#### 7.4 Benefits

#### 7.4.1 Benefit Items

Considering the "With" and "Without" situations mentioned above, the following items are identified as the benefits of the Short-term Development Plan for the New Port:

- 1) Savings in the waiting costs of vessels.
- 2) Savings in time costs.
- 3) Savings in land transportation costs.
- 4) Earnings of foreign currency in handling container cargoes.
- 5) Promotion of regional development in Sohar as well as national development in Oman.
- 6) Increase in employment opportunities/incomes.
- 7) Multiplier effect from the investment of the new port.

Of the above, items 1) to 4) are considered as tangible benefits in terms of the cost-benefit analysis in this Study.

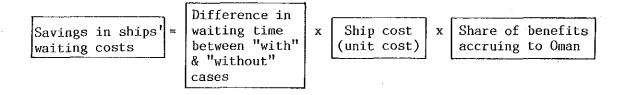
# 7.4.2 Savings in the Waiting Costs of Vessels

The volume of conventional cargo handled at Mina Qaboos and the new port will increase in future, as mentioned in Chapter 3. If the new port were not constructed, the increased volume would have to be handled at Mina Qaboos only and the waiting time of calling ships would increase in accordance with port congestion. (Container cargo volume would not increase, as mentioned in section 7.3.2.)

Implementing the project will prevent this problem. Investment in the new port will reduce the waiting time of calling ships and this cost reduction is one of the major benefits of the project.

Benefits that will accrue to Oman from the project can be calculated by comparing the "With" case to the "Without" case.

The formula used to calculate this benefit is as follows:



# (1) Difference in Waiting Time

The difference in ships' waiting time between the "With" case and the "Without" case can be obtained by using a queuing simulation. Waiting time under the "With" case is set at the same level as in the Mina Qaboos Development Plan.

The results are shown in Tables 7-4-1 and 7-4-2. (The details are shown in Tables 7-4-4 and 7-4-5.)

Table 7-4-1 Ships' Waiting Time between "With" Case and "Without" Case in 2000

Ship type		iting Time (hrs/ship)	Total Waiti	ng Time lays/year)	Diffrence (days/year)
3	"Without"	"With"	"Without"	"With"	
Steel	19.6	3.5	120.9	21.9	99.1
Timber	8.4	0.9	. 21.0	2.4	18.6
Vehicle	4.5	1.5	54.2	18.2	36.0
Livestock	6.5	1.4	12.2	2.7	9.5
General Cargo	12.3	0.8	167.0	11.0	156.0
TOTAL	10.0	1.5	375.2	/ 56 <b>.</b> 1.	319.1

Table 7-4-2 Ships' Walting Time between "With" Case and "Without" Case in 2004

Ship type		iting Time (hrs/ship)	Total Wait:	ing Time lays/year)	Diffrence (days/year)
	"Without"	"With"	"Without"	"With"	
Stee1	24.7	3.5	190.4	27.3	163.1
Timber	11.6	0.9	31.5	2.5	29.0
Vehicle	10.3	1,5	149.0	21.8	127.2
Livestock	15.7	1.4	34.1	3.1	31.0
General Cargo	21.5	0.8	337.2	12.5	324.6
TOTAL	17.4	1.6	742.1	67.3	674.9

# (2) Ship Cost (Unit Cost)

Ship cost is estimated by accumulating the component factors of cost such as depreciation, wages, maintenance cost and so forth.

Although it is conceivable to estimate ship cost based on charter rate, this rate has been fluctuating so much according to the market conditions that it is not appropriate for economic price of ship cost.

Table 7-4-3 shows the ship waiting cost estimated by the Study Team based on the estimation made by some Japanese shipping companies.

Table 7-4-3 Ship Cost by Ship Size
(General Cargo Ships)

Ship Size(DWT)	3,000	10,000	21,000	37,000
Ship Cost(US\$/ship/day)	4,000	10,000	15,000	17,000

# (3) Share of Benefits Accruing to Oman

The savings in waiting costs of vessels are primarily realized by shipping companies. Since Oman has no national shipping company at present, these benefits accrue to other countries. However, some portion of these benefits should be returned to Oman after some time-lag. It is possible for Oman to acquire some of the benefits by, for instance, decreasing freight rates reflecting the reduced incidence of delays at the port. In this Study it is assumed that 50% of the benefits attributed to foreign ship operators will be transferred to the Omani economy.

#### (4) Calculation Results (Savings in Waiting Costs of Vessels)

Tables 7-4-4 and 7-4-5 show the results of the calculation of savings in ships' waiting costs by ship size. Since the figures are shown in border prices, they are economic prices themselves.

Table 7-4-4 Saving s in Ships' Waiting Costs in 2000

																			فسننسا
Benefits	Accruing	to Омап	('000 RO)		20	70	110	38	7	13	13	38	13	ന	34	ľΩ	84	09	208
Ship's	Waiting	Costs	('000 RO)	-	77	141	220	9/	17	25	26	77	26	9	29	10	168	120	1,017
Ship's	Waiting	Çosts	(us\$	(000)	106	366	572	198	36	99	29	200	68	15	175	27	437	311	2,641
	Difference	(Days)			35.2	28.1	35.8	16.5	.2.1	16.4	6.7	12.9	8,5	0.1	87.4	6.7	39.7	22.2	319.1
- 91	)ifference	(Hrs.)			978	.675	859	396	51	395	.160	309	707	24	2,098	161	953	532	7,659
Waiting Time	With Case Difference	(Hrs.)	•		12	ie.	482	9	20	77	195	198	27	38	0	0	97	218	1,346
	Without Case	(Hrs.)		-	928	706	1,340	607	101	438	355	202	. 231	61	2,098	161	666	750	9,006
Ship Costs	1 \$SN)	/Ship/Day)	-		3,000	13,000	16,000	12,000	17,000	7,000	10,000	15,500	8,000	.15,000	2,000	4,000	11,000	14,000	
Ship Size	(DMI)				2,000	17,000	30,000	14,000	37,000	3,000	10,000	27,000	000,6	21,000	1,000	3,000	12,000	20,000	
Ship Type			*		Steel (I)	Steel (II)	Steel(III)	Timber (I)	Timber (II)	Vehicle (I)	Vehicle (II)	Vehicle(III)	Livestock (I)	Livestock (II)	General Cargo (I)	General Cargo (II)	General Cargo(III)	General Cargo (IV)	· TOTAL
No.					Н	2	ო	4	Ŋ	0	^	ω.	φ.	10	11	12	13	14	

Table 7-4-5 Saving s in Ships' Waiting Costs in 2004

<u>%</u> 	4	Sity Costs		4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ד אוווכ		s útuc	e diric)	מווערווער
	(DWT) ((	(ns\$	Without Case	With Case	Difference	Difference	Waiting	Waiting	Accruing
	<u> </u>	/Ship/Day)	(Hrs.)	(Hrs.)	(Hrs.)	(Days)	Costs	Costs	to Oman
•							\$sn)	('000 RO)	('000 RO)
							(000)		
12	2,000	3,000	1,304	15	1,289	53.7	191	62	31
17	17,000	13,000	899	39	860	35;8	997	179	06
8	30,000	16,000	2,366	602	1,764	73.5	1,176	453	226
14	14,000	12,000	248	7	541	22:6	271	104	52
37	37,000	17,000	208	54	154	6.4	109	75	21
ന	3,000	4,000	776	51	724	30.2	121	97	23
10	10,000	10,000	1,372	233	1,139	47.5	475	186	16
27	27,000	15,500	1,428	238	1,190	9.67	492	296	148
Q	0000.6	8,000	629	32	298	24.9	199	77	38
21	21,000	15,000	190	43	146	6.1	91	35	18
r-1 ·	1,000	2,000	3,372	0	3,372	140.5	281	108	54
ഗ	3,000	7,000	2,353	0	2,353	98.1	392	151	2/9
12	12,000	11,000	1,315	53	1,262	52.6	578	223	111
20	20,000	14,000	1,052	248	804	33.5	469	181	06
			17,811	1,615	16,197	6.479	5,558	2,140	1,070

#### 7.4.3 Savings in Time Costs

The reduction of ships' waiting time due to the construction of the new port brings about a reduction in the time required for imports and exports.

This will bring about a reduction in usance interest because invested funds will be called in faster. Converted into monetary terms, this reduced time can be estimated by the following equation:

Saving in Time Costs = Q X D X V X I / 365

Where, Q: Average Parcel Size (tons/ship)

D: Reduction of Ships' Waiting Time (days)

V : Average Cargo Value (RO/ton)

I : Interest Rate (%/year)

Average cargo value is calculated by commodity based upon the actual value and quantity of imports/exports in 1988, the data for which is available in the "Statistical Year Book 1988". The results of the calculation are shown in Table 7-4-6.

Table 7-4-6 Unit Price of Cargo

(Unit: RO/ton)

Cargo	Steel	Timber	Vehicle	Livestock	Other Cargo
Unit Price (RO/ton)	236.4	154.6	3,400.6	407.1	556.5

Usance interest rate is estimated at 8.5% per annum based on the London interbank offered rate (LIBOR) in April 1990.

Tables 7-4-7 and 7-4-8 show the estimated reductions in time costs. Since the figures are also shown in border prices, they do not need to be converted to economic prices.

Table 7-4-7 Savings in Time Costs in 2000

Ship Type	No. of	Averate	Cargo Value	Interest	Reduction of	Saving of
e e e	Ships:	Parcel Size	nit e i e i e.	Rate	Ship Waiting	Time Costs
		(ton/ship)	(RO/ton)	(%/year)	(Days)	(RO '000)
Steel (I)	40	716	236.4	8.50	35.2	1
Steel (II)	52	1,971	236.4	8.50	28.1	3
Steel(III)	56	4,111	236.4	8.50	35.9	8
Timber (I)	32	1,767	154.6	8.50	16.5	1
Timber (II)	28	2,409	154.6	8.50	2.1	0
Vehicle (I)	23	104	3,400.6	8.50	16.4	1
Vehicle (II)	177	306	3,400.6	8,50	6.7	2
Vehicle(III)	90	335	3,400.6	8.50	12.9	3
Livestock (I)	18	394	407.1	8,50	8.5	0
Livestock (II)	27	507	407.1	8,50	1.0	0
General Cargo (I)	150	221	556.5	8.50	87.4	. 3
General Cargo (II)	56	548	556.5	8.50	6.7	0
General Cargo(III)	92	1,558	556.5	8.50	39.7	8
General Cargo (IV)	29	3,652	556.5	8.50	22.2	10
TOTAL	870				319.1	42

Table 7-4-8 Savings in Time Costs in 2004

Ship Type	No. of	Averate	Cargo Value	Interest	Reduction of	Saving of
	Ships	Parcel Size		Rate	Ship Waiting	Time Costs
	-	(ton/ship)	(RO/ton)	(%/year)	(Days)	(RO '000)
Steel (I)	50	716	236.4	8.50	53.7	2
Steel (II)	65	1,971	236.4	8,50	35.8	4
Steel(III)	.70	4,111	236.4	8.50	73.5	17
Timber (I)	35	1,767	154.6	8.50	22.6	1
Timber (II)	30	2,409	154.6	8.50	6.4	1
Vehicle (I)	27	104	3,400.6	8.50	30.2	2
Vehicle (II)	212	306	3,400.6	8.50	47.5	11
Vehicle(III)	108	335	3,400,6	8.50	49.6	13
Livestock (I)	21	394	407.1	8.50	24.9	1
Livestock (II)	31	507	407.1	8.50	6.1	0
General Cargo (I)	173	221	556.5	8,50	140.5	4
General Cargo (II)	64	548	556.5	8.50	98.1	7
General Cargo(III)	106	1,558	556.5	8.50	52.6	11
General Cargo (IV)	33	3,652	556.5	8,50	33.5	16
TOTAL	1,025				674.9	90

#### 7.4.4 Savings in Land Transportation Costs

As mentioned in 7.2.4, under the "Without" case some of the local container cargo is assumed to deviate to the Dubai ports and to be imported from Dubai by land, while all the other cargo but containers is assumed to be handled at Mina Qaboos.

Therefore, the land transportation costs in the "Without" case can be considered as one of the benefits of the project.

The unit cost of land transportation is calculated based on the actual operation performance in Oman about which the Study Team has obtained some pieces of information by interviewing a few Omani land transport companies.

The unit cost is first estimated in the market prices which can be broken down into component costs such as depreciation, working expenses, fuel costs and so forth. Then, the economic pricing is applied to each of these factors in estimating the economic price of land transportation costs.

Taking into consideration that the distance from Dubai to Sohar is approximately  $250 \mathrm{km}$ , the unit cost of land transportation (trailer) is estimated as  $64.3 \mathrm{~RO/TEU}$ .

The benefit from savings in land transportation costs can be obtained by multiplying the above unit cost by cargo volume (TEUs) of containers, which are assumed to be transported by land. Table 7-4-9 shows the results from 2000 to 2005 year by year:

Table 7-4-9 Savings in Land Transportation Costs

Year	Cargo Volume (TEUs)	Land Transportation Costs(1000 RO)
2000	42,054	· 2 <b>,</b> 704
2001	49,516	3,184
2002	56,875	3 <b>,</b> 657
2003	64,150	4,125
2004	71,350	4 <b>,</b> 588
2005	78,486	5,047

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# 7.4.5 Foreign Currency Earnings in Handling Container Cargoes

While 348,412 TEUs of containers will be handled at both Mina Qaboos and the new port in 2000 under the "With" case, it is assumed that under the "Without" case only 246,058 TEUs would be handled at Mina Qaboos.

This means that the foreign currency earnings in handling the balance of the cargo volumes between both cases (102,354 TEUs) would be lost to Oman in 2000. Therefore, recouping these lost earnings is another major benefit of the project.

Foreign currency revenue related to container handling in the new port can be calculated based upon the figures given in the next chapter. Since this revenue can be considered as border prices, there is no need of converting to economic prices.

Table 7-4-10 shows the benefit of foreign currency earnings from 2000 to 2005.

Year	Cargo Volume (TEUs)	Foreign Currency Revenue('000 RO)
2000	102,354	1,565
2001	121,721	1,835
2002	141,087	2,110
2003	160,454	2,382
2004	179,820	2,658
2005	199,187	2,933

Table 7-4-10 Benefit of Foreign Currency Earnings

#### 7.4.6 Other Benefits

As mentioned in 7.4.1, there are other important benefits stemming from this project even though they are not calculated as benefits in the cost-benefit analysis in this chapter.

## 1) Promotion of regional development in Sohar

As detailed in Chapter 4, there are many proposed projects, such as a Free Trade Zone (FTZ), industries based upon natural gas resources, an industrial estate, agro-related industries and so forth, which are

crucially dependent upon the existence of the new port. Were it not for the new port, it would be impossible to carry out projects that will promote regional development in Sohar and achieve the diversification of Oman's industries.

# 2) Increase in employment opportunities/income

The construction of the new port and the subsequent port operation will increase employment opportunities for construction and port workers.

According to cost estimation, construction work will require 232,046 man-days and the total amount of the compensation of employees during construction will be RO 1,619,000.

According to the next chapter, the number of employees of the port management body will be 925 and annual personnel costs after 2000 will be RO 3,181,000.

This can be considered as one of the benefits of the project.

# 3) Multiplier effect from the project

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The construction and the operation of a port create a large amount of added value in the national economy. Although it is very difficult to evaluate this added value, an analysis partly based upon some assumption is made in Annex 7-4-1, which reaches the conclusion that the total added value created by construction of the new port will be RO 23,468,000 for the six years during construction and that the added value produced by the port service industries will be RO 2,889,000 in 2000, which will increase to RO 6,713,000 in 2005.

# 7.5 Costs

#### 7.5.1 Cost Items

The items that should be considered as costs of the project are: construction costs, personnel costs, operating/maintenance costs, administration costs and renewal investment costs.

#### 7.5.2 Construction Costs

The construction costs are estimated in Chapter 6. However, these costs include facilities/works such as breakwater, dredging and so forth, which are provided not only for the Short-term Development Plan but also used as existing facilities/works in the Master Plan for 2015. Therefore, it would be excessive to consider all of these costs as those of this short-term project only. In the economic analysis, the costs of these common-use facilities/works are allocated between the short-term plan and the subsequent Master Plan for 2015 according to the number of berths at each stage. (That is, since the number of berths planned in 2000 and in 2015 is three and seven, respectively, the costs for the short-term plan are assumed to be three-sevenths of the total costs of the above facilities/works.)

The costs estimated in Chapter 6 are shown at market prices. As mentioned in 7.3.1, in the economic analysis these costs have to be divided into foreign currency portion, skilled labour, unskilled labour, foreign labour and other local currency portions.

Since the foreign currency portion is shown in CIF prices, there is no need of conversion to economic prices. The labour costs should be converted into economic prices by using the respective conversion factors mentioned in 7.3.3.

Of the local currency portion, cement, the import of which a high protective duty is applied to, should be converted into a border price. The rest of the local currency portion should be converted into economic prices by multiplying the SCF.

Tables 7-5-1 and 7-5-2 show the construction costs at economic prices.

Table 7-5-1 Calculation of Construction Costs at Economic Prices

	Construction	Foreign			Local Portion	rtion		<i>i</i>	Overall	Construction
	Cost at	Portion	Non-	Cement	Skilled	Cement Skilled Unskilled	Foreign Custom	Custom	Conversion	Cost at
Item	Market		traded	. 1	Labour	Labour	Labour	Duties	Factor	Economic Prices
	Prices		Goods	-						(1000 RO)
	('000 RO)	1.00	0.971	0.865	0.974	0.446	1.00	00.0		•
Dreaging	000'9	75.42%	24.21%	200.0	0.30%	0.02%	250.0	0.00%	0.993	5,956
Quaywall	9,353	7.25%	75,33%	10.75%	1.35%	1.66%	3.31%	0.00%	0.951	168,8
Breakwater	4,289	0.13%	87.17%	8.02%	1.08%	1.20%	2.40%	0.35%	0.957	4,105
Small Craft Harbour	1,463	13.05%	77.50%	3.59%	1.26%	1.32%	2.64%	0.01%	0.959	1,403
Yard Pavement	1,986	0.00%	61.70%	36.25%	0.34%	0.57%	1.13%	0.64%	0.930	1,847
Road	301	0.00%	97.61%	0.00%	. 0.40%	0.66%	Ċ	0.00%	0.968	291
Buildings/Facilities	1,641	31.26%	50,15%	11.88%	1.46%	1.22%	2.44%	0.00%	976.0	1,553
Cargo Handling Equipment	13,216	95.20%	0.00%	0.00%	0.03%	0.01%	0.01%	1.58%	0.952	12,587
Others	82	39.02%	60.98%	0.00%	0.00%	0.00%	0.00%	4.76%	0.982	81
Consultant Fee	2,570	100,00%	0.00%	0.00%	0.00%	200.0	0.00%	0.00%	1.000	2,570
Indirect Cost	13,717	61.16%	34.94%	1.76%	0.54%	0.54%	1.07%	0.00%	0.984	13,503
Grand Total	54,618	518 53.98% 37.64%	37.64%	4.68%	0.58%	0.61%		1.23% 1.28%	0.966	52,786

Table 7-5-2 Annual Investment Schedule at Economic Prices Unit: '000 RO

					Unic	OUU RU	
Item	1994	1995	1966	1997	1998	1999	Tota1
Dreaging	0	0	1,125	1,744	1,744	1,344	5,956
Quaywall	0	0	0	1,365	4,092	3,434	8,891
Breakwater	0	O	606	1,294	1,294	809	4,105
Small Craft Harbour	0	0	224	0	1,179	0	1,403
Yard Pavement	0	0	Ö	0	114.	1,733	1,847
Road	0	0	. 291	0	0	0	291
Buildings/Facilities	0	0	0	Ô	553	1,000	1,553
Cargo Handling Equipment	0	0	0	0	0	12,587	12,587
Others	_0_	0	0	0	0	81	18
Consultant Fee	200	200	300	7007	470	700	2,570
Indirect Cost	0	0	3,559	3,264	3,264	3,416	13,503
Grand Total	500	2007	807.9	R 067	19.710	109 7%	52 786
	2	2	))	2	7777	100	1

#### 7.5.3 Personnel Costs

The personnel costs for the new port are shown in the next chapter. After being divided into skilled labour and unskilled labour, the costs are converted to economic prices by multiplying the respective conversion factors.

The result is that the personnel costs at economic prices are RO 2.886,000 in 2000.

# 7.5.4 Operating/Maintenance Costs

The operating/maintenance costs are also shown in the next chapter. Since these costs contain various indefinite elements, the conversion factor is estimated as equal to the SCF (0.971).

