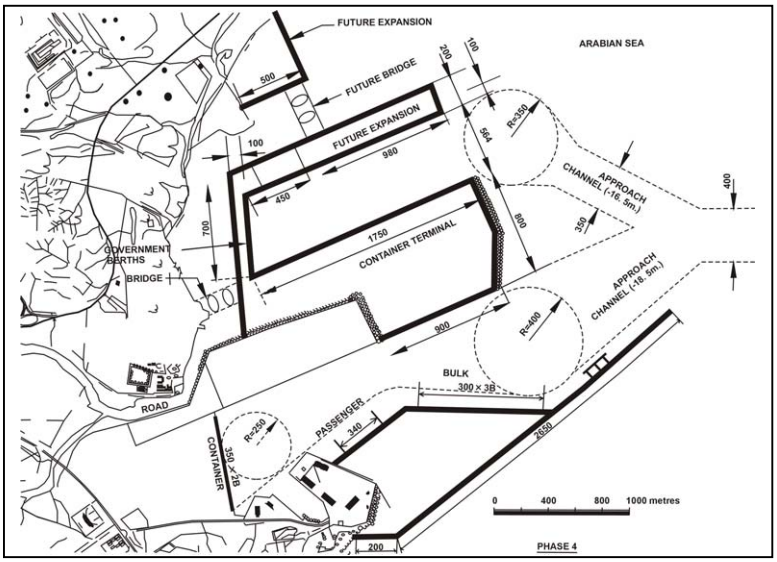
Source: JICA Study Team

As shown in Table 11.1-4, it is forecast that container throughput at Salalah Port will reach 4.1 million TEUs in 2015, which is nearly equivalent to the installed capacity of the first phase development. Therefore, initial one or two berths of the second phase development have to be realized by the end of the eighth 5-Year Development Plan.

5) Third phase development plan

The third phase development, which is the final development of this area, is construction of a dedicated government berth to the north of the container terminal, if required. Future extension space can be found to the further north. Break bulk terminal can be shifted from the existing conventional cargo terminal if necessary.

Figure 11.1-7 Second Phase Development Plan of Salalah Port



Source: JICA Study Team

6) Flexibility to demand

Container traffic forecast of Salalah Port is summarized by case in Table 11.1-5. Container throughput forecast of High Case is about 30 % higher than that of Base Case. If the container traffic increases in the manner of High Case, first one or two berths of the second phase development should come to realization by the beginning of eighth 5-Year Development Plan, and even after completion of the second phase development, proposed facilities for Salalah Port cannot accommodate the forecast level of container throughput. Alternation of the master plan would be required in such case.

If Low Case of container traffic is realized, implementation timing after the second phase developments should be adjusted accordingly.

Table 11.1-5 Forecast Container Throughput by Case of Salalah Port

(Unit: 1,000 TEU)

Year	2003	2010	2015	2025
Base Case	2,001	3,036	4,143	7,001
High Case	2,001	3,753	5,335	9,509
Low Case	2,001	2,768	3,695	6,249

Source: JICA Study Team

11.1.3 Sohar Port

1) Port traffic

Table 11.1-6 summarises results of demand forecast of Sohar Port in the Base Case scenario. Currently Sohar Port handles only project cargos for development of industrial zone and construction of factory's plants. It is forecast that bulk cargos will reach more than 10 million tons in the end of 7th Plan, 1.7 million tons in the end of 8th Plan forward while container traffic will steadily increase year by year, i.e. about 300,000 TEUs in 2010, about 400,000 TEUs in 2015, and nearly 700,000 TEUs in 2025. The containers handled at Sohar Port are for export/import and mostly originated from and destined to Sohar Industrial Area.

Table 11.1-6 Port Traffic of Sohar Port (Base Case)

		2003	2010	2015	2025
Break-Bulk	(1,000 ton)	0	854	1,010	1,010
Dry Bulk	(1,000 ton)	0	3,775	6,385	6,385
Liquid Bulk	(1,000 ton)	0	7,679	9,308	9,308
Im/Ex Cntr	(1,000 teu)	0	312	422	672
Transship Cntr	(1,000 teu)	0	0	0	0

Remarks: TEU of container includes both laden and empty.