#### 7.5.5 Administration Costs

In the next chapter the administration costs are estimated to be 20% of the total amount of the personnel costs and the operating/maintenance costs. Economic prices of these costs are calculated in the same manner.

#### 7.5.6 Renewal Investment Costs

The next chapter presents the schedule of renewal investment. Economic prices of these costs are calculated by multiplying the respective overall conversion factors shown in Table 7-5-1.

# 7.6 Evaluation

4 4 4 2

# 7.6.1 Calculated Results of Costs and Benefits

Table 7-6-1 shows the calculated results of the costs and benefits of the project.

#### 7.6.2 Calculation of EIRR

The economic internal rate of return (EIRR) based upon a cost-benefit analysis is used in order to appraise the economic feasibility of the project.

The EIRR is a discount ratio which makes the costs and benefits of a project during the project life equal. It is calculated by using the following formula:

$$\sum_{i=1}^{n} \frac{B_{i} - C_{i}}{(1+r)^{i-1}} = 0$$

n : Period of economic calculation

B<sub>i</sub>: Benefit in i-th year

C<sub>i</sub>: Cost in i-th year

r: Discount rate

The EIRR of the Short-term Development of the New Port is calculated as 5.02 %.

## 7.6.3 Conclusion

There are various views concerning the appropriate EIRR level used to determine whether a project is feasible or not. The leading view is that the project is feasible if the EIRR exceeds the opportunity cost of capital.

The opportunity cost of capital in Oman is not known. However, the opportunity cost of capital in various countries is considered to range from 8% to 15%. It is generally considered that an EIRR of more than 10% is economically feasible for infrastructure or social service projects.

Compared with this, the result of the EIRR calculation, 5.02%, is not high enough to convince us that this project is feasible from the viewpoint of the national economy. (It is very difficult to judge from the result

one way or another whether the project is beneficial to Oman's economy in the absence of comparable figures of other investment.)

However, it should be noted that this analysis is taking into consideration only four items of benefits, as mentioned in 7.4. Adjacent to the new port, there are many proposed projects, such as a free trade zone, an industrial estate, industries based upon natural gas resources and so forth. At the present time, no concrete plans have been made yet and there is no way at all of knowing the scale, output, earnings/costs or profits of these projects. Although it is difficult to quantify how these kinds of projects could benefit from a port development project in terms of a cost-benefit analysis, the EIRR will become considerably higher when the added value or net gain of these projects is calculated as a benefit of the new port project.

The new port will undoubtedly contribute to promoting the regional development as well as to diversifying industries in the country. However, more comprehensive consideration is required in order to decide whether the new port should be constructed or not.

 $\mathcal{A} = \{ (a,b) \in \mathcal{A} : (a,b) \in \mathcal{A} : (a,b) \in \mathcal{A}_{\mathbf{A}}(b) \}$ 

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-6,408 -8,067 -12,710 -26,332 3,636 -12,565 4,661 Costs 1,550 2,338 3,146 3,770 4,661 3,536 4,661 Benefits - Costs 4,445 3,403 3,637 -500 19,868 4,445 66,805 (Unit: '000 RO) 4,819 5,682 6,566 7,470 8,406 9,140 83,875 261,443 Total 1,565 1,835 2,110 2,382 2,658 2,933 Currency Earnings Foreign Benefits in Trans-portation 2,704 3,184 3,657 4,125 5,047 144,424 Savings Savings Savings in In Ships' Time Trans-Maiting Costs portatio Costs 51 51 75 75 2,580 30,564 508 612 738 888 1,070 Costs 5,504 8,408 8,067 12,710 4,033 4,132 4,132 4,132 4,132 4,435 4,435 -15,207 -10,728 22,204 -15,207 194,638 5,504 5,503 5,737 4,479 500 4,695 4,695 4,479 4,479 Total ual Adminis- Renewal Resid-tration Invest- ual ment Value 1,024 216 1,258 216 1,024 216 Operation/ Adminis-289 673 689 705 721 22,476 nance Cost Costs 477 558 638 718 798 847 24,336 Mainte− Cost nel 1,443 Construc- Person-88,014 Cost 500 6,408 8,067 12,710 24,601 52,786 tion Costs 2023 2024 2025 2025 2027 2027 2028 Year

Costs and Benefits of the Project

Table 7-6-1

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# CHAPTER 8 FINANCIAL ANALYSIS

# Chapter 8 FINANCEIAL ANALYSIS

# 8.1 Purpose of the Financial Analysis

The purpose of the financial analysis is to appraise the financial feasibility of the short-term development plan for the new port. This analysis focuses on the viability of the project itself and the financial soundness of the port management body (PMB) during the project life.

# 8.2 Approach and Methodology

## 8.2.1 Approach

Francisco Paris Commence (1994)

The long-term development plan consists mainly of the following five functions:

- A Supplementary Port for Mina Qaboos
- Transshipment Port
- Industrial/Regional Development
- Free Trade Zone
- Fishery Port

In order to implement such a huge project as a whole, cooperation among related ministries/authorities should be requested. Therefore, establishment of a coordination committee consisting of related ministries/authorities should be taken into consideration.

As far as regional development is concerned, urban and related infrastructures development will be conducted by the organization other than port management body. And regional development does not have a direct connection with the production activities. Therefore, the cost of above development is excluded from the financial analysis.

As far as industrial estate and free trade zone development is concerned, the financial analysis for this sector is not included in this analysis, taking into account the present financial rules applied to such authorities as the Rusayl Industrial Estate Authority, as mentioned in Section 8.3.2 in this chapter.

The second constant of the second constant  $(\mathbf{x}_{i}, \mathbf{x}_{i})$ 

# 8.2.2 Methodology

The viability of the project itself is analyzed using the Financial Internal Rate of Return (FIRR) by means of the discounted cash flow method. Sensitivity analysis is conducted to measure the impact of changing conditions on the financial status of the project.

The financial soundness of the PMB is appraised using the projected financial statements and some indices calculated based upon these statements. The financial indices employed are as follows:

(1) Working Ratio and Operating Ratio

Working Ratio (%) = 
$$\frac{\text{Operating Expenses}}{\text{Operating Revenue}} * 100$$

Operating Ratio (%) = 
$$\frac{\text{Total Operating Expenses}}{\text{Operating Revenue}} * 100$$

The working ratio and operating ratio show the operational efficiency of the body implementing the project.

 $(x_1, \dots, x_k) \mapsto (x_1, \dots, x_k) = (x_1, \dots, x_k$ 

(2) Rate of Return on Net Fixed Assets (%) =  $\frac{\text{Net Operating Income}}{\text{Net Fixed Assets}} * 100$ 

This indicator shows the profitability of the investment.

(3) Debt Service Coverage Ratio =

Net Operating Income before Depreciation

Repayment of and Interest on Long-term Loans

This indicator shows the ability of repaying the loans.

Sensitivity analysi is also carried out so as to measure the impact of changing conditions on the financial performance of the PMB.

#### 8.3 Presuppositions

#### 8.3.1 Project Life

Considering the economic service lives of facilities/equipment, the project life for the financial analysis is determined as 36 years, which consists of 6 years for the engineering service and construction and 30 years of operation.

# 8.3.2 Self-sustaining Basis

According to the rules for public authorities as set out in financial circular No. 6/85 from the Office of the H.E. (The Deputy Prime Minister for Financial and Economic Affairs), any surplus or deficit arising as a result of the operations of authorities is payable to or recoverable by the Government, and the proposed operating entity is a government organization.

In this study, however, the rules mentioned above cannot be adopted because the purpose of the financial analysis is to examine financial feasibility of the body implementing the project. The PMB should be managed on a self-sustaining basis to the best of its ability. Therefore, the principal accounting policies adopted by the PSC are also basically used for this analysis.

# 8.3.3 Financial Management

#### (1) Fund Management

The amount of cash on hand is assumed to be 3% of operating expenses based upon the actual percentage of cash on hand calculated from the financial statements of Mina Qaboos, and the rest is assumed to be in banks with 7.5% interest rate per annum.

On the other hand, annual deficit will be covered by short-term loans with 11.5% interest rate.

#### (2) Corporate Income Tax

The corporate income tax is as follows:

(a) 0 - 30,000 RO Nil

(b) 30,000 - 200,000 5%

(c) 200,000 - 7.5%

However, this tax is assumed not to be levied on the PMB; which is proposed to be a public authority.

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# (3) Investment for Renewal

The investment funds for the renewal of facilities/equipment will be covered by internal resources reserved as accumulated depreciation cost.

#### 8.3.4 Effect of Inflation

In this analysis, revenues and expenditures are calculated at constant December 1989 prices, and the effect of inflation is neglected. Instead, cost escalation is examined as one of the cases for the sensitivity analysis.

## 8.4 Appraisal of the Project

## 8.4.1 Fund-raising Plan

Funds necessary for this project will be assumed as follows:

#### (1) Government Funds

In case of Mina Qaboos, the construction cost of basic port facilities/equipment was paid by the Government and these facilities/equipment were owned by the Government. The costs covered by these funds are the cost of dredging, construction of quays, breakwaters, quayside gantry cranes and so on. Instead, 50% of the franchise payment as well as R.O. 100,000 as an annual rent is paid to the Government.

In this study, funds necessary for construction of the breakwater, quay, fishery port, quayside gantry cranes and dredging is assumed to be covered by Government funds as investment in the project and stated in the financial statements in order to clarify the sources of funds used for this project. These funds, therefore, are assumed to be free from repayment and interest.

Based upon the cost estimate, Government funds for this project will reach 57,245 thousand Rial Omani, i.e., 83.8% of the total cost for the project.

#### (2) Other Portion

The other portion of the funds for this project is assumed to be raised as follows:

Loan Period : 20 Years Grace Period : 5 Years

Interest Rate: 4.4% per annum

Repayment : Fixed Amount Repayment of Principal

In addition to this, the case of 8% interest rate will be examined in order to evaluate the impact of interest rates on the body implementing the project.

## 8.4.2 Bases for Revenue Projection

The revenue sources for this project are revenue from ships (port dues), revenue from cargo (stevedoring, shorehandling and storage charges) and other miscellaneous charges. These charges are calculated based upon the present tariffs used in Mina Qaboos. There should not be so-called "cut-throat" competition between Mina Qaboos and the new port. Actual rates are summarized in Table 8-4-1. The cargo volume that can be handled in the new port will reach the limit in 1994 in case of conventional cargoes and in 1995 in case of containers.

# 8.4.3 Bases for Expenditure Projection

The expenditures of the PMB consist of personnel costs, repair/maintenance and operating costs, administration cost, cost of the depreciation of fixed assets, cost of the amortization of the deferred assets, interest on long-term loans and interest on short-term loans. The bases for calculation are mainly derived from the financial data of the PSC and are summarized in Table 8-4-2.

# Table 8-4-1 Port Tariff of Mina Qaboos

•				
ARINE CHARGES		·	(Unit : RO)	
CHARGE	UNIT.	RATE	REHARKS	
Port Dues	per GRT	0.015	After 5 days for each day 0.005 per GRT	
ug Charges	per hour	55		
larbour Launch	per hour	40		
ilotage	Vessels up to 3000GRT	25.		
_	Yessels from 3000 to 7000	50		
	Yessels above 7000 GRT	75	the contract of the second contract of	
ilot Boat	İ		Boarding and disembarking	
ine Handlers	per vessel	30	Berthing and unberthing	

STEVEDORING CHARGES CHARGE	TINU	RATE	REHARKS
DISCHARGING General cargo Foodstuff and medicines Iron or steel bar, pipe,etc Plywood, hardboard etc Loose plywood etc. Timber Packed Loose	,	2.25 1.15 2.6 2 4	<ol> <li>Discharging rates will be reduced by 1/3 on palletised cargo (minimum 100 tonnes)</li> </ol>
Unpacked vehicle under 2.5 tonnes 2.5 and under 5 tonnes 5 tonnes and over Refrigerated cargo Bagged cement / hydrated lime	per unit per unit per tonne per gang hour	10.5	
LOADING FOR EXPORT General cargo Unpacked vehicle under 2.5 tonnes 2.5 and under 5 tonnes 5 tonnes and over Live animal	per tonne per tonne per tonne per head	2	Same as 1. and 2. above
EXTRA SERVICES Shifting lashing/unlashing etc	per gang hour	25	

QUAY HANDLING AND STORAGE CHAR	GES				147 1 17 17	de la
CHARGE	TINU		RATE			·
1MPORT				<u> </u>	REHARKS	
General cargo		]	2			
Foodstuff and medicines			1		*	
Iron or steel bar, pipe,etc			2	į		
Plywood, hardboard etc	-	·	2		* • *	
Loose plywood etc. Timber		!	3			
Packed		ļ				
Loose	per cubic meter		Z			
Unpacked vehicle	per cubic meter	ļ	<b>J</b> _			
under 2.5 tonnes	per unit	- 1	10	i		
2.5 and under 5 tonnes	per unit		10 20	l - 1;	en e	4.00
5 tonnes and over	per unit	- 1	20 25			
Heavy lifts 5 tonnes and over			2.3		100	:
Bagged cement / hydrated line			1.2			
Live animal	per head		0.3		*	4.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1
DEMURRAGE (Import/export)	•		:			
For the first 7 days		· }	0	1		
General carro, foodstuff,		-		ist period:	For a period o	of 14 days
medicine.iron/stecl.	1st and 2nd period	į	0.4		after the free	
timber/plywood	3rd period onwards		1.2			
Unpacked vehicle	•	j		2nd period:	For a period o	of 7 days
Under 5 tonnes	lst and 2nd period	-	5		after the 1st	period
ger unit	3rd period onwards	i	15			
5 tonnes and over	1st and 2nd period	-			Por a each per	
per unit	3rd period onwards		30	Į d:	ays after the	Znd period
Bagged cement / hydrated lime		}	0.3	}		
	3rd period onwards		1	<u>L</u>		

CONTAINER CHARGE	TINU	DITE	:
HANDLING CHARGES	UNIT.	RATE	
FCL - Import	20' Container	33	60% by consignee (RO 19/20', RO 25/40')
100 12,010	Over 20' Container	43	40% by shipowner (RO 14/20', RO 18/40')
LCL · Import	20'	14	tow of Surpositor (no 11/20 ) no 1-1-1-
	Over 20'	18	
Loaded container - Export	20'	33	
·	Above 20'	43	
Empty - laport/export	20'	17	į
	Above 20'	22	
STUFFING/UNSTUFFING			
Unstuffing(LCL) - Import	20	20	1
Ouscolling(PCP) - Imbotc	Above. 20'	40	
Stuffing · Export	20'	20	
on for the same of	Above 20'	- 40	
DENURRAGE .			
Loaded container		_	
3 days		0	
For each day for period of	20'	L	
1st 7 days	Above 20'	1.5	
For each day for period of 2nd 7 days	Above 20'	3	
For each day for period of	20'	2	1.
3rd 7 days	Above 20'	4	·
for each day after/before	20'	3	
3rd period	Above 20'	. 6	<u> </u>
Empty container – Export			
For each day	20'	0.5	
	Above 20'	ļ 1	Ir who contains will incur the
Empty container - Import			Import empty containers will incur the rates applicable to loaded containers
TRANSSHIPHENT :		[	Lates abbitcante to loaded concatners
Handling	26	1. 15	Full containers when unstuffed in the
nanuting	Above 20'	25	port area will revert to the rates abov
Demurrage	1 10070 20		
For 30 days	!	. 0	

where the contract of the section of the contract of the section 
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Table 8-4-2 Bases for Calculation

14010	6-4-2 bases for carculation			
Item	Remarks			
Personnel Cost	1) Annual per capita cost			
	Managerial Staff 15,432 R.O.			
	Other Staff 3,192 R.O.			
	2) Required number of employees			
	Managerial Staff 20			
	Other Staff 900			
	These figures are calculated based upon			
	the present situation at Mina Qaboos.			
Operating/	10% of the operating revenue. The revenue			
Maintenance Cost				
	the fuel sold are both excluded.			
	The maintenance dredging cost will be required every 10 years taking into account the estimated siltation in the channel.			
Administration	20% of the personnel cost and the cost			
Cost	above excluding depreciation cost			
Cost	above excitating depreciation cost			
Cost of	Depreciation is calculated on a			
Depreciation	straight-line method to write off			
of Fixed	the cost over the economic service			
Assets	lives, which are shown in Table 8-4-3.			
	•			
Cost of	The engineering service cost is amo-			
Amortization	rtized in 5 years from the start of			
of Deferred	the operations			
Assets	·			

Table 8-4-3 Depreciation Period

Item	Period
a. Breakwater	50 Years
b. Quay	50
c. Dredging	100
d. Pavement	25
e. Road	25
d. Building	40
e. Quayside Gantry Crane	25
f. RTG Crane	25
g. Mobile Crane	15
h. Forklift	8
i. Tractor	8
j. Trailer	5
k. Truck Scale	20
1. Tug	20
m. Navigation Aid	25

# 8.4.4 Financial Soundness of the PMB

#### (1) Base Case

The projected profit and loss statement, cash flow statement and balance sheet of the PMB are shown in Table 8-4-6.

#### (a) Operational Efficiency

The working ratio is continuously below 60% from 2004 till the end of the project life. Generaly speaking, this ratio should remain under 50 to 60%. On the other hand, the operating ratio slightly exceeds 75% almost the entire project life. The IBRD (International Bnak for Recoustucture and Devolopment) requests that it is preferable for this ratio to remain under 70 to 75%. Therefore, it would be better to increase the present tariff rates, especially in the case of rates for transshipment containers, to the greatest possible extent in order to recover the cost of fixed assets, taking into account the present tariff level, which is the lowest among the ports of the UAE and Oman as shown in Table 8-4-4.

In addition to this, the operating ratio can be reduced to about 71% if the PMB can reduce 10% of the personnel cost of the base case.

# (b) Profitability

The profitability of the project can be appraised using the rate of return on net fixed assets. This rate exceeds 4.4%, which is the assumed interest rate for this project, from 2011. Therefore, this project will maintain the profitability during the project life.

#### (c) Loan Repayment Ability

As shown in Table 8-4-6, the projected debt service coverage ratio will maintain a portion far above 1.0 times during the study period.

Table 8-4-4 Comparison of Port Charges

ITEKS	NATH CHARGES	200840	FUJAIRAS	FAKKAN	KHALID	RASHID	SINGAPORE	согояво
	Port Dues, Entering Dues	974	817	899	736	715	1,156	1,030
	Light Dues	12.2	245	266 510	. 750			773
	Pilotage	831	545	510	450	420	493	1,110
	Moorings	78	150	109	20	16	1	584
DUES ON VESSEL	Turs	571	817	1,289	381	738	1,192	
	Berthings	!	163	180	109	245	1.413	500
	Total (Per Vessel)	2,455	2,738	3,252	2,446	2,132	4,254	3,997
	Per GRT	0.10	0.11	0.13	0.10	0.09	0 17	0.16
	Index ( Qaboos=100 )	[60	112	132	100	87	173	163
	Loading/Discharging	39	114	123	123	125	102	52
DUES ON TRANSHIPMENT	Other Charges	1			1 . 7 .	- 1	1	l
CONTAINER(20' Loaded/Import)	Total ( Per 20')	39	114	123	123	125	102	52
	Index ( Qaboos=100 )	100	294	315	315	322	262	133
UNSTUFFING CHARGE	Per 20'	52	95	131	131	54	1	
			20(30)			20(20)	(28)	(28)
·	Over Time Surcharge	18	41	54	54	41		<u> </u>
EXCHANGE RTATE ( US\$ )		0.385	3.67	3.67	3.67	3.67	1.946	33.033

#### CONDITIONS FOR CALCULATION OF CHARGES

PILOT TUG BERTHING TIME SERVICE TIME CYCLE TIME OF CRAME TONNAGE PER CONTAINER

:25,000 GRT,15,000 NRT,35,000 DWT, Veekly Service :2 hours for entering/departure each :2 Tugs, 1 hour for entering/departure each :10 hours ( 8:00-18:00 )

:6 hours :30 Boxes/Hour :32 MT Per 20'

These charges are calculated based upon the present port Tariff of each port.

#### (2) Sensitivity Analysis

In order to examine the soundness of the PMB, sensitivity analysis is conducted in the following cases:

- Higher interest rate of 8%
- Case II Cost increase by 10%
- Case III Revenue decrease by 10%
- Case IV Decrease of personnel cost by 10%

Calculation results of each case are shown in Tables 8-4-7, 8-4-8, 8-4-9 and 8-4-10, respectively. In Case III, the operating ratio exceeds 80% during the project life. Therefore, rate increase of handling charges for transshipment containers should be taken into consideration, as mentioned above.