Source: JICA Study Team

2) Project components

First phase development of Sohar Port is composed of two different type of projects. The first one is to construct two bulk berths with a total length of 600m for aluminum smelter project and DRI project. These berths will be leased out to each project company from the first day of the commencement. Aluminum smelter project is expected to commence its operation in 2007 while operation schedule of DRI project is yet to be confirmed.

Construction of a container berth for unloading raw materials for industries and loading products manufactured in the Sohar Industrial Area is another important project for the first phase development. There are two other options to transport industrial related goods by containers, i.e. through Sultan Qaboos Port or through Jebel Ali Port. In the case of the former, it has been suffered from space shortage for container handling, and in the case of the latter, it is not only being a foreign port but also it is approaching gradually its economic maximum capacity. It takes more than three hours for trucking containers to either Sultan Qaboos Port or Jebel Ali Port. As about 300,000 TEUs per annum of container demand exist in Sohar Industrial Area in 2010, it is recommended to construct a dedicated container terminal at Sohar Port while using existing multi-purpose berths for container handling may be an option.

3) Container terminal capacity

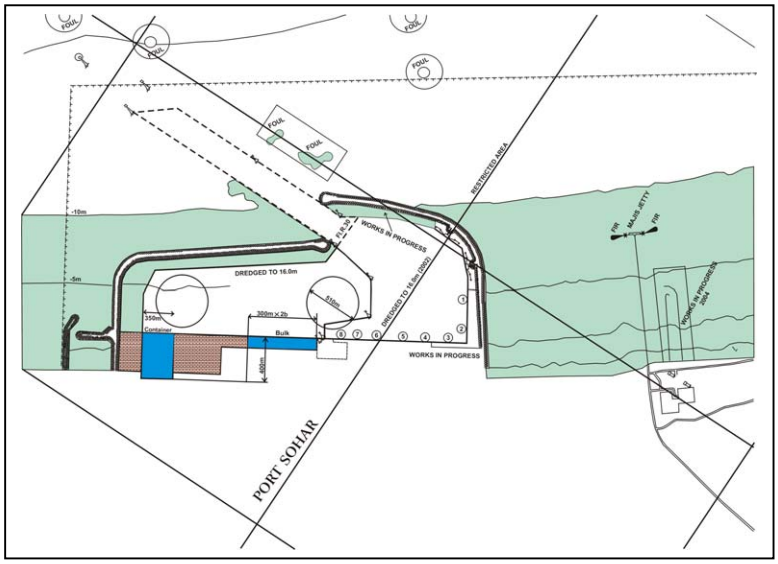
Container terminal capacity has to be evaluated from both quayside capacity and yard capacity. For the evaluation of the former, it is assumed that one container berth is equipped with 3 gantry cranes and

berth occupancy rate is set at 0.7. Resulting quayside capacity is estimated at about 300,000 TEUs per annum.

Regarding the yard capacity, terminal area is set at 350m in length by 400m in width, and average dwell time of containers is assumed at 7 days in light of natures of export container dominated terminal of Sohar. Resulting yard capacity is about 300,000 TEUs per annum, too. From these analyses, container terminal capacity at Sohar Port is estimated at about 300,000 TEUs per annum.

4) First phase development

Figure 11.1-8 First Phase Development Plan of Sohar Port



Source: JICA Study Team

Taking into consideration both the forecast demand shown in Table 11.1-6 and terminal capacity explained above, 2 berths for bulk cargoes and one dedicated container berth are required in 2010. Proposed facility layout for the first phase development is shown in Figure 11.1-8.

Container terminal's location is suggested to be at the northern end of the waterfront industrial area, i.e. at the foot of the northern breakwater. This proposed plan has flexibility for future use of shore line between the proposed bulk terminal and container terminal. It should be also noted that the proposed plan can avoid possible hindrance to port operation during the dredging works which may occur in other options. On the other hand, proposed first phase development plan requires large quantity of dredging for basin at the initial stage.