The comparison of each is summarized as follows:

# (a) Balance in Finance

	Year(Dificit)/Year(Surplus)	Retained Earinings in 2029
Base Case	2007/2008	169,086
Case I	2009/2010	131,899
Case II	2010/2011	107,568
Case III	2011/2012	90,994
Case IV	2005/2006	205,315

#### (b) Operating Efficiency in 2005

	Working Ratio	Operating Ratio
Base Case	55.76%	75.38%
Case I	55.76%	75.38%
Case II	60.13%	79.76%
Case III	60,62%	82.42%
Case IV	51.38%	71.01%

# 8.4.5 Viability of the Project Itself

The viability of the project is analyzed using the FIRR, which makes the costs and the benefits during the project life equal. The costs and benefits that are taken into account for the calculation of the FIRR are summarized as follows:

Costs	Benefits
• Initial investment cost, including reinvestment for	<ul><li>Port operating revenue</li><li>Residual value of the</li></ul>
renewal • Operating expenses	fixed assets at the end of the project life

As far as initial investment is concerned, construction costs of breakwater and dredging are allocated between the short-term development plan and Master Plan based upon the number of births as mentioned in Chapter 7. And the construction cost of fishery port is also neglected because the revenue from this facilities is excluded from benefits.

In addition to the Base Case, the following two cases are calculated in order to examine the impact of construction cost and revenue on this project.

Case A : Cost increases by 10%
Case B : Revenue decreases by 10%

Table 8-4-5 shows the calculation results of each case and calculation sheets are shown in Tables 8-4-11, 8-4-12 and 8-4-13, respectively.

Table 8-4-5 The Result of FIRR Calculation

Case	FIRR	Lower Limit
Base Case	4.62%	0.71%
Case A	3.14%	(1.30%)
Case B	2.85%	(1.30%)

Note: ( ) = Lower limit in case of 8% annual interest ratio.

Taking into account the fund-raising plan, the FIRR should exceed lower limit of 0.71% which is the weighted average interest rate for all the project funds. In all the cases, the FIRRs exceed not only this limit but also the limit in the case of 8% interest rate.

#### 8.4.6 Conclusion

Judging from the above analysis, this project can be regarded as feasible provided that more than 80% of funds necessary for this project will be raised as Government funds with interest-free and no repayment. Instead, the Government can receive a certain percent of retained earnings as dividend payment after appropriation of necessary reserves in the future.

As clearly indicated through the financial analysis of operaing efficiency, it is much difficult for the PMB to recover the cost for fixed assets based upon the present tariff rates. This is mainly due to the fund-raising method generally applied by GCC countries, that main port facilities are constructed by government and at least the operating cost should be earned through daily operations.

Taking into consideration the present competitive situation among ports in GCC countries, the induction of Government funds will be a must. Otherwise, this project cannot be regarded as feasible.

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Revenue Pactor Construction Cost Pactor Personnel Cost Pactor Interest Rate



ROPIT AND LOSS STATEMENT															***********			······································	- ·	· · · · · · · · · · · · · · · · · · ·	······································	2018				30.10	7076			2053	2021		2028	2027	2028	2020
perating Zevenue Revenue from Ships Revenue from Cargo Other Revenue Total	1994 0 0	1995 0 0	1998 0 0	1997 0 0	1898 0 0 0	1993 0 0	2000 448 4,329 137	2001 5,077 180	583 5,823 183	820 6,566 206	878 7,309 229	716 7,779 229	718 7,779 229	716 7,779 229	716 7,179 229	716 7,778 228	716 7,779 229	716 7,778 229	716 7,179 279 8,154	710 7,779 220 8,724	716 7,719 220	718 7,779 229 8,724	716 7,779 229	716 7,779 229	716 7,779 229	716 7,779 229	716 7,779 229	716 7,779 279	716 7,770 229	716 7,779 229	716 7,779 229	716 7,779 229	718 7,779 279 8,724	718 7,779 229 8,724	718	716
perating Expanses Personnel Cost Operating/Melatenence Cost	0	0	0	0	0	1,591 0	3,181 191	5,742 3,181 574	3,181 857	3,181 739	3,181 822 801	3,181 872	3,181 872 811	3,18i 872 811	3,181 872 811	3,181 872 811	3,181 1,023	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 1,023 8(1	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 311	3,181 872 811 4,864
Idulatistration Cost  Total  Preciation ortifation	0	y	<del>6</del>	0	0	1,808	1,712 514	1,712 514	1,712 514	784 4,704 1,712 514 6,931	1,803 1,712 514 7,029	4,861 1,712 6,578	4,864 1,712 8,576	1,861 1,712 8,578	4,864 1,712 6,578	1,712 6,576	5,045 1,717 8,757	4,864 1,712 8,576	4,884 1,712 8,578	1,884 1,712 6,578	4,884 1,712 8,578	4,864 1,712 8,578	4,864 1,712 8,578	4,864 1,712 6,578	1,894 1,712 8,576	4,804 1,712 6,578	5,045 1,712 8,757	4,864 1,712 6,576	1,884 1,712 8,578	4,864 1,712 8,576	4,884 1,712 8,578	4,884 1,712 8,576	4,864 1,712 6,578	4,884 1,712 0,576	4,86) 1,712 8,576	4,864 1,712 6,576 2,148
otal Operating Expenses et Operating Income on Operating Income on Operating Expenses Interest on Long-Term Loans	0	0	0 0 18	0 0 16	53	1,898 -1,808 0	8,633 -1,719 0 488 243	991 0	6,832 -263 0 487 759 -1,009	461 0 486	1,187 54 482	2,148 198 450	2,148 397 417	2,148 830 385	2.148 804 352	2,148 1,072 320	1,987 1,348 287	2,148 1,648 255	2,148 1,984 222	2,148 2,350 180	2,148 2,748 157	2,148 3,141 124	2.148 3,523 92	2,148 4,018 60	2,148 4,548 29	2,148 5,127 0	1,987 5,640	2,148 6,341 0	2,148 7,104 0	2,148 7,928	2,148 8,732	2,148 8,378 0	2,148 9,295 0	2,148 10,282 0	2,148 11,343 0	12,483 0 0
Taterest on Short-term Loams t Tacome a t Income a tacome after Tax tained Emenings	, 0 0	ŏ 0	-18 -18 -18	-18 -18 -18	·57 -57 -57	-2,408 -2,408 -2,408	-2,451 -2,451	-1,775 -1,775	1.008	-159 -159 -159	758 758 758	1,898 1,898 1,898	2,128 2,128 2,125	2,393 2,393 2,393 _	2,599 2,599 2,599 1,381	2,900 2,900 2,900 4,780	3,025 3,025 3,025 7,808	3,541 -3,541 - 3,541 - 11,347	3,910 3,910 3,910 15,258	4,308 4,308 4,308 19,584	4,737 4,737 4,737 24,301	5,184 5,184 5,184 29,485	5,578 5,578 5,578 35,044	6,103 6,103 6,103 11,147	6,687 6,687 6,687 17,814	7,275 7,275 7,275 55,089	7,807 7,607 7,607 82,698	8,489 8,489 -8,489 71,184	9,251 9,251 9,251 80,438	10,074 10,074 10,024 90,510	10,879 10,879 10,879 101,389	10,525 10,525 10,525 111,914	11,443 11,443 11,443 123,357		13,490 13,490 13,490 149,278	14,631
Accumulated Earnings	ŏ	ŏ	-18	-34	-91	-2,408 -2,489	-2,451 -4,949	-8,724	-1,009 -7,733	-7.892	-7,134	-5,239	-3,111	-718	1,881	4,780	7,808	11,347	15,258	19,584	24,301	19,465	35,044	41,147	47,814	55,089	62,696	71,184	80,438	90,510	161,389	111,914	123,357	135,787	149,278	183,908
SH PLOW STATEMENT	ستعصمه بريزوير دست د				7.00					**************************************	9404	3005		5503	2001	2000			2012	7613		2015	2018	2017	2018	2019	2020	7071	7522	2023	2024	2025	2028	2627	2028	2029
h Beginning	1984	0	- 1888	-1897 -18	1998	-91	2,117	2,570	2,258	1,167	716	2,637	5,441	8,512	10,883	14,435	18,088	22,122	26,599	31,482	36,763	42.023	47,118	53,891	60,792	68,512	75,344	84,099	94,864	105,827	116,569	111,847	124,085	137,240	151,382	166,585
sh Inflow Net Operating Income Depraciation Laortization Government Peads	0 0 0 500	0 0 0 500	0 0 0 8,490	0 0 0 11,193	0 0 0 16,178	-1,909 0 22,388	-1,718 1,712 514		-283 1,712 514	461 1,712 514 0	1,187 1,712 514 0	2,148 1,712 0 0	2,148 1,712 0	2,148 1,712 0	7,148 1,712 0	2.148 1,712 0	1,987 1,712 0	2.148 1.712 0	2,148 1,712 0 0	2,148 1,712 0 0	2,148 1,712 0 0	2,148 1,712 0	2,148 1,712 0 0	2.148 1.712 0 0	2,148 1,712 0	2,148 1,712 0 0	1.987 1,712 0	2,148 1,712 0 0	2,148 1,712 0 0	7,148 1,712 0 0	2.148 1,712 0 0	2.148 1,712 0 0	2.148 1,712 0 0	2,148 1,712 0 0	2,148 1,712 0 0	2,148 1,712 0 0
lozg-term Lozes Other Current Liabilities Incremental	0	0	361	9	852	9,879	ŏ 500	Õ	ŏ	0 20	0 20	12	Ò	6	0	0	0 18	0 -38	0	0	0 n	0	0	0	0	0	9 38	-36	0	0	0	0	0	0	0	0
Other Logg-term Limbilities Incremental Received Interest Cash Inflow Total	0 0 500	0 0 500	0 6,851	11,193	0 0 17,028	30,738	0 0 1,007	0 0 1,256	20 0 0 1.983	0 0 2,708	0 54 3,488	0 198 4,070	397 4,257	0 630 4,490	0 804 4,664	0 1,072 4,932	0 1,348 5,081	0 1,648 5,472	0 1,884 5,844	0 2,350 8,210	0 2,748 8,608	0 3,141 7,001	0 3,523 7,383	0 4,016 7,878	0 4,548 8,403	5,127 8,987	5,040 9,355	8,341 10,185	7,104 10,964	7,928 11,788	8,732 12,592	8,378 12,238	9,795 13,155	10,282 14,142	0 11,343 15,203	12,483 18,343
h Ostflor forestaept Long-term tonh Repayment Jaterest on Long-term Longs Other Current Assets Incremental Other Fined Assetm Incremental	500 0 0 0 0	500 0 0 0	6,851 0 18 0 0	11,193 0 18 0 0	17,028 0 53 0 0	32,285 0 488 0	0 0 488 737 0	0 24 488 124 0	0 24 487 124 0	0 81 488 123 0	220 739 482 124 0	739 450 76 0	739 417 0 0	1,044 738 385 0	739 352 0	220 739 320 Q O	739 287 0	739 255 0 0	739 222 0 0	0 739 190 0 0	449 739 157 0	1,044 739 124 0 0	715 92 0	0 715 80 0 0	0 659 29 0 0	2,158 0 0 0 0	0 0 0	0 0 0 0	0 0 0 0	1,04 <u>4</u> 0 0 0 0	17,314 0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
Tax Payed Appropriation Interest on Short-term Loans Cash Gutflow Total	0 0 0 500	0 0 0 500	6,567	11,211	17,085	10 32,783	243 1,469	933	259 895	134 824	1,565	0 1,268	0 1,157	0 2.188	1,092	0 1,278	1,027	984	982	0 929	1,345	1,008	0 807	776	0 688	0 2,156	0	0	0	1,044	17,314	0 0	0	0	0	0
h Inflos - Outflos h Ending Cash Excess	0 0	9	-16 -18	-18 -34	-57 -91	-2,028 -2,117	-462 -2.579		1,089	1,883	1,921 2 432	2,804 5 441	3,100	2,321 10 863	3,572	3,852	4,034	4,477 28 599	4,882	5,281 38,783	5,281 42,023	5,093 47,116	6,575 53,692	7,100 60.792	7,721 68.512	8,831 75.344	9,355 84.693	10,185	10,964	10,742	-4,722 111,847	12,238 124.085	13,155 137,240	14,142 151,382	15,203 168,585	16,343 187,927
Cash Exceso Short-term Loan	0	0	0 16	31		2,117	2,579	2,258 2,258	1,187	718	2,837	5,111	8,512 0	10,863	14,435 14,435	18,088 18,088 0	21,12	26,599 26,599 0	31,482 31,482 0	36,763 36,763 0	42,023 42,023 0	47,116 47,116 0	53,692 53,692 0	60,792 60,792 0	68,512 66,512 0	75,344 75,344 0	81,699 0	91,661	105.827	118,589		124.085	137,240	151,382	168,585	182,927 182,927 0
LANCE SHEET	1994	1995	1996	1997	1998	1999	2000	Z001°	2002	2003	2004	2603	2008	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	702 (	2025	2028	2027	2028	2029
ront Assets Cash & Deposit Cash on Hand Sbort-tern Deposit Uther Current Assets Total Current Assets	0 0 0	0 0	0	0	0	0	0 0 737 737	0 0 861	0 0 285 985	0 716 1,109 1,825	0 2,837 1,232 3,869	148 5,295 1,309 6,750	146 8,396 1,309 9,850	145 10,717 1,309 12,172	148 14.289 1,309 15,744	146 17,942 1,309 19,396	151 21,970 1,309 23,430	146 26,453 1,309 27,908	146 31,338 1,309 32,790	148 38,817 1,309 38,071	148 41,878 1,309 43,332	148 48,970 1,309 48,425	148 53,548 1,309 55,000	148 80,646 1,309 82,100	146 68,365 1,309 69,821	75,198 1,309 76,652	151 84,548 1,309 88,907	148 94,718 1,309 98,172	148 105,682 1,309 107,136	148 118,424 1,309 117,878	148	148 123,939 1,309 125,393	148 137,094 1,309 138,549	148 151,238 1,219 152,691	148 168,439 1,309 187,893	146 182,782 1,309 184,238
ed Assets Capital Assets Accusulated Depreciation Set Fixed Assets	0	0	0	0	0	0	85,767 1,712 84,055	85,787 3,425 82,342	65,767 5,137 60,630	65,767 6,849 58,918	85,767 8,341 57,428	85,787 10,054 55,713	65,787 11,766 54,001	85,787 12,434 53,333	65,787 14,148 51,621	65,767 15,639 50,128	65,767 17,351 48,416	65,787 19,063 46,794	65,787 20,776 44,891	65,767 22,488 43,279	65,787 23,751 42,018	85,707 24,419 41,348		65.767		65,767 29,112 36,655	-	65,787 32,537 33,230	65,767 34,249 31,518	65,767 34,918 30,848	65,767 19,316 46,451	65,767 21,028 44,739	85 287	65,787	85,747 28,185 39,802	65,787 27,877 37,890
Capital Work in Progress Other Fixed Assets Total Fixed Assets Terred Assets Terred Assets Tal Assets	0 0 500 1 500 1		6,747 0 8,747 1,104 7,851	17,727 0 17,727 1,317 19,044	34,518 0 34,518 1,558 38,072	65,787 0 65,787 2,570 68,337	64.055 2,056 68,848	0	60,630 1,028 62,814	58,918 514 61,257	57,428 0 57,428 0 81,295	0	9	0	51,621 0 51,621 0 57,354	50,128 0 50,128 0 69,524	18,418 0 18,418 0 71,848	0 0 48,704 0 74,612	44,891 0 77,782	43,278 0	0	0 0	0 0 38,835 0	0 0 37,923 0	0 0 36,211 0	0 0 30,655 0	.34,912 C	33.230 0 129,402	31,518 0 31,518 0 138,654	0 0 39,849 0 148,728	0 0 48,451 0	0 0 44,739 0	43,027 0	0 61,314 0	39,602 0	0 0 37,890 0 222,128
rent Liabilities Sbort-tera Loans Other Liabilities Total Current Llabilities	0 0 0	0 0 0	18 0 18	34 0 34	91 0 91	2,117 382 2,499	2,579 881 3,480	2,258 801	1,167 921 2,088	0 941 941	0 981 981	973 973	0 973 973	973 973	0 973 973	0 973 973	0 1,009 1,009	0 973 973	0 973 973	0 973 973	0 973 973	0 973 973	973 973	973 973	0 973 973	973 973	0 1,009 1,009	0 973 973	0 973 973	0 973 973	0 973 873	0 973 973	0 973 973	973 973	973 973	0 973 973
rterm tiabilities Long-term toans Other Long-term Liabilities Jotal tong-term Liabilities Worth	0 0 0	0 8 0	361 0 361	361 0 361	1,213 0 1,213	13,092 0 11,092	11.092 0 11.092	11,068 0 11,088	11,044 0 11,044	10,983 0 10,883	10,224	9,484 0 9,484	8,745 0 8,745	8,005 0 8,005	7,268 0 7,268	8,528 0 6,528	5,787 0 5,787	5,047 0 5,047	4,308 0 4,308	3,568 0 3,588	2,829 0 2,829	2,089 0 2,088	1,374 0 1,374	859 0 859	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0	0 0 0	0 0 0	0 0 0
Retained Earnings Reserves	0 500 500	0 1,000 1,000	-18 7,480 7,851	-34 18,883 19,044	-91 34,859 38,072	-2,499 37,245 68,337	-4,049 57,245 66,818	-	-7,733 57,245 82,844	-7,892 57,245 61,257	-7,134 57,245 81,285	-5,239 57,245 82,463	-3,111 57,245 83,851	-718 57,245 65,505	1,881 57,245 67,361	4,780 57,245 69,524	7,808 57,245 71,848	11,347 57,245 74,812				29,465 57,245 89,773		41,147 \$7,245 100,023		55,089 57,245 113,307		71,184 57,245 129,402	80,436 57,245 138,654	90,510 57,245 148,728					149,278 57,245 207,485	163,908 57,245 222,126
pancial Indicators rking Satio(%) prating Ratio(%) prating Ratio(%) te of Return on Net Fixed Assets(%) tt Service Coverage Ratio(Times)	Ŏ	1995 0 0 0	1698 0 0 0	1997 0 0 0	1998 6 0 0	1989 0 0 0	2000 89.88 134.98 -2.88 11-12	7001 78.45 117.25 1.59	2002 70.11 104.00 -0.43 13.86	2003 63.84 93.78 0.76 13.95	2004 58.46 85.58 2.07 7.14	2005 55.76 75.38 3.85 7.34	7008 55.76 75.38 3.98 7.54	2007 55.76 75.38 4.03 7.76	2008 55.78 75.38 4.16 7.99	2009 55.78 75.38 4.28	2010 57.83 77.48 4.08 8.50	2011 55.76 75.38 4.80 8.78	2012 55.78 75.38 4.77 9.07	2013 55.76 75.38 4.98 9.39	2014 55.76 75.38 5.11 9.73	2015 55.78 75.38 5.19 10.10	2018 55.78 75.38 5.42 10.81	2017 55.76 75.38 5.66	2018 55.76 75.38 5.93 12.69	2019 55-76 75-38 5-86	2020 57.83 77.46 5.63	7021 \$5.78 75.38 6.46	2822 55.78 75.38 6.81	2023 55.76 75.38 8.98	2024 55.76 75.38 4.62	2025 55.78 75.38 4.60	2026 55.76 75.38 4.89	2027 \$5.76 75.38 5.20	2028 55.78 75.38 5.42	2029 55.78 75.38 5.67