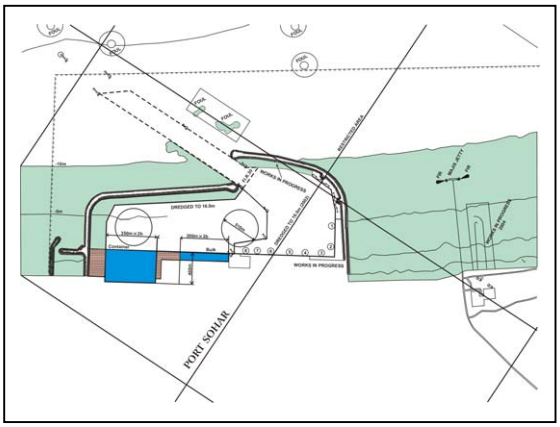
Another option can be considered regarding the location of the container terminal. The location of the first container berth can be shifted to south, adjoining the bulk terminal. This option has less planning flexibility because expansion of bulk/general cargo terminal further north is limited by the existence of the container terminal. Using a multi purpose berth for container handling may be another option at the first stage, but needs long term foresight about container traffic in the Sohar industrial area and waterfront land use as well as future scheme of port operation.

JICA Study Team evaluated the pros and cons of each location plan, and proposes the facility layout plan shown in Figure 11.1-8 as the first phase development plan of Sohar Port.

5) Second and third phase development

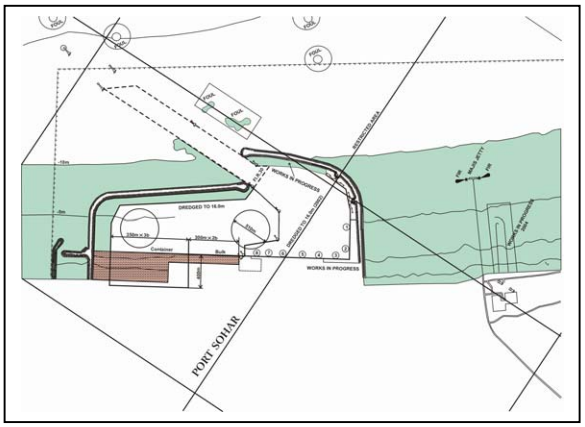
JICA study team forecasts that the second container berth will be needed around in 2015, and the third one should be constructed by 2025. The port demands for years after 2015 include input and output cargoes to/from industrial activities which will take place at inland industrial area with the maximum expansion area of 6,828 ha. 12.5% and 25% of utilization rates of the hinterland industrial area are assumed for the year of 2020 and 2025, respectively.

Figure 11.1-9 Second Phase Plan



Source: JICA Study Team

Figure 11.1-10 Third Phase Plan



Source: JICA Study Team

6) Flexibility to demand

Table 11.1-7 summarises the forecast container traffic by each case of Sohar Port. Resulting demands of each case up to 2015 do not much differ among the cases because same development speed of waterfront industrial area is assumed for each case. Different resulting demands are originated from development speed of inland industrial area only. In the High Case, the third container berth should be built by 2020. In the Low Case, 2 berths can accommodate the container traffic even in 2025. Careful monitoring on port traffic is recommended because Sohar is a new port without past traffic records.

Table 11.1-7 Forecast Container Throughput by Case of Sohar Port

(Unit: 1,000 TEU)

Year	2003	2010	2015	2025
Base Case	0	312	422	672
High Case	0	312	496	796
Low Case	0	312	438	546

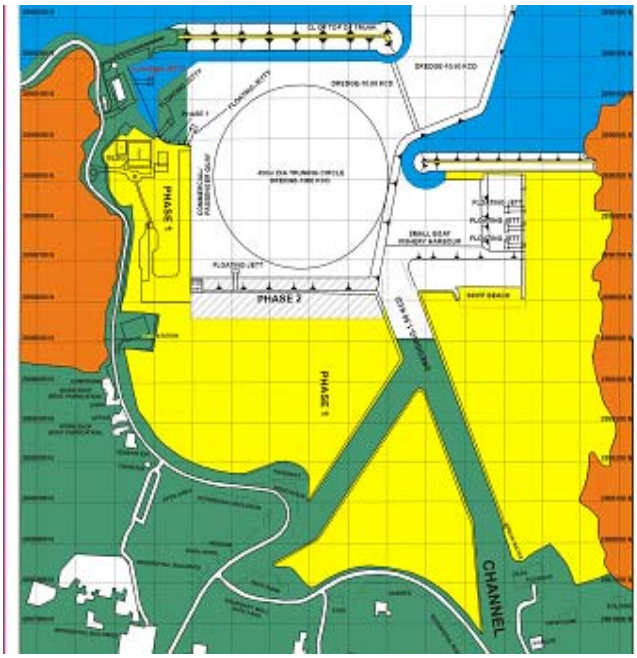
Source: JICA Study Team

11.1.4 Khasab Port

Marine works for Khasab Port expansion, which is shown in Figure 3.4-1, were completed in October 2004. Two breakwaters were constructed to protect basin with water depth of 10m, and mooring facilities were developed to accommodate both cruise vessels and Ro/Ro vessels. Floating berths for wooden boats and speed boats were also prepared. Fishery harbour with berthing facilities was developed at the east side of the Khasab Bay. Reclamation area with 75 ha was created by the dredged materials of the basin. It seems that the newly completed harbour can sufficiently accommodate traffic for the foreseeable future. Careful monitoring on the trends of the port activities is recommended for the preparation of the next step development.

After completion of the marine works explained above, construction of passenger terminal building and other buildings began in October 2004, conceptual layout of which is shown in Figure 9.2.10. Main area left for expanding berthing facilities is an area along the seaward end of the reclaimed land (about 400m long) on the southern side of the bay. An area behind the north breakwater is anther possibility. These areas are considered to be enough to cope with unpredictable port activities in future.

Figure 11.1-11 Development Plan of Khasab Port



Source: DGPMA/MOTC

In light of the existence of sufficient port capacity and wide unutilised reclamation area, it is not likely that Khasab Port encounter with shortage of port capacity within foreseeable future. Further, there exist unpredictable elements in Khasab Port planning such as foreign country's policy on unofficial trade practice. Taking these factors into consideration, Khasab Port Development Plan for 2025 shown in Figure 9.2.10 need not be further phased out.

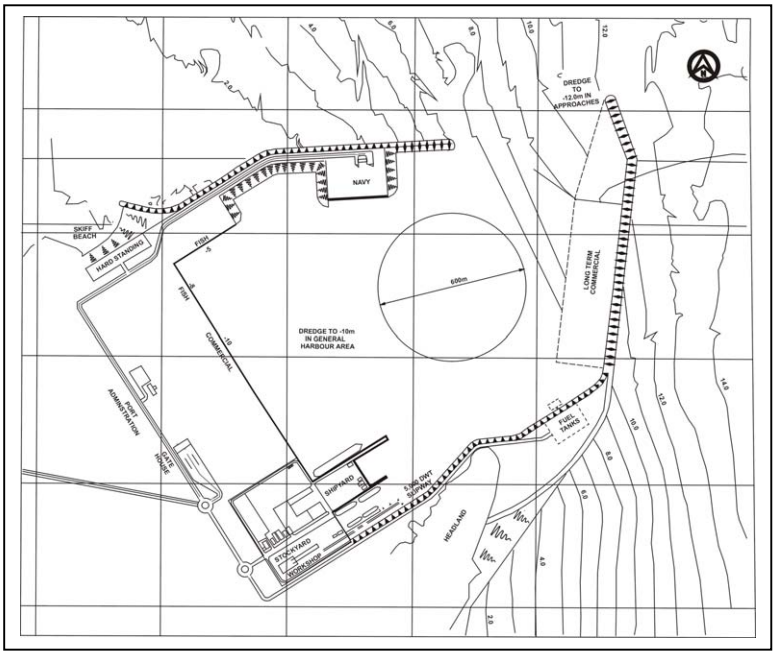
11.1.5 Duqm Port

1) First phase development

Duqm dry dock port project should start small. It is difficult to say that the 100,000 DWT dry dock has sufficient number of potential customers and that the project is financially viable. Dry dock at scarcely populated area without significant industrial activities will require basic and social infrastructure developments which will need considerable length of time to be taken place.