Revenue factor Construction Cost facto Personnel Cost factor Interest Sate



PROPER AND LOSS STATEMENT	······································	nic	Tobe	1007	1004	1000	2000	2001		2003	2004	2805	2008	2002	2008	2009	2010	2011	2512	2013	2014	2015	2018	1017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Operating Revenue Revenue from Ships Revenue from Cargo Other Revenue Total	0	0 0 0	0 0 0	0 0	0	0	448 4,329 137	505 5,077 160 5,742	583 5,823 183 8,569	620 8,586 206	678 7,309 229	7 18 7 779 220	718 7,778 229	716 7,779 229 8,721	718 7,779 229 A.724	716 7,779 229 8,724	716 7,779 229 8,724	718 7,779 229 8,724	718 7,779 279 8,724	716 7,779 229 8,724	718 7,779 229 8,724	718 7,779 229 8,724	716 7,779 229 8,721	716 7,770 229 8,724	7,778 7,778 229 8,724	7,779 7,779 229 8,724	716 7,779 229 8,724	7,779 7,779 229 8,721	7,718 7,779 229 8,724	7,779 7,779 228 8,724	718 7,779 229 8,724	7,718 7,778 229 8,724	718 7,779 229 8,724	7,779 7,779 229 8,724	7,778 7,778 229 8,724	7,18 7,779 229 8,724
Operating Expenses Personnel Cost Operating/Maintenance Cost Administration Cost Total	0 0 0	8	0 0 0	0 0 0	0 0 0	1,591 0 318	3,181 401 731	3,181 574 751	3,181 657 766	3,181 739 784	3,181 822 801	3,181 872 811	3,181 872 611	3,181 872 811	3,181 872 811	3,181 872 811	3,181 1,023 841	3,181 872 811 4,884	3,181 872 811	3,181 872 811	3,181 872 811	3,181 872 811	3,181 372 811 	3,181 872 811 4,864	3,181 872 811 4,664	3,181 872 811 4,664	3,181 1,023 841 5,045	3,181 872 811 4,861	3,181 872 811 4,884	3,181 872 811 4,881	3,181 871 811 4,864	3,181 872 811 4,884	3,181 872 811 (,884	3,181 872 811 4,864	3,181 872 811 4,884	3,181 872 811 4,864
Depreciation igortization Total Oceration Facences	0	0	0	0	0	1,909 0 1,909 -1,909	1,712 514 6,633	1,712 514 8,733	4,805 1,712 514 8,832 283	1,712 514 8,931	1,803 1,712 514 7,029 1,187	4,861 1,712 8,576 2,148	4,884 1,712 6,576	1,712 6,576	1,712 6,576 2,148	1,684 1,712 6,576 2,143	6,757 1,067	1,712 6,578 2,148	1,712 6,576 2,148	1,712 8,578 2,148	1,712 6,578 2,148	1,712 6,578 2,148	1,712 6,576 2,148	1,712 6,578 2,148	1,712 6,576 2,148	1,712 0,576 2,148	1,712 8,757 1,967	1,712 6,576 2,148 5,089	1,712 8,576 2,148	1,712 6,578 2,148	1,712 6,578 2,148	1,712 6,576 2,148 6,705	1,712 6,576 2,148 7,498	1,712 8,578 2,148 8,350	8,578 2,148 9,265	1,712 6,576 2,148 10,250
Ret Operating Income Son Operating Income Son Operating Expenses Interest on Long-Term Loans Interest on Short-term Loans	. o	0	0 29 0	29 3	97 7 -104	887 19	-1,719 0 887 299	-991 0 857 404 -2 282	885 425	481 0 884 365 787	877 721 89	81B 77 1,253	2.146 101 759 0	2,148 286 700 0	810 840 0 1,815	2,148 827 581 0 2,184	848 522 0 2,293	1,095 483 0 2,780	1,375 404 0 3,118	1,681 345 0 3,484	2,016 785 0 3,878	2,346 226 0 4,287	2,880 187 0 4,841	3,083 110 0 5,121	3,542 53 0 5,637	4,044 0 0 6,192	4,475 0 0 0,442	5,089 0 7,237	7,905	6,479 0 0 8,627	9,324	0 0 0 8,853	0 0 9,645	0 0 10,497	0	0 0 12,397
Net Income Tax Net Income after Tax Retained Faceings	9	0	-29 -29	·32 ·32	-101	-2,816 -2,818	-2,905 -2,905	·2,282	-1,574 -1,574	-787 -787.		1,253	1,490	<u>1.734</u> .	<u>1,918</u>	2,194 2,194	2,293 2,283	2,780 2,780	3,118 3,118	3,484 3,484	3,878	4,707	4,641 4,641 22,809	5,121 5,121 27,730	5,837 5,837	6,192 6,192	6,412 8,442	7,237	7,905	8,627 8,627 69,769	9,324 9,324		9,845 9,845 97,591	10.497		12,397 12,397 131,899
Accusulated Earoings	Ŏ	Ŏ	- 79 - 29	ĕī	-104. -165	-2,981	-2,805 -5,886	-2,252 -8,168	9,742	-10,529	10,440	1,253 -9,188	1,480 -7,898	-5.964	-1,018	-1,853	440	3,220	8,338	9,823	13,701	17,988	22,609	27,730	33,367	39,558	48,000	53,237	81,142	69,768	79,093	01,940	81,391	100,000	118,501	101,100
CASH FLOY STATEMENT Cash Beginding	1984 19	195	1996	1697	199's -81	1909 -185	2000 .2.589	2001 -3 518	2002	7003 -3 125	2004 -1.921	2005	2008 1.492	2007 3.955	2008 5.818	2009 8,508	2010	2011 14.758	18.473	2013 22,584	2014	2015 31,423	2018 35,619	2017 41,257	2018 47,374	2019 54,065	2020 59,813	2021 68,003	2022 78,918	2023 86,534	2024	2025 89,551	2028 100,118	2027	2028 123,883	2029 136,609
Cash Inflow  Net Operating Income	0	0	9	0	0	-1,909	-1,719 1,712	-991	283 1,717	481	1,187	2.148 1,712	2,148 1,712	2,148 1,712	2,148 1,712	2,148 1,712	3,857 1,712	2,118 1,717	2,148 1,712	2,148 1,712	2,148 1,712	2,148 1,712	2,148 1,712	2,148 1,712	2,148 1,712	2,148 1,712	1.987 1,712	2,148 1,712	2,148 1,712	2,148 1,712	2.148 1,712	2,148 1,712	2,148 1,712	2.148 1.712	2,148 1,712	2,148 1.712
Appreciation Appreciation Government Funds Long-term Louns	0 500 5	100 6	0 3,490 361	11,193 0	16,178 852	22,388 9,879	514 0 0	1,712 514 0 0	\$14 0 0	1,712 514 0 0	514 0 0	0 0	0	0 0	0	0	0 0	0	0 0 0	0	0	0	0 0	0 0	0	0 0 0	0 0 0	0	0 0 0	0 0	0 0 0	0 0 0	0 0 0	8 0 0	0	0
Other Current Liabilities Incremental Other Long-term Liabilities Incremental	0	0 0	0	0	. 0	382 0	500 0	20 0	20 G	20	20 0	. 12 0	0	0	0	0	38 0	-36 0	0	0	0	0	0	. o	0	0	36	-38 0	. 0	0	0	0	0	0	0 785	0 0 10,250
Received Interest Cash Inflos Total	500 5	00 E	0 3,851	11,193	17,028	30,738	1,007	0 1,258	1,983	2,708	3,433	3,872	101 3,961	288 4,148	4,270	827 4,487	818 4,563	1,095 4,819	1,375 5,234	1,881 5,541	2,018 5,878	2,346 6,208	2,860 6,520	3,083 6,943	3,512 7,402	4,044 7,804	4,475 8,190	5,068 8,913	5,758 9,618	8,479 10,339	7,176 11,036	10,585	11,358	12,210	9,285 13,125	14,110
Cash Butflow Investment Long-term Loan Repayment Interest on Long-term Loans Other furrent Assets Incremental Other Fixed Assets Incremental	500 5 0 0 0	9 9 0	3,851 0 28 0	11,193 29 0 0	17,028 G 97 G O	32,265 0 887 0 0	0 0 887 737 0	0 24 887 124 0	0 24 885 124 0	0 81 884 123 0	220 739 877 124 0	730 818 78 0	739 759 0 0	1,044 739 700 0	739 810 0	220 739 581 0 0	739 522 0 0	739 483 0	739 404 0 0	739 315 0 0	449 739 285 6 0	1,044 739 228 0 0	0 715 187 0 0	715 119 0	659 53 0 0	2,156 0 0 0 0	0 0 0	0 0 0	0 0 0 0	1,044 0 0 0 0	17,314 0 0 0 0	0 0 0 0	0 0 0 0	0 0 0	0 0 0 0	0
lax Payed Appropriation Interest on Short-term Loans Cash Outflor Total	0 0 500 5	0 0 00 e	0 3,850	3 11,225	17,132	33,171	289 1,023	404 1,440	425 1,450	365 1,453	221 2,181	77 1.711	0 1,498	2,483	0 1,380	0 1,541	0 1,262	1,202	. 1,143	0 1,054	1,474	0 2,010	0 883	0 825	711	0 2,158	Ŭ 0	0	0	1,044	17,314	0	0	0	0	0
Cash Inflor - Outflow Cash Ending	0	0 0	-29 -29	-32 -81	-104 -185	-2,434 -2,599	·917 ·3,518	-184 -3,700	524 -3,175	1,255 -1,921	1,252 -669	2,182 1,497	2,463 3,955	1,683 5,818	2,890 8,508	2,946 11,454	3,302 14,756 14,756	3,717 18,473	4,091 22,564 22,564	4,457 27,021 27,021	4,402 	4,198 35,619 35,819	5,638 41,257 41,257	8,118 47,374 47,374	6,691 54,065	5,748 59,813 59,813	8,190 68,003 68,003	8,913 78,916 78,918	9,618 60,534 80,534	9, 295 95, 829 95, 829	-8,278 89,551 89,551	10,595 100,116 100,116	11,358 111,474 111,474	12,210 123,683		14,110 150,918 150,918
Cash Ending Cash Excess Short-term loam	9	0	38	0 81	185	2,589	3,518	3,700	3,175	1,921	689 689	1:192	3,955	5,818 0	8,508 0	11,454	14,758	18,473	22,584 	27,021	31,423 0	35,819	11,257	17,374	54,085 0	Ó	0	0,010		Ö		<u>0</u>		<u>0</u>	<u> </u>	Q
							•																													
BALANCE SHEET Current Assets	1994 19	95	1998	1907	1995	1999	2000	2001	2002	2003	2004	2005	2008	2007	2008	2009	2010	7011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2021	2078	2029
Cash & Deposit Cash on Rand Short-term Deposit Other Current Asstes Total Current Assets	0 0 0	0 0 0	0 0 0	0 0 0 0	0 0 0	0 0 0	0 0 737 737	0 0 881 881	0 0 985 885	0 0 1,109 1,109	0 0 1,232 1,232	146 1,348 1,309 2,801	3,809 1,308 5,284	148 5,472 1,309 6,928	148 8,362 1,308 9,817	148 11,308 1,309 12,763	151 14,805 1,309 16,085	146 18,327 1,309 19,781	148 22,418 1,309 23,873	146 28,875 1,309 28,330	146 31,277 1,309 32,731	148 35,473 1,309 38,927	148 41,111 1,309 42,585	146 47,229 1,308 48,683	\$5,374		151 67,852 1,309 69,312	78,770 1,309 78,225	86,388 1,309 87,842	95,683 1,309 97,137	89,405 1,309 60,859	148 99,970 1,309 101,425		124,992	1,309 138,117 1	150,772 1,309 152,227
Pixed Assets Capital Assets Accusulated Depreciation Not Pixed Assets	0	0 0 0	0	0 0 0	0	0	85,767 1,712 64,055	65,767 3,425 82,342	65,787 6,137 60,630	65,767 8,849 58,918	65,767 8,341 57,426	85.767 10.054 55.713	85,767 11,768 54,001	65,787 12,434 53,333	65,767 14,146 51,621	85,787 15,639 50,128	85.787 17,351 45,418	85,767 19,083 48,701	65,787 20,778 41,891	85,767 22,488 43,279	65.787 23.751 42.016	85,787 24,419 41,348	65,767 28,132 39,835	65,767 27,844 37,923	65,767 79,558 36,211	85,787 29,112 36,655	65,767 30,825 34,942 0	65,767 32,537 33,230 0	85,767 34,249 31,518 0	85,787 34,918 30,849 0	65,787 19,318 46,451 0	85,787 21,028 44,739 0	65,787 22,740 43,027 0	24.453	65,767 28,185 39,602 0	85,787 27,877 37,890 0
Capital York in Progress Other Fixed Assets Iotal Fixed Assets Deferred Assets	6 0 0 500 1,0 500 1,0	0	8,747 0 6,747 1,104 7,851	17,727 0 17,727 1,317 18,044	34,516 0 34,516 1,556 36,072	85,767 0 85,767 2,570 68,337	0 0 81,055 2,058 68,848	0 62,342 1.542 64,746	0 0 60,630 1,028 62,644	0 0 58,918 514 80,541	57,428 58,658	55,713 0 58,514	51,001 0 59,285	53,333 0 60,259	51,821 0 81,437	50,128 0 82,891	65,418 0 84,481	48,704 0 86,485	44,981 0 68,884	43,278 0 71,809	42,018 74,747	· n	0	0	•	0 36,655 0 97,776	34,942 0 104,254	33,230 0 131,455	31,518 0 119,360	30,849 0 127,987	46.451 0 137.311	44,739 0 148,164	Û	41,314 9 168,308	0	37,890 0 190,117
Current Lisbilities Short-term Loses Other Lisbilities Total Current Lisbilities	0	0 0 0	29 0 29	61 0 81	165 0 165	2,599 382 2,981	3,518 881 4,397	3,700 601 4,801	3,175 921 4,097	1,921 941 2,862	669 661 1,630	973 973	0 973 973	0 973 973	973 973	0 973 973	0 1,009 1,009	0 873 973	0 973 973	0 973 973	0 973 973	0 973 973	0 973 973	973 973	0 973 973	973 973	0 1,909 1,009	973 973	973 973	973 973	0 973 973	0 973 973	973 973	973 973	973 973	973 973
Long-term Limbilities Long-term Loons Other Long-term Limbilities Total Long-term Limbilities	0 0	0 0 0	361 0 361	381 0 361	1,213 0 1,213	11,092 0 11,092	11,092 0 11,092	11,088 0 11,088	11,044 0 11,044	10,963 0 10,963	10,224 0 10,224	0,484 0 9,484	8,745 .0 8,745	8,005 0 8,005	7,266 0 7,266	0,526 0 6,526	5,787 0 5,787	5,047 0 5,047	4,305 0 4,308	3,568 0 3,568	2,829 0 2,829	2,089 0 2,089	1,374 - 0 1,374	659 0 659	0 0 0		0 0 0	0 0 9	0 0 0	0 0 0	0 0 0	0 0 0	0 0	0 0 0	0 0 0	0 0 0
Net Yorth  Retained Cardings Reserves Gavernment Pund Total Liabilities & Net worth	8 500 1, 500 1,	8 000 000	-19 7,490 7,851	-61 18,683 19,044	-165 34,859 36,072	·2,981 57,245 88,337	-5,886 57,745 68,848	-8,188 37,245 84,748	-9,342 57,245 82,644	-10,529 57,245 50,541	-10,440 57,245 58,658	-9,188 57,245 58,514	-1,688 57,245 59,265	-5,964 57,245 60,259	57,245 61,137	-1,853 57,245 62,891	440 57,245 64,481	3,220 57,245 66,485	6,338 57,745 68,884	0,823 57,245 71,809					33,367 57,246 91,585			53,237 57,245 111,455	\$1,142 57,245 119,380	69,789 57,245 127,987	-	-		-	-	131,899 57,245 190,117
Pinancial Indicators borting Estic(\$) Operating Estic(\$) Rate of Return on Net Pixed Assets(\$) Bate of Return on Net Pixed Assets(\$) Bobt Service Congrage Estic(fises)		993 6 6 0 0	1998 0 0 0 0	1997 0 0 0 0	1898 0 0 0 0	1999 0 0 0 0	2000 89.68 134.98 -2.68 6.12	78.48 117.25 -1.59 -0.86	2002 70.11 104.00 -0.43 7.79	2003 83.64 93.78 0.78 8.20	2004 58.48 85.58 2.07 5.40	2005 55.76 75.38 3.85 5.80	2608 55.76 75.38 3.98 5.82	2007 55.76 75.38 4.03 8.06	2008 55.76 75.36 4.18 8.32	2009 55.78 75.38 4.28 0.01	2010 \$7.83 77.48 4.08 6.92	2011 55.76 75.38 4.80 7.28	2012 55.78 75.38 4.77 7.83	2013 55.76 75.38 4.96 8.05	2014 55.76 75.38 5.11 8.51	2015 76 75.38 5.19 9.03	2016 55.76 75.38 5.42 9.88	2017 55.76 75.38 5.86 10.57	2018 55.78 75.38 5.93 12-27	2019 55.76 75.38 5.86	2020 57.83 77.48 5.83	2021 55.76 75.38 6.46	2022 55.76 75.38 8.81	2023 55.76 75.38 6.98	2024 55.76 75.38 4.62	2025 55.70 75.38 4.80	2026 55.76 76.38 4.99	75.38 5.20	2028 55.76 75.38 5.42	2029 55.76 75.38 5.67