On the other hand, careful analysis on ship call records of Salalah Port reveals that several vessels are calling the southern port and stay along the berth for several days. This fact indicates that there exists demand for ship repairing in this region. Because the preceding feasibility study predicted that the 100,000 DWT dry dock is not financially viable, starting the project with ship repair slipway for smaller size such as 5,000 DWT class vessels is recommended. Quays for commercial vessels, fishing boats and government's boats should be also constructed at the early stage of the development because there are no berthing facilities for these types of vessels in the Region.

Figure 11.1-12 First Phase Development Plan of Duqm Port



Source: Modified by JICA Study Team

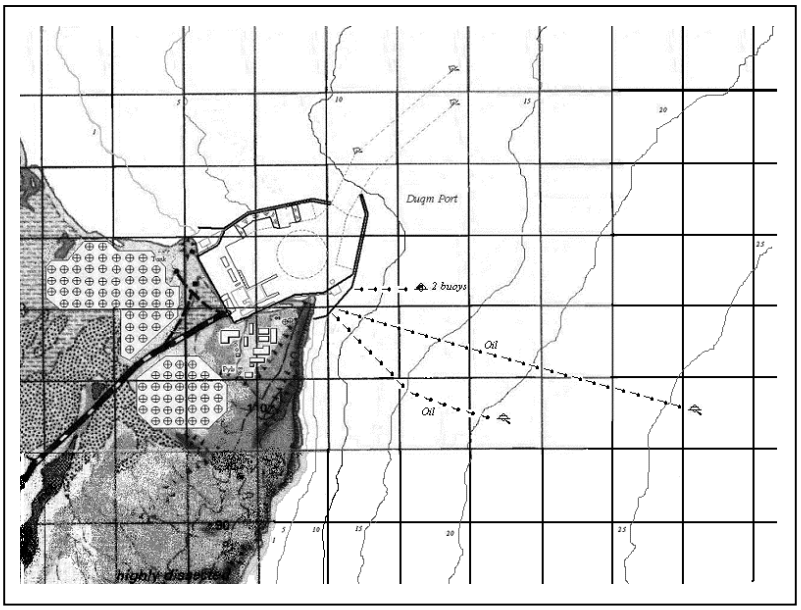
Construction of breakwaters may need some modifications. As it seems that East Breakwater can protect a considerable portion of basins from high waves, initial length of West Breakwater may be shortened for the sake of cost reduction. Shortening by 300m may be an option. After monitoring degree of calf in the basin and sediment movement on the sea bottom, West Breakwater can be extended if necessary.

2) Second phase development

Oil refinery and storage project will require huge investment. However, once national or/and international consensus is reached, project should proceed as quickly as possible. Prior to the consensus, careful studies and evaluation on natural and environmental conditions have to be implemented. Among marine meteorological condition surveys, wave height observation is important

because wave height is decisive factor for the rate of operation of SBM. Soil investigation is also important to decide the suitable location for oil storage tanks