Revenue Pactor
Construction Cost Factor
Personnel Cost Pactor
Interest Rate



PROFIT AND LOSS STATEMENT	1897	1905	1996	1997	1298	7999	2000	2001	7007	2063	2004	2005	2008	2007	2008	2009	2010	2011	7012	2013	2014	2015	2018	2017	2018	2018	2020	2021	2022	2023	2024	2025	2028	2021	2028	2029
Operating Revenue Revenue from Ships Revenue from Cargo Other Revenue Total	0 0 0	0 0	0	0 0	0	0 0	448 4,328 137 4,914	505 5,077 180 5,742	563 5,823 183 6,569	620 6.566 706 7,392	678 7,309 229 8,216	716 7,779 229 8,724	718 7.779 728 8,724	718 7,778 220 8,724	716 7,179 228 8,724	716 7,778 220 8,724	716 7,778 720 8,711	718 7,779 229 8,724	718 7.779 229 8,724	716 7,778 229 8,724	716 7,779 229 8,721	718 7,779 229 8,724	716 7,779 229 8,721	718 7,779 229 8,721	716 7,779 229 8,724	716 7,779 229 8,724	716 7,779 129 8,721	716 7,778 229 8,724	718 7,778 229 8,721	716 7,779 729 8,724	718 7,779 278 8,724	716 7.779 229 8.721	716 7,779 229 8,724	718 7,779 229 8,724	718 7,779 229 8,724	718 7,778 279 8,724
Operating Expenses Personnel Cost Operating/Naintenance Cost <u>Administration Cost</u> Total	0	0 0 0	0 0 0	0	0	1,750 0 350	3,499 491 798	3,499 574 815	3,489 857 831	3,490 739 848	3,499 822 864	3,499 872 874	3,499 872 874	3,498 872 874	3,499 872 874	3,499 872 874	3,499 1,023 904	3,499 872 874	3,499 872 874	3,489 872 874	3,499 872 874 5,248	3,499 872 874	3,499 872 874	3,499 872 874	3.499 372 574	3.498 872 874	3,198 1,023 804	3,499 872 874	3,499 872 874	3,499 872 874	3, 499 .872 .874	3,468 872 874	3,499 872 874	3,499 872 874	3,499 872 874	3,499 872 874
lotal Depreciation inortization fotal Operating Expenses Fut Operating Income	0 0 0	0 0	0	0 0	0	2,100 0 2,100 -2,100	1,883 585 7,237 -2,323	1,883 585 7,337	1,883 585 7,438	1,883 565 7,535	1.883 585 7,634 582	1,883 7,129 1,595	1,883 7,129 1,595	1,883 7,129 1,595	1,883 7,128 1,595	1,883 7,129 1,595	1,853 7,310 1,414	1,883 7,129 1,595 1,007	1,883 7,129 1,595	1,883 7,129 1,595	1,883 7,129 1,595	1,883 7,129 1,595	1,883 7,129 1,595	1,883 7,128 1,595	1,883 7,129 1,595	1,883 7,120 1,595 3,802	1,883 7,310	1,883 7,129 1,595	1.883 7,129 1.595	7,129 1,595	1,883 7,129 1,595 8,346	1.883 7,120 1.595 5,855	7,129 1,595 6,340	1,883 7,128 1,595	1,883 7,120 1,595	1,883 7,120 1,595
Non Operating Income Non Operating Expenses Interest on Long-Term Louns Interest on Short-term Louns Not Income	0	0 0 0	0 17 0 -17	0 17 2 -13	59 4 -63	537 11 -2,848	537 268 -3,128	537 369 •2,501	538 390 -1,793	535 329 -1,007	531 188 -134	495 53 1,047	108 459 0 1,243	423 0 1,453	384 387 0 1.592	352 0 1,827	783 318 0 1,881	1,007 250 0 2,321	1,259 244 0 2,609	1,535 208 0 2,921	1,834 173 0 3,258	2,122 137 0 3,579	2,384 101 0 3,878	2,757 67 0 4,285	3,161 32 0 4,724	3,802 0 0 5,197	1,414 3,955 0 0 5,389	1,595 4,507 0 0 6,096	1,595 5,098 0 0 6,692	5,741 0 0 7,338	8,340 0 0 7,841	5,855 0 0 7,249	6,340 0 7,934	1,595 7,078 0 0 8,871	1,595 7,887 0 0 9,482	1,595 8,718 0 0 10,313
Tax Net Incope after Tax	0		17	-19	-83	-2,618	-3,128	-2,501	-1,793	-1,007	-134	1,067	1,243	1,453	1,592	1,827	1,551	2,321	2,609	2,971	3,258	3,579	3,878	1, 285	1.721	5, 197	5.360	8,098	6,692	7,338	7.841	7.249	7,934	8.07L	9,482	10,313
Retained Earnings Accumulated Earnings	0.	0	-17	-19 -37	-83 -100	-2.648 -2,748	-3,128 -5,878	-2,501 -8,377	-1.793 -19,170	-1,007 -11,178	-134 -11,310	1,047 -10,283	1,243 -9,020	1,453 -7,587	1,592 -5,976	1,827 :4,148	1,881 -2,287	2,321 55	2,609 2,684	2,921 5,585	3,758 8,841	3,579 12,420	3,878 10,298	4,285 20,584	4,724 25,307	5,197 30,504	3,369 35,873	6,095 41,989	6,692 48,662	7,336 55,997	7,941 83,838	7,249 71,188	7,934 79,122	8.671 87,782	9,462 97,255	10,313 107,588
CYN BOTIONINT  CYN BOTIONINT	1901	1685	1998	1997	1998	1999	2000	200)	2002	2003 -2 281	2004	2005 -459	2006	2007	2008 5 243	2009 7.064	2010	2011 13.587	2012	2013 20.622	2014 24,613	2016 28,445	2016 31 548	2017	7018 42.303	2619 48 185	2020 52,394	2021 80,183	2022 88 128	2023 78.702	2024	7075 75 559	2026 84 885	2027	2028 165.657	2029
Cash Inflow	v	•	·	•	•	100	*1010		0,000		.,			01000						-			4			4 505							4 50-			.10,100
Nat Operating Income Depraclation Americanton Government Fueds Loag-term Loame Other Current Ljabilities	0 0 0 559 0	0 0 0 550 0	0 0 0 7,139 397	0 0 0 12,312 0	0 0 0 17,764 937	-2,100 0 0 24,625 10,887	-2,323 1,883 565 0	1,595 1,883 505 0	1,883 565 0	-143 1,863 585 0	582 1,883 565 0 0	1,595 1,883 0 0	1,595 1,883 0 0 0	1,595 1,883 0 0 0	1,595 1,883 0 0 0	1,595 1,883 0 0 0	1,614 1,883 0 0	1,595 1,883 0 0 0	1,595 1,883 0 0 0	1,595 1,883 0 0	1,595 1,863 0 0	1,595 1,883 0 0	1,595 1,883 0 0 0	1,595 1,883 0 0	1,595 1,883 0 0	1,595 1,883 0 0 0	1,414 1,883 0 0	1,595 1,883 0 0 0	1,595 1,683 0 0	1,595 1,883 0 0 0	1,595 1,883 0 0 0	1,595 1,883 0 0 0	1,595 1,683 0 0	1,595 1,683 0 0	1,595 1,883 0 0	1,595 1,883 0 0
lucremental Other Long-term Liabilities	0	0	0	0	0	420	538	20	20	20	20	12	0	0	0	. 0	36	-38	0	0	0	0	0	0	0	0	36	-36	0	0	0	0	0	0	0	0
Tocremental Escalved Interest Cash Isflow Total	0 0 550	0 550	7,536	0 0 12,312	0 0 18,731	0 0 33,811	0 0 663	0 0 874	0 0 1,602	0 0 2,328	0 0 3,051	0 3,490	0 108 3,586	0 281 3,760	384 3,883	0 584 4,062	783 4,117	1,007 4,449	1,259 4,737	0 1,535 5,013	1,634 5,312	2,122 5,600	0 2,384 5,882	0 2,757 8,235	0 3,161 8,839	3,602 7,080	3,955 7,289	4,502 7,844	5,098 8,578	5,741 9,219	0 8,348 9,824	5,855 9,133	0 8,340 9,518	7,078 10,554	7,887 11,348	8,718 12,197
Cash Outflow  Termstment  Long-term Loan Repayment  Interest on Long-term Loans Other Current Assets Terremental Other Fixed Assets Incremental	550 0 0 0	550 0 0 0	7,538 0 17 0	12,312 0 17 0	18,731 0 59 0	35,492 0 537 0 0	0 0 537 737 0	28 537 124	25 536 124	0 89 535 123 0	242 813 531 124 0	813 495 78 0	813 459 0 0	1,148 813 423 0	813 387 0	242 813 352 0	813 318 0	813 280 0	813 244 0 0	0 813 208 0 0	494 813 173 0	1,148 813 137 0	787 101 0	787 67 0	724 32 0 0	2,372 0 0 0 0	0 0 0 0	0 0 0 0	0 0 0	1,148 0 0 0 0	19,045 0 0 0	0 0 0 0	0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
Fayed Appropriation Interest on Short-term Loans Cash Gutflew Total	0 0 550	0 0 550	7,554	12,332	18,784	38,040	268 1,542	389 1,658	390 1,076	329 1,078	188 1,895	53 1,437	1,272	0 2,385	1,201	1,407	1,129	0 1,093	0 1,058	1,022	0 1,480	2,099	0 888	0 853	0 758	2,372	0	0	0	1,148	0 19,045	0 0	0	0	0	0
Cash Inflow - Outflow	0	0	-17	-19	-83	-2,228	-879	-182	528	1,250	1,158	2,053	2,314	1,374	2,662	2,855	2,837	3,355	3,879	3,991	3,832	3,501	4,974	5,382	5,883	4,709	7,289	7,944	8,578	8,071	-9,221	9,133	9,818	10,554	-	12,197
Cash Encess Short-term Loan	<u>0</u>	0	0 17	37	-100 0 100	2,328 2,325	-3,207 3,207	-3,389 0 3,389	2,864 2,864	-1,814 0 1.814	-159 0 159	1,595 1,595 0	3,963 3,908 0	- 5,283 5,283 0	7,844 7,944	16,600 16,800 0	13,587 13,587 0	16,942 16,942	20,622 20,622 0	-24,813 -24,813 0	. 28,445 28,445	-31,94 <u>6</u>	- 36,921 38,921	42,303	48, 185 45, 185	52,891			78,702 78,702	81,773 81,773 0	75,552 75,552	84,885	84,503 84,503 0	105,057 105,057 0	116,402 116,402	128,599 128,599 0
BALLNCF SWEET  Current Assets  Cash & Deposit  Cash on Hand	1994	1895	1998	1997	1998	1989	2000	2001	2062	2003	2004	2005	2006	2007	2008	7009	2010	2011	2012	2013	2014	2015	2016	2017		1019		2021	2022	2623	2024	2025		2027	2028	
Short-term Deposit Other Current Asstes Total Current Assets Fixed Assets	0 0 0	0	0	0	0	0	737 737	0 861 861	0 685 885	1,109 1,109	1,232 1,232	157 1,437 1,309 2,003	157 3,751 1,309 5,217	157 5,125 1,309 6,591	157 7,787 1,309 9,253	157 10,442 1,309 11,908	183 13,424 1,309 14,898	16,785 1,309 18,751	157 20.484 1,309 21,930	157 24,456 1,309 25,922	157 28,288 1,309 29,754	157 31,789 1,309 33,255	157 36,783 1,309 38,229	157 42,145 1,309 43,611	157 18,028 1,309 49,494	52,737 1,309 54,203	163 80,020 1,309 81,492	157 67,959 1,309 69,435	78,545 1,309 78,011	157 84,618 1,309 88,082	157 75,395 1,309 76,861	157 84,527 1,308 85,993	157 94,345 1,309 95,811	157 104,899 1,309 108,385	157 116,245 1,309 117,711	157 (28,441 1,309 (29,907
Capital Assets Accusulated Depreciation Net Fixed Assets Capital Work in Progress Other Fixed Assets Iotal Pixed Assets Gefered Assets Intel Assets Intel Pixed Assets	0 0 0 0 0 550 550	0 0 0 0 0 0 1,100 1,100	7,422 07,422 1,214 8,835	0 0 0 19,500 0 18,500 1,440 20,948	0 0 0 37,968 0 37,368 1,712 39,679	72,344 0 72,344 2,827 75,171	72,344 1,883 70,460 0 70,460 2,282 73,459	72,346 3,767 68,577 0 0 68,577 1,696 71,134	72,344 5,850 66,693 0 0 86,693 1,131 88,809	72.344 7,534 64.810 0 64.810 565 86,484	72,344 9,175 83,168 0 0 83,188 0 84,401	72,344 11,059 61,285 0 61,285 0	72,314 12,942 59,401 0 0 59,401 0 64,818	72,344 13,878 58,668 0 0 58,868 0 65,257	72,344, 15,561 58,783 0 58,783 0 68,038	72,344 17,203 55,141 0 0 55,141 0 87,049	72,344 19,088 53,258 0 0 63,258 0 88,153	72,344 20,970 31,374 0 0 51,374 0 69,625	72.344 22.853 49.491 0 49.491 0 71.421	72,314 24,737 47,607 0 0 47,607 0 73,529	72,344 26,126 48,218 0 0 46,218 0 75,971	72.344 28,861 45,482 0 0 45,482 0 78,737	72,344 28,745 43,599 0 0 43,598 0 81,828	0	72,341 32,512 39,832 0 0 39,832 Q 89,328	72,344 32,024 40,320 0 40,320 0 94,523	72,344 33,907 38,437 0 0 38,437 0 99,928	72,344 35,791 36,553 0 0 38,553 0 105,988	72,344 37,674 34,670 0 0 34,670 0	0	51,096 0 0 51,098	72,344 23,131 49,213 0 49,213 0 135,208	47,329 0 0 47,329	45,448 0 0 45,446	28,761 43,582 0 0	72,344 30,685 41,678 0 0 41,679 0
Current Liabilities Short-tera Loans Other Liabilities Total Current Liabilities Long-tera Liabilities	0 0 0	0 0 0	17 0 17	37 0 37	100 0 100	2,328 420 2,748	3,207 958 4,185	3,389 978 4,387	2,864 997 3,861	1,614 1,017 2,631	459 1,037 1,495	0 1,049 1,049	0 1.049 1.049	0 1,049 1,049	0 1,049 1,049	0 1,049 1,049	0 1,085 1,085	0 1,049 1,049	0 1.049 1.049	0 1,049 1,049	0 1,049 1,048	0 1,048 1,049	0 1,019 1,019	0 1.049 1,049	0 1,049 1,049	0 1,049 1,049	0 1,085 1,085	0 1,049 1,049	0 1,049 1,049	0 1,049 1,049	0 1,048 1,049	0 1,049 1,049	0 1,049 1,049	0 1,049 1,049	0 1,049 1,049	0 1,019 1,049
tong-term Loans Other Long-term timbilities Total Long-term timbilities	0 0	0 0 0	397 0 397	397 6 397	1,334 0 1,334	12,201 0 12,201	12,201 0 12,201	12,175 0 12,175	12,148 0 12,148	12,059 0 12,059	11,246 0 11,246	10,432 0 10,432	9,619 0 9,618	8,808 0 8,803	7,892 0 7,692	7,179 0 7,179	8,385 0 8,385	5,552 0 5,552	4,739 0 4,739	3,925 0 3,925	3,112 0 3,112	2,298 0 2,298	1,511 0 1,511	724 0 724	9 0	. 0 0 0	0 0 0	0 0 0	0 0 0	0 · 0 0	0 0 0	0 0 0	0	0	0	. 0 0
Net Worth Retained Earnings	0	0	·17	-37	-100	-2,748	-5,876					-10,263	-9,020	-7,587	-5.975	-1.148	-2,267	55	2,884	5,585	8,841	12,420	16,298	20,584	25,307	30,504	35,873	41,989	48,662	55,997	83,938	71,188	79,122	87.792	87,255	107,568
Reserves Government Fund Total Liabilities & Net worth	550 550	1,100 1,100	8,239 8,636	20,551 20,918	38,345 39,679	62,970 75,171	62,970 73,459	62,970 71,134	82,970 68,809	62,970 66,181	62,870 64,401	62,970 64,188	82,970 84,818	62,970 65,257	62,970 68,036	62,970 67,019	62,970 68,153	82,970 89,625	62,970 71,421	82,970 73,529	82,970 75,971	62,970 78,737	62,970 81,828	62,970 85,327	82,970 89,328	82,970 84,523	62,970 99,928	82,970 105,988	62,970 112,880	82,970 120,018	82,970 127,937	62,970 135,208	62,870 143,140	82,970 151,811	62,970 161,273	82,970 171,586
Pipancial Indicators sorting Ratio(\$) Operating Ratio(1) Rate of Raturn on Not Pixed Assets(\$) Debt Service Coverage Ratio(filess)			1986 0 0 0 0	1997 0 0 0 0	1998 0 0 0 0	1899 0 0 0	2000 97.45 147.28 -3.30 10.21	2001 85.13 127.75 -2.33 11.20	2002 75.92 113.20 -1.30 12.69	2003 68.80 101.93 •0.22 12.76	2004 63.11 92.91 0.92 6.53	2005 60.13 81.72 2.80 6.87	2806	2007 60.13 81.72 2.72 7.05	2008 60.13 81.72 2.81 7.26	2009 60.13 81.72 2.89 7.49	2010 62.20 83.79 2.65 7.73	2011 60.13 81.72 3.10 7.88	2012 60.13 81.72 3.22 8.25	2013 60-13 81-72 3-35 8-54	2014 60.13 81.72 3.45 8.85	2015 60.13 81.72 3.51 9.18	2016 60.13 81.72 3.66 9.82	2017 60.13 81.72 3.82	2016 60.13 81.72 4.00	2019 69.13 81.72 3.96	2020 62.20 83.79 3.68	2021 80-13 81-72 4-38	2022 60.13 81.72 4.60	2023 60.13 81.72 4.70	2024 60.13 81.72 3.12	2025 80.13 81.72 3.24	2026 60.13 81.72 3.37	2027 60.13 61.72 3.51	2078 60.13 81.72 3.68	2029 60.13 81.72 3.83

Revenue Factor Construction Cost Factor Personnel Cost Factor Interest Rate



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OFIT AND LOSS STATEMENT  Arating Revenue Revenue from Shipm	1994	1995	1996 0	1997 0	1993	1999	2000 403	2601 455	2002 507	2003 558	2004 610	2005	2008 844	2007 844	2008 844	2009 644	2010 844	2011 844	2012 844	2013 844	201 C	2015 844	2016 844	2017 844	2018 644	2019 844	2020 644	2021 844	2022 844	2023 844	2024 844	2025 844	2026 644	2021 814	2028 614	<u>20</u> 6
Revenue from Cargo Other Revenue Total	<u>0</u>	0 0	<u>0</u>	0 0 0	<u>0</u>	 0	3,898 123 4,423	4,589 144 5,168	5,241 185 5,012	5,809 185 6,653	6,578 208 7,394	7,001 208 7,852	7,001 206 7,852	7.001 208 7.852	7,001 208 7,852	7,001 208 7,852	7,001 206 7,852	7,001 208 7,852	7,001 206 7,852	7,001 208 7,852	7,001 208 7,852	7,001 208 7,852	7,001 206 7,852	7,601 208 7,852	7,001 108 7,852	7,001 208 1,852	7,001 208 7,852	7,001 208 7,852	7,001 208 7,852	7,001 208 7,852	7,001 208 7,852	7,001 208 7,852	7,001 7,852 7,852	7,001 208 7,852	7,001 208 7,852	7,0 7,0
orating Espenses Personnel Cost Operating/Naintenance Cost Adeleistration Cost Total	0 0	0 0 0	0 0	0 0 0	0 0	1,591 0 318 1,909	3,181 442 725 4,348	3,181 517 740 4,437	3,181 591 754 4,527	3,181 665 769	3,181 739 784 4,765	3,181 785 793 4,759	3,181 785 793 4,759	3,181 785 783 4,759	3,181 785 793 4,759	3,181 785 793 1,759	3,181 938 823 4,940	3,181 785 793 4,759	3,181 785 793 4,759	3,181 785 793 4,759	3,181 785 783 4,759	3,181 785 793 4,759	3,181 785 793 4,759	3,181 785 793 4,759	3,181 785 793 4,759	3,181 785 793 4,759	3,181 938 823 4,940	3,181 785 793 4,759	3, 181 785 783 4, 769	3,181 785 793 4,759	3,181 785 793 	3,181 785 793 4,759	3,181 785 793 4,759	3,181 785 703 4,759	3,181 785 703 4,759	3,
recistion tization 1 Operating Expunses Operating Income Operating Income	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 1,909 -1,609	1,712 514 8,574 -2,152 0	1,712 514 6,681 -1,496 0	1,712 514 6,753 -841 0	1,712 514 6,842 -189 0	1.712 514 6.931 464 0	1,712 6,472 1,380 0	1,712 6,472 1,380 87	1,712 8;472 1,380 217	1,712 8,472 1,380 303	1,712 6,472 1,380 476	6,652 1,199 647	1,712 6,472 1,380 839	1,712 6,472 1,380 1,057	1,712 6,472 1,385 1,297	1,712 6,472 1,380 1,558	1,712 8,472 1,380 1,804	1,712 6,472 1,380 2,028	1,712 8,472 1,380 2,351	1,712 0,472 1,380 2,701	1,712 8,472 1,360 3,084	1,712 6,652 1,199 3,388	1,712 8,472 1,380 3,860	1,712 6,172 1,380 4,380	1,712 6,472 1,380 4,910	1,712 8,472 1,380 5,484	1,712 8,472 1,380 4,807	1,712 8,472 1,380 5,400	1,712 8,472 1,380 8,037	1,712 6,472 1,380 8,721	1, 6, 1, 7,
Operating Expenses (aterest on Long-Term Louns (aterest on Short-term Louns Income	0	0 0 0	18 0 -16	-18 5 -18	53 4 -57	488 10 -2,408	488 243 -2,883	488 339 -2,323	487 364 -1,692	488 318 -991	482 184 - 213	450 83 847	417 0 1,030	385 0 1,212	352 0 1,331	320 0 1,538	287 0 1,559	255 0 1,965	222 0 2,215	.190 0 2,487	157 0 2,779	124 0 3,059	92 0 3.316	60 0 3,671	28 0 4,052	0 0 1,484	0 0 4,585	0 0 5,240	0 0 5,780	0 0 8,320	0 0 8,844	0 0 6,187	0 0 8,780	0 0 7,417	0 0 8,101	8
Income after Tax	0	0	-16	-18		-2,408	-7.883	-2,323	-1,692	-991	213	847	1,030		1,331	1.538	1,558	1,985	2,215	2.487	2.770	3,059	3,316	3,671	4,052	4,484	4,585	5,240	5,760	8,320	8,844	6,187		7,417	8,101	8
ined Earolage eccumulated Earologs	0	0	-16 -18	-18 -34	-57 -91	-2,408 -2,499	-2,883 -5,387	-2,323 -7,705	-1.892 -9,398	991 10,387	-213 -10,600	847 -8,753	1,030 8,723	1,212 -7,511	1,331 -6,180	1,538 -4,845	1,559 -3,085	1,965 -1,121	2,215 1,095	2,457 3,582	7,775 6,381	3,059 9,420	3,316 12,738	3.671 18,497	.4.052 20,459	4.464 24,923	.4,585 29,508	_5,240 31,748	5,760 40,508	8,320 46,828	6,844 53,872	6,187 59,859	8,780. 68,639	7,417 74,055	8,101 . 82,157	90
B PLOV STATEMENT										. شاند خونوس، فرد. ــــــــــــــــــــــــــــــــــــ											- جند نارش غربية تنسست	·					مدمور د ۱۰۰۰	- Schron				************		منده ديري ويوم		***
Beginging	1894	1995	1998	1997 -16	1998	-91	2,117	-2,949	-3.164	-2,747	-1,666	-725	1,037	3,039	4.181	6,484	8,773	11,341	14,242	2013 17,430	20,890	24,193	27,181	31,493	38,161	11,267	15,288	51,821	58,538	-66,009 ·	72,998	64,240	72,139	80,631	89,780	99
o Inflow let Operating Income Papreciation Roytization	0	. 0	0	0	0	-1,909 0	-2,152 1,712 514	-1,490 1,717 514	-841 1,712 514	-189 1,712 514	484 1,712 514	1,380 1,712	1,380	1,380 1,712	1,380	1,380 1,712	1,199 1,712	1,380 1,712	1,380 1,712	1,380 1,717	1,380 1,712	1,380 1,712	1.380 1,712 0	1,380 1,712 0	1,389 1,712 0	1,350 1,712 0	1,199 1,712 0	1,380 1,712	1,380 1,712	1,380 1,712	1,380 1,712 0	1,350 1,712	1,380 1,712 0	1,380 1,712	1,380 1,712	ł:
porezzetum veroment Fueds veg-term Loans char Current Liabilities	500 0	500	6,490 361	11,103	18,178 452	22.366 9,879	0	0	0	0	0	ő	0	0	. 0	ŏ O.	ŏ	ě	ů 0	o O	Ö	ŏ	Ö	0	0	0	o o	Ö 0	Ŏ 0	Ö	ů 0	9	0	0	ő	
lacresental ter Long-term Limbilities	0	. 0	C n	0	0	382	488	18	18	18 A	18	11	0	0	0 8	0	35 0	-36 0	0	0	0	ð 0	0	0	0	0	36 . 0	-38 0	0	0	0	0 0	0	0	0	
Incremental ceived laterest ab laftow Total	0 500	0 500	0 8,851	0 11,193	17,028	30,738	0 582	748 0	0 1,403	2,055	2,708	3.103	67 3,159	217 3,309	303 3,395	478 3,588	847 3,595	839 3,895	1,057 4,150	1,297 4,389	1,558 4,648	1,804 4,898	2,028 5,120	2,351 5,444	2,701 5,794	3,084 8,177	3,386 6,333	3,860 8,817	4.380 7,472	4,940 8,032	5,484 8,55B	4,807 7,399	5,400 8,492	8,037 9,129	8,721 9,814	10
Outflow avestarch ong-term Loam Repayment aterest on Long-term Loam tterest on Long-term Loam tter Current Assets Encremental ther Fixed Annote Incremental	500 0 0 0	500 0 0 0	6,851 0 28 0 0	11,193 0 78 0 0	17,026 0 53 0 0	32,285 0 488 0 0	0 0 488 683 0	0 24 488 112 0	0 24 487 112 0	0 81 488 111 0	220 739 482 111 0	739 459 69 0	739 417 0	1,044 739 385 0 0	73B 352 0	220 739 320 0	739 287 0 0	739 255 0 0	739 222 0 0	739 190 0 0	449 739 157 0 0	1,044 739 124 0	0 715 92 0 0	0 715 80 0	859 29 0 0	2,156 0 0 0 0	0 0 0	0 0 0 0	. 0 0 0 0	1,044 0 0 0 0	17,314 0 0 0 0	0 0 0 0	0 0 0	0 0 0	0 0 0	
191 Psyed Appropriation Interest on Short-term Loans Cash Gutflow Total	0 500	0 0 500	0 6,897	11,211	17,085	10 32,783	243 1,395	339 983	364 987	318 994	184 1,747	83 1,341	0 1,157	0 2,188	1,092	1,279	0 1,027	994	0 - 932	828 0	0 1,345	1,935	0 807	776	Ç 888	0 2,158	ê 0	0	6	0 1,044	0 17,314	0	0	0	0	
Inflor - Outflow	0	0	-16	-18	-57	-2,026	-832	-215	417	1,061	961	1,762	2,002	1,141	2.303	7,289	2,588	2,901	3,188	3,460	3;303	2,988	4,313	4,888	5,108	4,021	8,333	8,917	7,472	8,988	-8,758	7,599	8,492	9,129	9,614	10
h Ending Cash Eucose Short-tern Loan		9	10	34_	9i	-7,117 0 7,117	2,949	3.104	2,747	1,680	725	1,037	3,039	1,181	8;181 0	8,773 8,773 0	11;31	11:212	17,136	20,890 20,890 0	21,193	27; 181 27; 181	31,493	38,181 38,181 0	11,787 0	45,288 45,288 0	51,621 51,621 0	58,538	68,000	72,808	81,210 0	72,138 0	80,831	18,780	99,574 99,574 0	110
														•																						
INCE SHEET	.1884	1005	1098	1997	1998	1,580	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	7021	2022	2023	2024	2025	7028	2027	2028	
ent Assets Jah & Deposit Cash on Hand Short-term Deposit Inher Current Assets Octal Current Assets	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 863 863	0 0 775 775	0 0 887 887	0 0 998 998	0 0 1,109 1,109	143 894 1,178 2,215	143 2,897 1,178 4,217	143 4,035 1,178 5,358	143 8,341 1,178 7,682	143 8,830 1,178 9,950	148 11,192 1,178 12,518	143 14,099 1,178 15,420	143 17,287 1,178 18,605	143 20,747 1,178 22,088	143 24,050 1,178 25,370	143 27,038 1,178 28,358	143 31,351 1,178 32,671	143 36,018 1,178 37,339	143 41,124 1,178 42,445	143 45,145 1,178 46,465	148 51,473 1,178 52,780	143 58,395 1,178 59,715	143 85,887 1,178 67,187	143 72,855 1,178 74,175	143 84,097 1,178 85,418	143 71,987 1,178 73,317	143 80,489 1,178 81,808	143 89,017 1,178 80,938 1	143 98,431 1,178 100,751	109, 1, 111,
d Assets apital Assets ccumulated Depreciation	0	0	0	0	0	0	65,787 1,712 61,053	65,767 3,425	85,787 5,137 80,830	65,767 6,849 58,918	65,787 8,341	65,767 10,054 55,713	85,787 - 11,786 54,001	65,767 12,434 53,333	85,787 14,146	65,767 15,639 50,128	65,767 17.351	85,787 19.083	65,767 20,778	85,707 22,488	85,767 23.751	85,767 24,419	65,767 28,132	65,767 27,844 37,923	65,767 28,556 35,211	65,767 20,112 38,655	65,787 30,625 31,842	85,787 32,537 33,230	65,767 34,249	85,767 34,918 30,849	05,767 19,318	85,787 21,026 44,739	85,787 22,740 43,027	85.787 <b>71,4</b> 53	65,787 18,165	65, 27, 37,
et Fized Assetes apital York in Progress Ither Fized Assets	0 0 0	0 0 0	8,747 0	17,727 0	34,516 0	0	0	62,342 0 0	8 .	0	57,426 0 0	55,713 0 0	54,001 0 0	53,333 0 0	14,146 51,821 0	50,128 0 0	17,351 48,418 0	19,083 48,704 0	20,778 41,991 0	22,488 43,279 0	23,751 42,016 0	24,419 41,348	28,132 39,635 0 0	37,923 0 0	35,211 0 0	38,655 0 0	31,812 0 6	33,230 0 0	34,249 31,518 0 0	30,849 0 0	48,451 0 0	44,739 0 0	43,027 0 0	74,453 41,314 0	78,165 39,802 0	37,
otal fixed basets rred lasets l bssets	0 500 500	0 1,600 1,000	6,747 1,104 7,851	17,727 1,317 19,044	34,518 1,558 38,072	65,767 2,570 68,337	84,055 2,058 86,774	82,342 1,142 64,680	60.630 1,028 62,545	.53,918 514 80,430	57,426 0 58,535	55,713 0 57,828	54,001 0 58,218	53,333 0 58,691	51.821 0 59,282	50,128 0 60,079	48,418 0 60,934	48,70 6 82,124	44,991 0 63,599	43,279 0 85,347	42,018 0 67,386	41,348 69,708	39,835 0 72,307	37.923 0 75.262	36,211 0 78,656	36,655 0 83,120	34,912 0 87,741	33,230 0 82,845	31, <u>5</u> 18 0 88,705	30.849 0 105,025	48,451 0 111,869	¢	Ç	0	9	37, 149,
ent Liabilities hort-ters Loans ther Liabilities	0	õ	16	34 0	91	2,117 382	2,949 870	3,164 887	2,747 905 3,652	1,688 923 2,809	725 941	952 952 952	952 952	952 952	952 952	952 952	0 988 983	в.	0 952 952	0	0	952 952	0 952	0 952 952	0 952 952	0 \$52 \$52	0 988 988	0 852 952	0 952 952	0 952 952	0 952 952	0 952 952	0 952 852	0 952 952	952 952	
otal Current Liabilities r-term Liabilities Long-term Loane Liber Long-term Liabilities Lotal Long-term Liabilities	0 0 0	0 0 0	361 0 361	34 381 0 381	91 1,213 0 1,213	2,499 11,092 0 11,092	3,818 11,092 0 11,092	4,051 11,088 0 11,088	3,652 11,044 0 11,044	2,809 10,963 10,963	1,656 10,224 0 10,224	957 9,484 0 9,484	952 8,745 0 8,715	8,005	7,286	8,526	5,787	952 852 5,047 0	4,308	952 952 3,568 0	957 957 2.829	2,089	952 1,374 0	659 9	952 0 0	952 0 0	988 0 0	952 0	952 0	952 0 0	952 0 0	952 0 0	952 0 0	952 0 0	952 0 0	
Vorth letained Earwings	0	0	-18	-34	-91		-5,382	-7,705		-10,387	-10,800	-9,753	-8,723	8,005 -7,511	7,286 -8,180	6,528 -4,845	5,787 -3,085	5,047 -1,121	4,308 1,095	3,568 3,582	2,829 8,361	2,089 9,420	1,374	859 16,497	20,459	24,923	29,508	34,748	40,508	46,828	53,672	59,859	88,839	74.055	82,157	90
eserves everpment Pucd   Liabilities & Ket worth	500 500	1,000 1,000	7,490 7,851	18,683 19,044	34,859 36,072	57,245 66,337	57,245 86,774	\$7,245 84,880		57,245 60,430	57,245 58,535	57,245 57,928	57,245 58,218	57,245 58,691	57,245 59,282		57,245 60,934	57,245 82,124						-	57,245 78,658			57,245 92,945					57,245 124,838 J		57,245 140,351	
ancial indicators ling Watlo(%) rating Matlo(%) e of Meturp on Met Pixed bosets(%) t Service Coverase Matlo(limes)	1894 0 0	1995 0 0 0	8881 0 0 0	1997 0 0 0	1998 0 0 0	1999 0 0 0	2000 68.31 148.85 -3.36 10.11	2001 85.87 128.94 2.40 31.09	2002 78.57 114.22 1.39 12.57	2003 69.38 102.84 -0.32 12.64	2004 63.62 93.73 0.81 6.47	2005 60.82 82.42 2.48 8.80	2008 60.82 82.42 2.58 6.79	2007 80.82 82.42 2.59	2008 60.62 82.42 2.67 7.19	2009 60.62 82.42 2.75 7.41	2010 82.92 84.73 2.48	2011 60.82 82.42 2.95 7.90	2012 60.62 82.42 3.07	2013 80.82 82.42 3.19	2014 60.62 82.42 3.28 8.78	2015 80.82 82.42 3.34 9.09	2016 80.62 82.42 3.48 9.73	2017 60.62 82.42 3.84 10.12	2018 80.82 81.42 3.81 11.42	2019 60.62 82.42 3.76	2020 82.92 84.73 3.43	2021 60.62 82.42 4.15	2022 80.82 82.42 4.38	2023 60.62 82.42 4.47	2024 60.62 82.42 2.97	2025 60.82 82.42 3.08	2028 60.62 82.42 3.21	2027 60.62 82.42 3.34	2078 80.62 82.42 3.48	80 82 3

Revenue Pactor
Construction Cost Pactor
Personnel Cost Pactor
Interest Pate



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OFIT AND LOSS STATEMENT	1994	1895	1996	1097	1998	1909	2000	2001	2002	2003	2004	2005	200B	2007	2008	2009	2010	2011	2012	7013	2011	2015	2016	2617	2018	7019	2020	2021	2022	2023	2024	2025	2028	2027	2028	2029
Revenue from Skips Revenue from Cargo Other Revenue Total	0 0 0 0	0 0 0 0	0 0 0	0 0 0	0 0 0 0	0 0 0	448 4,329 137 4,914	5,077 160 5,742	5,823 5,823 183 0,589	820 8,568 206 7,392	678 7,309 229 8,218	7,718 7,779 279 8,724	716 7,779 229 8,724	718 7,779 229 8,724	7,779 7,779 229 8,721	716 7,779 228 8,724	718 7,778 229 8,724	716 7,779 229 8,724	718 7,779 229 8,721	716 7,779 229 8,721	7,778 7,778 220 8,724	718 7,779 229 8,724	7,716 7,779 229 8,724	716 7,779 229 8,724	716 7,779 229 8,721	716 7,779 229 8,724	716 7,779 279 8,721	716 7,779 229 6,724	7,718 7,779 229 8,724	7,779 7,779 229 8,724	7,718 7,779 229 8,724	7,716 7,779 229 8,724	7,779 7,779 279 8,724	710 7,779 229 6,721	718 7,779 228 8,724	7,779 229 8,724
erating Expenses Personnel Cost	Ð	0	0	٥	0	1,432	2,883	2,863	2,863	2.883	2,863	2,863	2,863	2,863	2,863	2,883	2,863	2,883	2,863	2,883	2,863	2,883		2,863	2,883	2,883	2,863	2,863	2.583	2,883	2,883	2,863	2,883	2.863 872	2,883	2,86
Operating/Maletenance Cost Administration Cost Total	ŏ	, O	<u>0</u>	0	0	0 288 1,718	491 671 4,025	574 887 4,125	2,863 857 704 4,224	7,883 739 720 4,323	822 737 4,421	872 747 4.482	872 747 4.462	872 747 4,482	872 747 4,482	872 717 4,162	1,023 777 4,663	872 747 4,482	872 747 4,482	872 747 1,482	872 747 4,482	872 747 4,482	2,863 872 747 4,482	872 747 4,482	872 747 4,482	872 747 4,482	1,023 777 4,663	872 747 1,482	872 747 4,482	872 747 1,482	872 -747 4,482	872 747 4,482	872 747 4,482	4, 482	872 747 4,482	87 74 4,48
reclation rtization	0	0	0	0	0	0 0 1.718	1,712 514	1,712 514	1,712 514 8,430	1.712 511	1,712 514	1,712	1,712	1,712	1,712	1,712	1.717	1,712	1,712	1,712	1,712	1,717	1,717 8 195	1,712	1.712	1,712 6,195	1,712 6,375	1,712 6,195	1,712 8,195	1,712 6,185	1.712 8,195	1,712 6,195	1,712 6,195			8,19
al Operating Expenses Operating Income Operating Income	0	0	0	0	0	-1,718	6,251 1,337 0	6,351 -609 0	119	6,519 843 21	6.648 1,588 202	6,195 2,529 388	6,195 2,529 829	6,195 2,529 908	8,195 2,579 1,131	8,195 2,529 1,453	6,375 2,349 1,784	8,195 7,529 2,147	8,195 2,529 2,550	8,195 2,529 2,987	6,195 2,529 3,459	6,105 2,529 3,936	2,529 4,405	2,529 4,994	5,195 2,529 5,629	2,529 6,317	2,349 8,848	2,529 7,778	2,529 8,875	2,529 9,813	2,529 10,606	2,529 10,422	2,529 11,521	0,195 2,528 12,703	8,195 2,529 13,974	2,52 15,34
Detrating Expenses Interest on Long-Term Loans Interest on Short-term Loans	0	0	16 0	16 2	53 4	488 10	488 226	188 237	487 150	. \$88 0	482 0	150 0	117 0	385 0	352 0	320	287 0	255 0	222	190 0	157	124	92 0	60 0	29 0	0	0	0	0 0 11. <b>20</b> 1	0 0 12,173	0 0 13,138	0 0 12,951	0 0 14.051	0 0 15,233 1	0 0 16,504	17.8
Income after Isx	0	0	-18	·15	-57 -57	-2,217 	2,051 2,051	1,334 1,334	-518 -518	378 378	1,288	2,168 2,166	2,741 	3,052 3,052	3,309	3,662 3,682	3,845 3,845	4,422	4,857	5,327 5,327	5,832 <u>5,832</u>	6,341 <u>6,341</u>	8,844 8,844	7,463 7,463	8,129 8,129	8,847 8,847	9,296 9,296	10,305	11.204	12,173	13,138	12,951	14,051	15,233		7.8
ained Earnings Accumplated Earnings	0	0	-16 -18	· 18 -34	- \$7 - 91	-2,217 -2,308	-2,051 -4,350	-1.334 -5,693	-518 -6,211	378 -5,833	1,288 -4,544	2,466 -2,078	2,741 863	3,052 3,715	3,309 7,024	3,662 10,688	3,845 14,531	18,422 18,953	4.857 23,810	.5,327 29,137	5,832 34,989	8,341 41,310	6.844 48,153	7,483. 55,617	8.129 83,746	8.847 72,593	9,798 81,889	10,305 92,184	11,204 103,388	12,173 115,571	13,136 128,707	12.951 141,857	14,051 155,708 1	15,233 1 170,941 18	18,504 1 87,445 20	17,81 05,3
A PLOW STATEMENT  b Seginalog	1894	1995	1998 0	1997 ·16	1998	1699	2000	7001	2002	2003 279	2004 2,699	2005 5,151	2008 8,525	2007 12,239	2008 15,221	2009	2010 23,917	2011 28,771	2012 34,130	2013	2614 46,259	2015 52,615	2616 56.681	2017 68,725	2018 75,185	2019 84,368	2020 92,771	2021 103,816	2022 115,797	2023 128,713	2024 141,554	2025 139,088	7078 153,751 1	2027 160,514 18	2018 86,459 2	20: 14,6
Inflor	0	0	0	0		-1,718	-1,337	-609	119	843	1,588	2,529	2,529	2.529	2.529	2.528	2,349	2.529	2,529	2.529	2.529	2.529	2,529	2,529	2.529	2,529	2,349	2,529 1.712	2,529	2,529 1,712	2.529 1,712	2,520	2,529 1,712	2,520	2,529 1,712	2,5
let Operating Income depreciation mortization overnment funds	0 0 500	0 0 500	0 0 6,490	0 0 11,193	0 0 16,178	0	1,712 514	1,712 514	1,712 514	1,717 514	1,712 514	2,629 1,712 0	1,712	1,712	2,529 1,712 0	2,529 1,712 0	1,712	2,529 1,717 0	1,717	2,529 1,712 0	2,529 1,712 0	2,520 1,712 0	1,712	1,712	1,712	1,712	1.712	1.712	1,712	1,712	1,712 0	1,712	1,712 . 0	1,717	0	1,7
ong term Loans ther Cerrent Liabilities Incremental	ő	0	381	,,,,,,,	852	9,379	Ď	0 20	Ŏ.	ŏ	0	0	ŏ	ő	ŏ	ŏ	0	ŏ	ő	0	Ď	. 8	ŏ	ŏ	ŏ	ŏ	Ŏ ar	0 -36	ŏ	ŏ	Õ	ð	ŏ	ō	ō	
ther Long-term Limbilities Incremental eccived laterest	0	0	0	0	0	0	481 0	0	. 0	0	0	.0	0	0	0	0	0	-35	0	0	2 40	0	0		0	0	8,948	7,778	0 8,875	9,843	0 10,608	10,422	0	0 12 203 7	0 13.924	15 7
ash laflow Total	500	500	8,851	11,193	17,028	30,890	1,350	1,837	2,385	3,110	202 4,017	386 4,640	629 4,871	908 5,150	1,131 5,373	5,694	5,881	2,147 8,353	2,550 6,791	2,987 7,228	7,701	3,936 8,178	4.408 8.648	4,994 8,238	5,628 9,870	8,317 10,559	11,045	11,981	12,916	13,885	14,848	14,683	11,521 15,763	12,703 1 18,945 1	13,974 18,218	15,3 19,5
Outflow avestment ong-term toam Repayment	500 0	500 9	6,851 0	11,193	17,028	32,285	0	0 24	0 24	0 81	220 739	0 739	0 739 417	1,044 739	739 352	220 739	739 287	739 255	739 222	0 739 190	449 739 157	1,011 739 171	715 92	0 715 60	0 859 29	2,158 0	0	0	0	1,044	17.314	0	0	0	0	
atorest on Loag-term Loans Other Current issets Incremental Other Fised issets Incremental	0	0	16 0 0	18 0 0	53 0 0	488 0 0	488 737 0	488 124 0	467 124 0	486 123 0	739 452 124 0	739 150 78 G	417 0 0	739 385 0 0	352 0 0	739 320 0	287 0	255 0 0	222 0 0	190 0 0	157 0 0	174 0 0	92 0 0	60 0 0	29 0 0	0 0 0	0	0	0	0	9	0	0	0	0	
ax ayed Appropriation aterest on Short-tera Loans	0	0	0	2		. 10	228 1.451	237	150	0	. 0	. 0	0	0	0	0	0	0	0	0	0	0	_0	0	0	0	9	0	0		0 17.314	0	0	0	5	
lash Outflow Total h Inflow - Outflow	500 0	500 0	8.867 -16	11,211 -18	17,085 -57	32,783 -1,673	1.451 -101	874 784	785 1,580	890 2,420	1,583 2,451	1,268 3,375	1,157 3,714	2,168 2,981	1,092	1,278	1,027 4,854	994 5,359	. 962 5,830	929 6,300	1,345 8,356	1,908 8,270	807 7,841	776 8,460	688 9,183	2,156 8,403	11,045	11,981	12,918	17,841	-2,486	14,883	15,763	16,845 1	18,218	19,5
h Ending Cash Excess		<del>0</del>	-16 C	-34	<u>-01</u>	-).884 0	2,085	-1,301 0	279 279	<u>7,899</u> 2,699	5,151 5,151	8,525 6,525	12,239	15,221 15,221	19,502 19,502	23,017 23,017	28,771 28,771	34, <u>130</u>	39,960 39,960	46,259 46,259	52,615 52,615	- 58,884 -	_68,725 66,725	75,185 75,185	84,388 81,388	92,771 92,771	103,818 103,816	115,797 115,797	128.713 128.713	-141,554 -141,554	139,088 139,088	-153,751 153,751	169,514	88,459 20 88,159 20	04,675 - 2 04,675 - 2	24 . 2 24 . 2
Short-term Loam		<u></u>	18	34		1,981	2,085	1,301	0_	0		<u>0</u> _	Ω_	0	0.		<u>.</u>	0	0_	0_			<u>0</u>	<u>V</u>	Д				<u>Y</u> .	<b>.</b> .		_,X	·····	×	<u>V</u>	•
ANCE SHEET	Your			······································	Inve	vaas	···· ··· ·· · · · · · · · · · · · · ·				**************************************	*^^*	2000				***************************************		4018		······································	· · · · · · · · · · · · · · · · · · ·			2010	6036			9649	755	1094	2075	2028	7691	2028	2020
rest Assets Cash & Deposit	1393	1993	1830		1880	1989	2000		7007 ~	2003	2004	2005	2008	2007	2008	2009	2010	2011	2012	2013	2014		2018	2017	2018		2020	2021	2072-		1019				194	12
Casb on Hadd Short-ters Deposit Other Curreat Asstes Total Curreat Assets	0	0	0 0	0 0 0	0 0 0	0	0 737 737	6 0 561 561	279 985 1,265	2,699 1,109 3,808	5,151 1,232 6,383	134 8,391 1,309 9,834	12,105 1,309 13,548	15,086 1,309 16,529	19,368 1,309 20,811	134 23,783 1,309 25,228	28,831 1,309 30,080	134 33,995 1,309 35,438	134 39,825 1,309 41,268	134 48,125 1,309 47,568	52,480 1,300 53,023	134 58,750 1,309 69,193	134 66,590 1,309 68,033	134 75,050 1,309 76,493	134 84,233 1,309 85,876	92,636 1,309 94,070	140 103,876 1,309 105,124	115,682 1,399 117,105	128,579 1,309 130,022	141,420 1,309 142,883	138,954 1,309 140,397	153,617 1,308 155,060	189,380 L8 1,309 170,823 L8	134 86,325 204 1,309 1 87,788 205	4,541 22 1,309 5,984 22	4,12 1,30 5,56
d Assets apital Assets accumulated Depreciation	0	0	0	0	0	0	85,767	65.767	85,767	65,767	65,767	65,787	65,767	65,787	65,767	85,787	65,767	85,787	85,787	65,787	85,787	65,767	65,767	65,787	85.767	65,787	85.787	85,787 32,537	85,767	65,767	85,787 19,316	65,787 21,028	85,787 ( 22,740	65,787 85 24,453 26	6,787 6 6,165 2	5,76 7,87 7,89
fet Pixed Assetes Capital York in Prozress	0	Ŏ O	8,747	17,727	34,518	85,787	1,712 84,055 0	3,425 62,342 0	5.137 80.830 0	6,849 58,918 0	8,341 57,426 0	65,787 10,054 55,713 0	11,768 54,001 0	12,434 53,333 0	14,146 51,821 0	15,639 50,128 D	17,351 48,418 0	19,063 48,704 D	20,776 41,991 0	22,488 43,279 D	23,751 42,018 0	24,419 41,343 0	26,132 39,635 0	27,844 37,923 0	29.556 38,211 0	29,112 36,655 0	85.787 30,825 31,942 0	33,230	34,749 31,518 0	34,918 30,849 0	46,451	11,739	43,027	41,314 39	i9,802 3	1,89
Other Pixed Assets Total Fixed Assets erred Assets	6 500 500	0 1,000 1,000	6,747 1,104	17,727 1,317 19,044	34,516 1,558 38,072	65,787 2,570	.64,055 2,058 68,848	82.342 1,542 64,746	60,630 1,028 62,923	58.918 514 63,240	57,428 0	55,713	.54,001	.53,333	51,621	50,128 0	48,418 0	48,704 0	44,99L	43,279 0	0	0	9	6	38,211	38.655 C	34,942	_33,230 0	31,518	30,849	48,451	44,739	ก	Ð	0	7,89 3,45
l Assets ent Liabilities	500	1,000	7,851	19,044		68,337			62,923	63,240	63,809	65,547	67,549	69,862	72,431	75,354	78,496	82,142	86,260	90,847	95,939	101,541	107,689	114,417	121,887	130,734	140,068	150,335	161,539		186,848	199,799	213,650 2	20,082 245	5,588 28	3,40
Short-term Loans Utber Liabilities Fotal Current Liabilities	. 0 0	0	16 6 18	34 0 34	91 0 91	1,984 344 2,308	2,085 805 2,870	1,301 825 2,128	845 845	865 865	884 884	0 898 828	896 896	0 898 898	898 898	0 898 888	933 933	0 896 898	698 898	0 898 896	0 828 898	0 896 893	0 898 898	898 888	0 898 898	896 888	933 933	0 898 898	0 898 898	0 896 896	0 886 896	0 898 898	0 898 898	898 898	898 898	89 89
term Liabilities ong-term Loans ther Long-term Liabilities	0	0	361 0	391	1,213	11,092 0	11,092 0	11,068 0	11,044	10,983	10,224	9,484 0	8,745	8,005	7,288 0	8,528	5,787	5,647	4,308	3,588	2,829	2,089 0	1,374	659 6 659	0	0	0	0	0	0	0	ō 0	0	0	0	
otal Long-term Limbilities Worth etained Euroings	0	0	381 -16	361 -34	1,213 -91	11,092	11,092	11,068	11,044 -8,211	10,963	10,224	9,484	8,745	8,005	7,788	8,528	5,787	5.047	4,308	3,588	2,829 34,989	2,089	1,374		0 03,748	0 72,593	0 81,889	0 92,194	0 103.398	0 115,571	0 128,707	0 141,857	0 155,708 j	V 170,941 18	0 87,445 20	15,3
lavervev	500 500	1,000 1,000	7,490 7,851	18,883 19,044	34,859 36,072	57,245 68,337	57,245 68,648	57,245 84,748	57,245 82,923	-5,833 57,245 63,240	-4,544 57,245 63,809	-2,078 57,245	863 57,245 67,549	3,715 57,245 89,882	7,024 57,245 72,431	10,686 57,245 75,354	14,531 57,245 78,498	18.953 57,245 82,142	23,810 57,245 88,260	29,137 57,245 90,847			57,245			57,245 130,734		57,245 150,335		57,245 173,712	57,245 188,848				57,245 45,588 21	
		1995	1996	1997	1998	1999	2.4		_	2803	200€	7005	2608	2003 284982	76,431	75,354	7010	2011	2012	2013	2014	2015	on ce	2017	201X	:	9000		2022	2023	2026	20.05		4000	2019	202
ancial indicators king Matio(%) rating Matio(%) e of Return on Net Pixed Assets(%)	0 0	0	0 0 0	0	0	0	2000 31.01 127.22 -2.09	2001 71 -83 110 -80 0 -88	2002 64.30 98.19 0.20	58.48 88.59 1.43	53.81 80.81 2.73	51.38 71.01 4.54 7.34	61.38 71.01 4.88 7.54	31.38 71.01 4.74	51.38 71.01 4.90 7.93	51.38 71.01 5.05 8.24	53-45 73-08 4-85 8-50	51.38 71.01 5.42	51.38 71.01 5.62 9.07	51.38 71.01 5.84	51.38 71.01 6.02 9.73	51.38 71.01 8.12 10.10	51.38 71.01 8.38	51.38 71.01 6.67	51.38 71.01 6.99	2019 51.38 71.01 6.60	53.45 73.08 8.72	51.33 71.01 7.01	51.38 71.01 8.03	51.38 71.01 8.20	51.38 71.01 5.45	51.38 71.01 5.65	51.38 71.01 5.88	51.38 71.01 8.12	51.38 71.01 0.39	51.36 71.0
t Service Coverage Batio(Ilmes)	<u>ŏ</u> .	<u>ŏ</u>	š	<u>ŏ</u>		<u>č</u> .	11.12	12.72	13.86	13.95	7.14	7.31	7.54	7.78	7.93	8.24	8.50	5.4Z 8.78	9.07	9.39	9.73	10.10	10.81	11.24	12.89											