Figure 11.1-13 Second Phase Development of Duqm Port

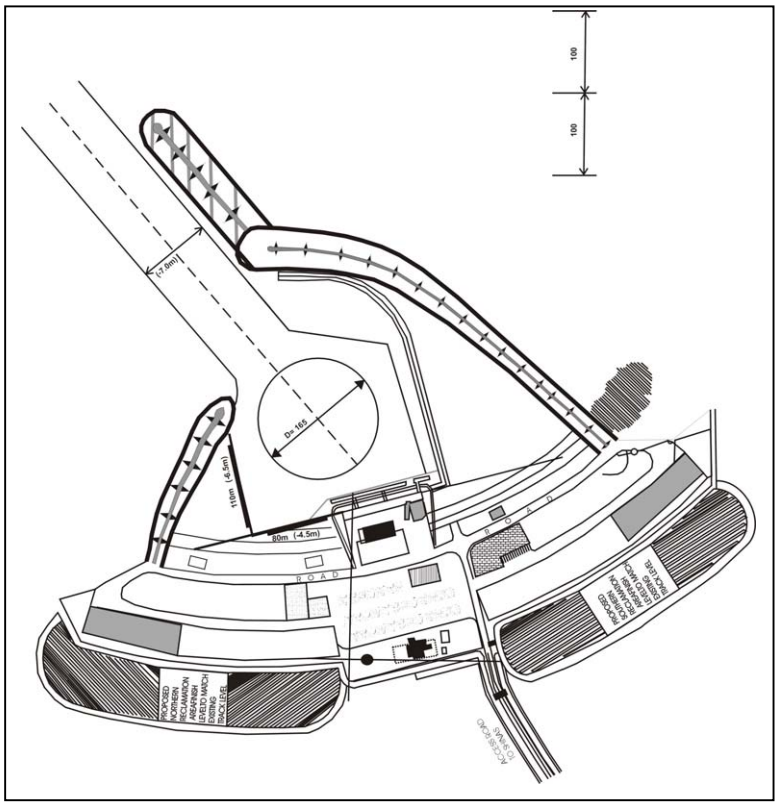


Source: JICA Study Team

Figure 11.1-13 shows suggested overall concept of the second phase development of the port and industrial complex at Duqm.

11.1.6 Shinas Port

Figure 11.1-14 Development Plan of Shinas Port



Source: JICA Study Team

Shinas Port development plan is not ambitious one but rather simple. Two berths with alongside water depth of 6.5m and 4.5m each are proposed. Dredging of channel and basin is also proposed to allow commercial vessels for entering and leaving the port. As these civil works are on a small scale, formation of phased development plan is not necessary for the implementation in this particular case. The project should be implemented at a time as early as possible because the project can be considered as provision of minimum infrastructure to the local people.

Figure 11.1 14 shows development plan of Shinas Port.

11.2 Assessment and Selection of Priority Projects for the Seventh Five-Year Development Plan

First phase development projects of the long-term plan of each study port were evaluated and assessed to select priority projects, which are to be incorporated in the Seventh Five-Year Development Plan. Projects which are currently carried in the Sixth Five-Year Development Plan and expected to continue in the next Five-Year Plan are also evaluated in this work.

Selection criteria basically consist of the following three components and each has several elements:

Policy Consistency	i.	Economic Diversification
	ii.	Transportation Cost Reduction
	iii.	Balanced Development
Economic Justification	iv.	Continuity
	v.	Urgency
	vi.	Maturity

Environmental Considerations

In the Chapter 8, Basic Policy on Port Sector Development is discussed. For assessing and selecting the priority projects, consistency with the basic policy is desired. Economic diversification is the government's long-term policy. Projects in line with this policy should be given high priority.

Deepening and widening channel to accommodate larger vessels aim at reducing maritime transportation cost. Development of new port where no other ports exist nearby could contribute to reduce land transportation cost. This type of port development projects will be given high priority.

Currently population is concentrated in Muscat, and more than 50% of the national total resides in either Muscat Governorate or Batinah Region. Government has a policy to maximize the benefits generated from utilization of the national land. Priority is given to port projects in unpopulated region and will play as a nucleus of regional development.

Economic justification is another important component to assess and justify the projects. Projects which started in the Sixth Five-Year Development Plan had already been evaluated and selected as good projects. To complete the already started project is important for the government to keep the public reliance and trust.

Projects with high urgency should be implemented as early as possible. If a large gap exists between demand and supply on services, social unrest and economical loss will be generated. Projects with high demand shall be given preference over the others.

In order proceed the projects, several kinds of studies and works such as project definition study and design of major facility have to be preceded before the construction works come on site. The word "Maturity" may be altered by the word "Readiness" of the project.

Environmental aspect is another important factor for the selection of the priority projects. Results of screening and scoping on environmental issues related with future development plans are taken into consideration. If a project seems to give adverse effects to social and natural conditions, a lower point will be given in this evaluation.