Table 8-4-11 FIRR Calculation (Base Case)

FIRR: 0.046187993636

BASE CASE

ЖО.	YEAR	COST	BENEFIT	BNFTCOST	P.COST	P.BNFT	P.VALUE
1.	1994	500	0	-500	500	0	-500
ž	1995	500	ŏ	- 500	478	0	-478
3	1996	3,081	0	-3,081	2,815	0	-2.815
4	1997	5,908	. 0	-5,908	5,160	0	-5,160
5.	1998	10,249	Ö	-10,249	8,353	0	8,555
6.	1999	30,752	ŏ	-30.752	24,537	Ó	-24,537
7.	2000	4,407	4,914	507	3,361	3,748	387
8.	2001	4,506	5,742	1,236	3,285	4,186	901
9.	2002	4,605	6,569	1.964	3,209	4,577	1,369
10.	2003	4,704	7,392	2,688	3,133	4.924	1,790
11.	2004	5,023	8,216	3.193	3,198 -	5,231	2,033
12.	2004	4,864	8,724	3,860	2,960	5,309	2,349
13.	2006	4.864	8,724	3,860	2,829	5,075	2,245
14.	2007	5,908	8,724	2,816	3,285	4.851	1,566
15	2008	4,864	8,724	3,860	2,585	4 636	2,051
15.	2008	5,084	8,724	3,640	2,583	4,432	1,849
17.	2010	4,864	8,724	3,860	2,362	4,236	1,874
18.		4,864	8,724	3,860	2,258	4.049	1,792
	2011	4.864	8,724	3,860	2,158	3,870	1,712
19.	2012	4,864	8,724	3,860	2,063	3,699	1,637
20	2013		8,724	3,411	2,154	3,536	1,383
21.	2014	5,313	8,724	2,816	2,289	3.380	1,091
22.	2015	5,908		3,860	1,801	3,231	1,429
23.	2016	4,864	. 8,724	3,860	1,722	3,088	1,366
24.	2017	4,864	8,724		1,646	2,952	1,306
25.	8102	4,864	8,724	3,860		2,821	551
26.	2019	7,020	8,724	1,704	2,270	2,697	1,137
27.	2020	5,045	8,724	3,679	1,560	2,007	1,141
28.	2021	4,864	8,724	3,860	1,437	2,578 2,464	1,090
29.	2022	4,864	8,724	3,860	1,374		760
30.	2023	5,908	8,724	2,816	1,595	2,355	
31.	2024	22,504	8,724	- 13,780	5,807	2,251	-3,556
32.	2025	4,861	8,724	3,860	1,200	2,152	952
33.	2026	4,864	8,724	3,860	1,147	2,057	910
34.	2027	4864	8,724	3,860	1,096	1,966	870
35	2028	4864	8,724	3,860	1,048	1,879	831 6,728
36.	2029	·23950	8,724	32,674	-4.931	1,796	0,720
	TOTAL	190,299	250,933	60,634	104,026	104,026	U

Table 8-4-12 FIRR Calculation (Case A) FIRR: 0.031399699571 CASE A

NO.	YEAR	COST	BENEFIT	BNFT COST	P.COST	P.BNFT	P.VALUE
1.	1994	550	0	-550	550	0	-550
2.	1995	550	Ō	∙550	533	0	-533
3.	1996	3,766	Ō	-3,766	3,540	0	-3,540
4.	1997	7,027	0	-7,027	6,405	0	$\cdot 6,405$
š.	1998	11,951	Ü	-11,951	10,561	0	-10,561
6.	1999	34,170	0	-34,170	29,276	0	-29,276
7.	2000	4,789	4,914	125	3,978	4,082	104
8-	2001	4,388	5,742	854	3,937	4,625	688
ġ.	2002	4,937	6,569	1,582	3,894	5.130	1,235
10.	2003	5,086	7,392	2,306	3,851	ă,ā97	1,746
11.	2004	5.405	3,216	2,811	3,968	6.031	2,063
12.	2005	5,246	8,724	3,478	3,734	6,209	2,475
13.	2006	5,246	8,724	3,478	3,620	6,020	2,400
14.	2007	6,290	8,724	2,434	4,208	5,837	1,628
15.	2003	5,246	8,724	3,478	3,403	5,659	2,256
16.	2009	5, 166	8,724	3,258	3,438	5,487	2,049
17.	2010	5,427	8.724	3,297	3,309	5,320	2,010
18.	2011	5,246	8,724	3,478	3,101	$\bar{5}, 15\bar{8}$	2,056
19.	2012	5,246	8,724	3,478	3,007	5,001	1,994
20.	2013	5,246	8,724	3,478	2,916	4,848	1,933
21	2014	5,695	8,724	3.029	3,069	4,701	1,632
22.	2015	6,290	8,724	2,434	3,286	4,558	1,272
23.	2016	5,246	8.724	3,478	2,657	4,419	1,762
24.	2017	5,246	8,724	3,478	2,576	4,284	1,703
25.	2018	5,246	8,724	3,478	2,498	4,154	1,656
26.	2019	7,402	8,724	1,322	3,417	4.028	610
27.	2020	5,427	8,724	3,297	2,429	3,905	1,476
28.	2021	5,426	8,724	3,298	2,355	3,786	1,431
29.	2022	5,246	8,724	3,478	2,207	3,671	1,463
30.	2023	6,290	8,724	2, 134	2,566	3,559	993
31.	2024	22,560	8.724	-13,836	8,923	3,451	-5,473
32.	2025	5.246	8,724	3,478	2.012	3,346	1,334
33.	2026	5,246	8,724	3,478	1,951	3,244	1,293
34.	2027	5,246	8,724	3,478	1,391	3,145	1,254
35.	2028	5,246	8.724	3,478	1,834	3,049	1,216
36.	2029	-26.831	3,724	35,355	-9.093	2,956	12,049
:01	TÖTÄL	205, 505	250,933	45,428	135,257	135, 257	0

Table 8-4-13 FIRR Calculation (Case B)

FIRR: 0.028509139303 CASE B COST BENEFIT BNFT.-COST P.COST P.BNFT P.VALUE 500 0 -500 500 1. 1994 0 0 0 0 4,423 5,188 -500 1995 500 -486 3,081 5,908 10,249 30,752 4,407 4,506 -300 -3,081 -5,908 -10,249 -30,752 16 662 -2,913 -5,430 -9,159 -26,720 2,913 5,430 1996 1997 1998 9,159 26,720 3,723 3,701 3,678 3,653 3,792 1999 3,737 2000 4,245 4,721 5,166 5,582 5,764 5,604 5,448 2001 4,605 4,704 5,023 4,864 1,307 1,949 2,371 2,988 2,988 5,912 6,653 7,394 9. 10. 2002 2003 1.044 1,513 2004 12. 13. 14. 7,852 7,852 7,852 2,193 2,132 2005 3,570 3,471 4,864 5,908 2006 1,349 2,016 1,816 2007 1,944 4,100 2,988 2,768 2,988 2,988 2,988 2,988 15. 16. 4,864 5,084 4,864 7,852 7,852 7,852 5,297 5,151 3,282 3,335 2008 2009 2010 3,102 5,008 1,906 7,852 7,852 7,852 7,852 3,016 2,933 4,869 4,734 18. 19. 1.853 2011 4,864 1.802 2012 4,864 4,864 1,752 1,447 1,077 20. 2013 2,851 4,603 5,313 5,908 4,864 4,864 7,852 7,852 7,852 7,852 7,852 7,852 7,852 2,539 1,944 2,988 3,028 3,274 21. 4,475 4,351 4,231 2014 2015 2,621 2,548 2,477 23. 24. 25. 26. 27. 1,610 2016 2,988 2,988 832 2,807 2,988 4,113 3,999 1,565 1,522 2017 4,864 7,020 2018 3,476 2,429 2,277 2019 3,888 5,045 4,864 4,864 7,852. 7,852 7,852 3,781 3,676 1.352 2020 1.399 2021 29. 2022 2,988 1,360 5,908 22,504 4,864 7,852 7,852 7,852 7,852 1,944 2,615 9,683 3,475 3,379 860 6,305 30 2023 2024 2025 2,988 7,852 7,852 2,988 2,988 2,988 1,215 2026 2027 33. 4,864 1.978 3,194 3,105 3,019 2,936 128,410 1,924 4.864 2028 4,864 7,852 670 11,890 -23,950 190,299 7,852 225,850 31,802 35,551 -8,954 128,410

# CHAPTER 9 STRAREGY FOR DEVELOPMENT OF NEW PORT

### Chapter 9 STRAREGY FOR DEVELOPMENT OF NEW PORT

1. Launching a port is really an ambitious project. Planning and design are both important factors, however, management and operation should also be emphasized to guarantee the success of a new port. In this chapter, this aspect will be examined in detail, although not exhaustively. In doing so, the team has tried to make a realistic approach rather than drawing up a theoretically ideal scheme, since in determining institutional aspects and operational practices, the existing social background of the nation is a more relevant factor than theory.

### 9.1 New Port Management Organization

2. Some of the points for management structure are indicated in Chapter 8-2 and 8-3 and here the work area of PMB is considered.

Generally speaking, the body should be streamlined with a view to maintaining high efficiency.

With this principle in mind, the port managing body of new port may be a separate organization from existing port service corporations. There are no standards throughout the world as to whether one PMB governs a single port or plural ports. Generally speaking, major European, North American and Japanese ports have their own port authorities. On the other hand, in some developing countries, a port authority or a government organization operates all or some of their ports.

However, as stated in 8-4, the construction costs of basic facilities/equipment are borne by the government, but the remainder is procured in the form of loans. \*The PSC (Mina Qaboos) may not be able to do anything to financially assist the new port. Furthermore, although over a longer period the body should be self-sustaining, in the years after launching the port a huge deficit is envisaged, and it may be neither possible nor desirable for the PSC (Mina Qaboos) to share the burden.

- \* For the cost of fishery port, special consideration should be given since this contrbutes to the promotion of fishing.
- 3. There are a large number of variations throughout the world as to the extent of the work that PMBs actually conduct. Within the work, the most important one is whether a PMB conducts cargo handling by itself. The PSC (Mina Qaboos) owns handling equipment and conducts loading and unloading.

It is considered advisable that the organization for the new port follow the example of Mina Qaboos, at least in its initial stage, taking into account the advantage of learning from the experience of the existing PSC.

There are many examples in the world, in which independent companies undertake cargo-handling activities, and in the future these possibilities might be considered with a view to streamlined organization and efficiency.

The management of the FTZ and other factory sites should be separated from the PMB, although the PMB might act as the landlord of the FTZ, etc., and close cooperation maintained between the activities of port operation and manufacturing. This is because the characteristics of management are different and unifying them may cause inefficiency by mixing different types of business.

Since the area of work is similar to that of the existing PSC, the structure of the organization is similar with slight modifications, corresponding to different functions such as ship repairing, fishery port, and landlordship of the FTZ and other factory sites. Fig.9-1 shows an idea of the structure and sectionwise duty of the PMB, mainly following the example of the PMB (Mina Qaboos). Within its functions of the new port, that of contains handling is the most important in terms of port management. In this view, organization and its duty is shown in Fig.9-2, as an example.

### 9.2 Recruitment and Training

4. The new port requires some one thousand personnel and workers to be employed. Hard work is envisaged in recruiting the many kinds of persons needed, from top management to laborers, and training them will be even more difficult. The greatest attention should be paid to these matters, and thorough study to draft a comprehensive scheme for recruitment and training is needed.