Each element has 3 points as the highest, and point "0" means the project is very far away from such element. Point of each element will be added up arithmetically, and comparative importance among the elements is not taken into consideration.

Resulting outcome of this assessment is shown in Table 11.2-1. Projects both at Salalah and Sohar gain high points while projects at Khasab Port and Shinas Port are given relatively low points.

Table 11.2-1 Assessment and Selection of Priority Project

Port	Project	Diversification of Economy	Transportation Cost Reduction	Balanced Development	Continuity	Urgency	Matuarity	Environment	Total
Qaboos	**Cruise Terminal***	3			3		3	2	**11**
	1st Phase	2	2			3	2	2	**11**
Salalah	**Berth No5 & 6***		2	1	3	3	3	2	**14**
	1st Phase	3	2	1	1	1		3	**11**
Sohar	**1st Phase***	3	2	1	3	2	1	2	**14**
Khasab	**Development Plan**			3				3	**6**
Duqm	**1st Phase***	1	1	3	3	1	1	1	**11**
Shinas	**Development Plan**		1	3	1		1	2	**8**

Source: JICA Study Team

Remarks: * indicates " Under Implementation " project

Priority projects are selected and shown as follows;

Figure 11.2-1 Sultan Qaboos Port

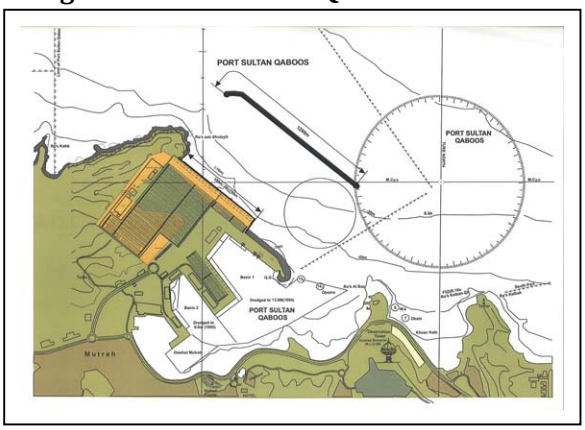


Figure 11.2-2 Salalah Port

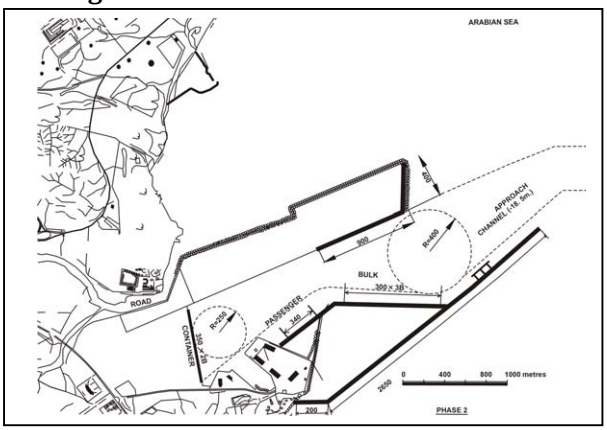


Figure 11.2-3 Sohar Port

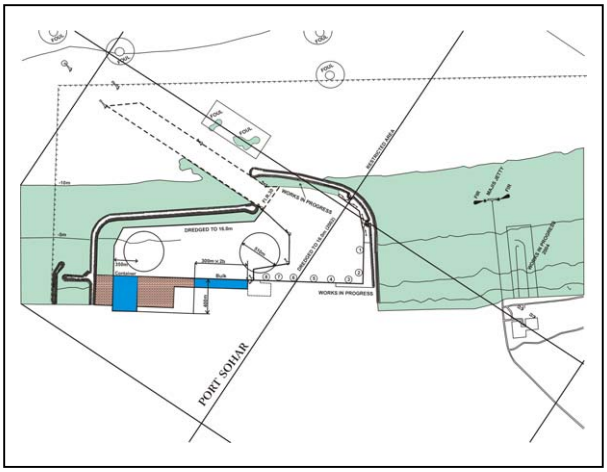


Figure 11.2-4 Duqm Port