Even with the above measures, it is envisaged that it will be difficult to hire a sufficient number of experts for higher-ranking management, and in that case foreign experts with much experience of port management, preferably including a general manager, might be recruited in order to assist in the port's smooth operation and to transfer expertise of port management in the inauguration period.

Besides the above, it may be advisable to learn from the experience of

### 9.3 Coordination Measures

5. The new port should, when operating, cooperate with many kinds of related bodies. The relationship with Mina Qaboos should be taken up first. Both ports should cooperate and coordinate their activities in many fields. Particular importance should be attached to concerted action for cargo sharing, especially for general cargo, to which tends to be the subject of fierce competition. For maintaining cooperation, consideraton should be given to establishing a council under the Ministry of Communications with a small secretariat and consisting of executives of the PSCs of Mina Qaboos and the new port. Meetings should been convened regularly with a view to exchanging information and to draft a ports policy.

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Officials from other government organizations or other bodies may join the meetings where possible and necessary. The council may be named the National Port Council, following the example of the United Kingdom.

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6. Another facet of coordination relates to various development projects in the region. Coordination in the planning and construction stages is no doubt important, but in the operating stage it is equally indispensable. In order to ensure concerted action between project-related organizations, some mechanism should be developed. Possible participants in such a mechanism may be municipalities, regional branches of central organizations dealing with energy, housing, education, customs, quarantine and immigration, the industrial estate authority, the governing body of the FTZ and petro-chemical factories.

#### 9.4 Port Pricing Policy

7. The fundamental principles of port pricing are that (1) the client should pay for what he uses, i.e., charges should be levied on each place of equipment or service; (2) charges should provide the required income; (3) the pricing structure should promote the efficient utilization of port facilities. In reality, however, these principles tend to be not implemented because of various circumstances or constraints. For the new port, competition with neighboring ports will inevitably affect pricing. Despite this, when making tariffs, due consideration should be given to

avoid so-called "cut-throat competition".

As for the fishery port, charges may not be imposed on small fishing boats, if the cost of construction is borne by the fishing promotion budget (see paragraph 2).

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### 9.5 Port Sales

8. In terms of geography, the ports of Oman are advantageously located among the ports in the Gulf. However, in recent years, from the customers point of view, economic benefits including quick transit time of vessels tend to be more attractive than mere geographical advantage. As a new comer, the PMB of the new port should carry out intensive port sales activities. Ports in the United Arab Emmirates have been actively engaging in selling their ports and FTZs. For new comers, port sales activity is more important than for advanced ports. Without a positive approach, clients, who are essential for the port's survival, may not be attracted to the port. However, it should be noted that publicity does little on its own. A reputation for speedy and safe movement of goods is essential for attracting clients. In this context, quick customs, immigration and quarantine procedures are also vital.

References

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p.44

Port Administration and Management J-G Baudelaire

Chapters III, V, VII and VIII

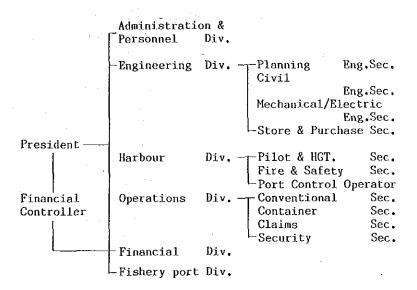
1. 人名英格兰人姓氏克克克斯 医皮肤

Report of the Study of Mnagement and Operation for Developing Countries,

1990 (OCDI) in Japanese

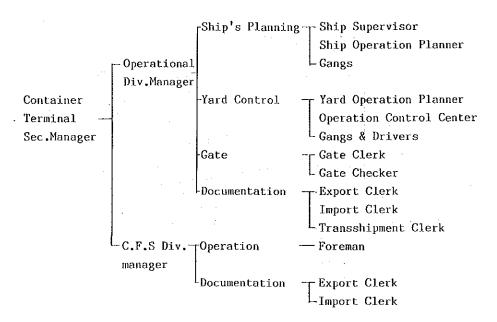
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Fig.9-1 Organization Chart of the PSC in the New Port



The Duty of Each Division : Port Planning/Port strategy survey/Port Engineering Div.Port Planning promotion Eng. Sec. Design of port facilities/Cost estimate Civil Eng.Sec. of construction Superintend of the construction work : Dredging Maintenance of port facilities Survey, etc. Purchase planning of machine/electric Mechanical/ Electric equipment Eng.Sec. Management of machine/electric equipment Maintenance of machine/electric equipment Store & purchase: Storing & purchasing civil/electric/ Sec. mechanical materials Harbour Div.Pilot & MGT Sec. : Pilotage for entry/exist ship (using tugboats) Fire & Safety : Fire service Sec. Safety control in the port area Port control Procedure for ship entry/exit Berth allotment operator Operation Div.Conventional : Management of transit shed terminal Sec. : Cargo handling operation of break bulk-: Allotment of the gang/cargo handling equipment Container Sec. See Fig.9-2 Claims Sec. Dealing with claims regarding cargos Security control in the port area Security Sec. Security training of the PMB Fishery port Div. : Planning of the fishing port Berth allocation in the fisher port Maintenance/management of the fisher port facilities : Management of the fishing market

Fig.9-2 Detailed Chart of the "Container Section"



The Duty of the Container Terminal Section

C.F.S

Ship's planning : Allocation of the stowage slots of import/export container according to the manifesto : Maker of container sequence checklist : Maker of loading ship stowage plan/loading container sequence checklist Yard control : Operator of the C.Y, according to the container sequeuce checklist : Checker of the container location : Reporter of the operating results to the documentation clerk : Allotment of gang/cargo handling equipment : Indicator of adequate operation in the C.Y Gate : Checking the delivery slip : Confirmation of the custom import clearance/custom export permission Documentation : Information of the arrival notice to consignee : Reporter of the confirmed discharging container list to the custom : Confirmation of the custom import/export clearance

: Maker of the container loading plan in C.F.S

## APPENDICES

### I. Appendix to Chapter 4-1

### Appendix 4-1-1 Revised Cost Estimates for Further Expansion of Mina Qaboos which Had Planned by CES

The CES recommended the shceme II for further expansion of Mina Qaboos as shown in Fig. A-4-1-1. They phased the scheme II to the phase I and the phase II. The berth length of the phase I is 1,120m which is just the same as our plan in 2000. In order to compair their plan with our plan, we revised their cost estimate as follows:

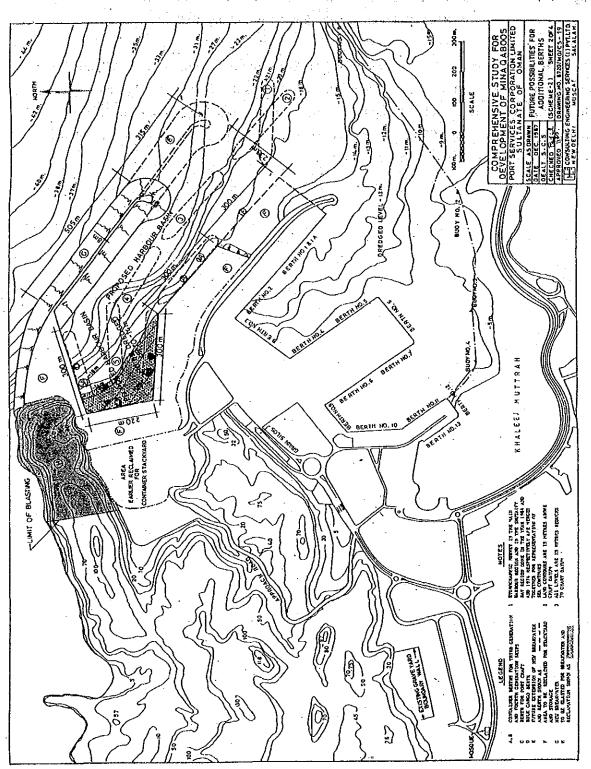


Fig.A-4-1-1 Scheme II of Further Expansion of Mina Qaboos

Table A-4-1-1 Breakup of Quantity and Cost of Items for Various Alternatives by CES

Phase	ase Item	Sche Qty. Unit	Scheme I hit Rate (RO)	Amount M(RO)	Qty.	Scheme Unit Ra	S t H	Amount M(RO)	Scheme Qty. Unit )	Rate (RO)	Amount M(RO)	Sche Qty. Unit	Scheme lv nit Rate (RO)	Amount M(RO)
н	Reclamation with i) Dredged soil	Lin	ı	1	75,000	Em.	44	Negli-	85,000 m3	4	Negli-	400,000 m3	4	ł
	ii) Blasted Jebel	30,00,000 m3	4	12	27,00,000	m3	4.	gible 11	29,50,000 m3	4	gible 12	800,000 m3	4	m
	Total	30,00,000 m3		12	27,75,000	m3		## ## ## ## ## ## ## ## ## ## ## ## ##	30,35,000 m3		12	12,00,000 m3		S
	Breakwater i) Stone ii) Stabits	10,00,000 m3 2,67,000 m3	30	ဖစ	8,33,000	E E E E	306	rv r-	10,00,000 m3 2,67,000 m3	30	<b>ഗ</b> റ	8,33,000 m3 2,00,000 m3	30	ro o
	Total	12,67,000 m3		14	10,66,000	m3	,	1.2	12,67,000 m3	****	14	10,33,000 m3	:	11
	Blasting Dredging Berth Approach Road	40,00,000 m3 Nil 810 m 1,000 m	10,000	ம் பறை	33,40,000 75,000 1,120 1,000	E H H H	10,000	जन्त् स	40,00,000 m3 85,000 m3 1,200 m	1.5 11 10,000 1,000	1 12 11 11 11 11 11 11 11 11 11 11 11 11	20,00,000 m3 4,00,000 m3 1,120 m	10,000 11,0000	6 <b>4</b> 다
	Grand Total	-		41	:			41	-	•	46		Ì	35
H.	Reclamation with i) Dredged soil	ר ניא	1		Nil		. 1	- • <b>I</b>	- Lin	1	· I	Lin		
<del></del>	ii) Blasted Jebel	7,50,000 m3	4	<b>m</b> ,	7,50,000	m3	4	m	7,50,000 m3	4,	'n	1,00,000 m3	4	4
	Total	7,50,000 m3		m <sub>3</sub>	7,50,000	m3	-	8	7,50,000 m3	÷	m	1,00,000 m3	,	4
	Breakwater i) Stone ii) Stabits	5,00,000 m3	9 08	in in	5,00,000	E E	9 e	ι. ω 4	3,30,000 m3 1,00,000 m3	ဖင္က	01 M	6,66,000 m3	30	4 t
	Total	6,67,000 m3	-	ω	6,33,000	. E		7	4,30,000 m3		ហ	8,32,000 m3		σı
	Blasting Dredging Berth	13,50,000 m3 N±1 300 m	1.5.	ИIМ	13,30,000 Nil 300	e e	10,000	01 m	13,30,000 m3 Nil 300 m	1.5	010	13,30,000 m3 Lin 550 m	10,000	0.10
	Grand Total			. 16				1.5			13			21

Table A-4-1-2 Comparison of Further Expansion of Mina Qaboos with New Port Development

Item		Cost Estimate by CES for Phase I of Scheme	stimate by CES for Phase I of Scheme II	for eme II	Reveresed	Cost	Reveresed Cost Estimate by JICA Team for Phase I of Scheme II	by JICA 1 Scheme 1	Team II	Cost Est	imat E	Cost Estimate by JICA Team Majis Port Development in 2000	eam Maji: nent in 1	5000
Breakwater	E	(505)	(505) (23,700) (11,988)	(386,11)	Breakwater	E	505	30,214	15,260	Breakwater	Ħ	2,695	(3,714)	10,008
. 1) Stone	E C	333,000	φ	4,998	10000	f	010	171 70	0					, ,
2) Stabits	Ę	233,000	S.	066,9		<del></del>	2	1 1 1 2 2 2			ì		1	1 .
Blasting	E	3,340,000	1.5	5,010	Blasting	E E	3,340,000	1.50	5,010		1	1	I	I
Dredging	e E	75,000	11	825	Dredging	#3	75,000	2.13	160	Dredging	E 33	X1,000 12,458	(1.12)	13,999
Berth					Berth					Berth		:		;
-14m					-14m	E	290	8,483	5,005	-14m	E	580	8,483	4,920
-18n					-18m	E	0230	11,028	5,844	-13m	E	540	8,148	4,400
Total					rotal					Total			:	
Approach Road m	E	1,120	10,000	11,200	Approach Road	E	1,000	ı	Ţ	Road	E	3,500	86	301
					Direct Cost	,			40,524	Direct Cost	:			35,614
Ground Total m	Æ	1,000	п	τ.	Ground Total	E		(1.28)	(1.28) 51,870	Ground Total	E,		(1.28) 45,586	45,586
				-			A							

### II. Appendices to Chapter 4-3

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### Appendix 4-3-1 Long-Term Targets and Policies of the Omani Government

The long-term targets and policies in Oman were commissioned in February 1975. The contents are summarized as follows:

- 1. To diversify the resources of national income by developing new resources to augment and eventually to replace oil resources.
- 2. To increase the ratio of investment directed to income-generating projects particularly in the fields of manufacturing, mining, agriculture and fisheries.

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- 3. Fair distribution of natural investment among geographic regions with a view to spreading progress and prosperity to all districts of the Sultanate. Special priority is assigned to the less-developed areas in order to reduce differences in the standards of living between them and other areas.
- 4. To support and develop the existing population centers and communities, to safe-guard those communities from the danger of mass immigration to densely populated urban centers and to conserve the environment.

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- 5. To give due attention to development of national water resources as a vital prerequisite for continued economic activities and growth.
- 6. To give due attention to local human resources and to improve their abilities of contributing to the national economy.
- 7. To complete infrastructure requirements.

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8. To support national commercial activities by removing market deficiencies which affect their operation and reduce free competition.

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9. To provide a proper basis for the creation of a national economy based on private enterprises and fair competition, free from monopolistic practices. All efforts and assistance would be provided to support this purpose.

- 10. To improve the efficiency of the government administration system.
- 11. To intensify regional economic co-operation among G.C.C. member states. The establishment of the Council is considered a fundamental step towards the integration and coordination in strategies, policies and programmes of the member states, to guarantee the realization of progress, growth and prosperity for all the G.C.C. member states.

According to the above long-term targets and policies, the policies related to the new port development can be summarized as follows:

The Association of the Control of the Control

 $\label{eq:continuous} (x,y,y,z) = (x,y,z) + (x,z)  

- 1. Diversification of commerce and industry to replace oil resources.
- 2. Diversification of manufacturing, mining, agriculture and fisheries.

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- 3. Promotion of regional development.
- 4. Internationalization of the Omani economy.

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In the third five-year development plan (1986-90), the important targets and policies of the sectors related to the above policies are summarized as follows:

- (1) Mining and Quarrying Sector
  - 1) To encourage the private sector to engage in industries relying upon copper raw materials, such as wires.

the entropy subdivives to promote substitute of the

- 2) To encourage the private sector to expand activities in the field of quarrying, particularly with regard to the exploitation of marble deposits.
- 3) To encourage international companies to invest in prospecting for minerals in Oman.

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4) To complete detailed a geological survey with a view to determining the mineral resources available in Oman.

- (2) Agriculture and Animal Husbandry
- 1) To concentrate efforts on vertical expansion for improvement of productivity.
- 2) To continue a subsidy programme of providing farmers with improved seeds, fertilizers, insecticides, animal feed and hybrid breeds of livestock.
- 3) To develop the means of marketing agricultural produce and animals.
- (3) Fisheries Sector
  - 1) To assign top priority in the economic development policy to the development of the productivity of tradional fishermen.
- 2) To continue the support programme which is implemented by the fishermen's fund.

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3) To expand the construction of docking facilities needed for landing fishing boats.

4) To expand the construction of fish storage and marketing centers.

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- (4) Industry Sector
- 1) To give strong stimulus to the private sector to invest in industry.
- 2) To give higher priority to industrial projects that utilized local raw materials, the food and beverage industries, which include the benefit of a relative advantage in the export market, and industries that could use a higher percentage of local manpower.
- 3) To encourage foreign investors to participate in projects that contribute to the economic development of the country.
- 4) To carry out feasibility studies of industrial projects that have a potential for success in Oman and to make these studies available free of charge to the private sector.

5) To provide comprehensive statistical date on industrial production in Oman.

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- (5) Commercial Sector
- 1) To expand transit trade activities.
- 2) To expand investment in the trade sector.

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- 3) To promote trade co-operation with G.C.C. and other friendly countries.
- 4) To promote and encourage local trade to offset the effect of the collapse of oil prices.

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- (6) Tourism Sector
- 1) To utilize and beautify the coastline to make it a tourist attraction.
- 2) To develop and adopt new methods of encouraging and managing trourism.
- 3) To train and prepare Omani personnel in the field of tourism and in hotel management and service.
- 4) To continue to encourage the private sector to invest in the field of tourism

The above important targets and policies of the related sectors are in the line with the long-term targets and policies in Oman.

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### Appendix 4-3-2 Analysis on Import Cargo Handling Function

(1) Geographical Population Distribution in the Hinterland.

The total population of the Sultanate of Oman is estimated by DC as 1.5 million at present.

The geographical population distribution is presented in Table A-4-3-1. In this table, the distance from Muscat, Sohar and Barka is also presented.

Table A-4-3-1 Geographical Population Distribution and Distance

No. Name   Muscat Sohar Barka   Present Population   1 Rustaq   159   163   85   49,654   2 Nakhal   109   181   35   20,839   3   A1 Awabi   146   178   72   6,332   4   Sohar   230   0   150   68,641   5   Saham   205   35   131   52,035   6   Suweiq   136   106   62   63,438   7   Barka   84   156   0   46,124   8   Shinas   284   62   210   36,703   9   Khaburah   171   63   97   39,356   10   Msanaa   112   126   38   36,458   11   Liwa   256   34   182   16,918   A1 Batinah Sub-total   436,498   1   Ibry   307   198   232   71,967   2   Buraimi   343   121   269   30,120   3   Dhank   367   235   292   14,972   4   Yanqa1   324   216   250   11,999   5   Mhadha   322   100   248   6,527   A1 Dhahirah Sub-total   135,585   1   Nizuwa   174   332   186   47,160   22,938   5   Bidbid   71   229   87   16,556   6   Adam   223   381   235   11,416   7   A1 Hmra   221   316   233   11,759   9   Haima   541   636   553   4,793   Dakhliyah Sub-total   1   A1 Modhaili   177   335   189   44,669   190,264   10   Dihal   185   343   197   11,776   11   Mahirah   185   343   197   11,776   11,500,024   11,500,02	Populati	on and Distance	<u>.</u>			
1 Rustaq 2 Nakhal 109 181 35 20,839 3 Al Awabi 146 178 72 6,332 4 Sohar 230 0 150 68,641 5 Saham 205 35 131 52,035 6 Suweiq 136 106 62 63,438 7 Barka 84 156 0 46,124 8 Shinas 284 62 210 36,703 9 Khaburah 171 63 97 39,356 10 Msanaa 112 126 38 36,458 11 Liwa 256 34 182 16,918 Al Batinah Sub-total  1 Ibry 307 198 232 71,967 2 Buraimi 343 121 269 30,120 3 Dhank 367 235 292 14,972 4 Yanqal 324 216 250 11,999 5 Mhadha 322 100 248 6,527 Al Dhahirah Sub-total  1 Nizuwa 174 332 186 4 7,160 2 Bahla 208 297 220 32,765 3 Samail 92 250 104 3 3,541 4 Izki 138 296 150 22,938 5 Bidbid 7 1 229 87 16,556 6 Adam 223 381 235 11,416 7 Al Hmra 221 316 233 11,759 Bahlaya 541 636 553 4,793 Dakhliyah Sub-total  1 Al Modhaili 177 335 189 44,669 9 Haima 541 636 553 4,793 Dakhliyah Sub-total  1 Al Modhaili 177 335 189 44,669 10,379 4 Bidiya 260 418 272 13,266 5 Al Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Hals 303 441 295 5 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 11,776 11,776 11,776 11,776 11,776 11,776 11,776 11,776 11,776 11,776 11,776 11,776 11,776 1				Sohar	Barka	Present Population
2 Nakhal 109 181 35 20,839 3 Al Awabi 146 178 72 6,332 4 Sohar 230 0 150 68,641 5 Saham 205 35 131 52,035 6 Suweiq 136 106 62 63,438 7 Barka 84 156 0 46,124 8 Shinas 284 62 210 36,703 9 Khaburah 171 63 97 39,356 10 Msanaa 112 126 38 36,458 11 Liwa 256 34 182 16,918 Al Batinah Sub-total 436,498  1 Ibry 307 198 232 71,967 2 Buraimi 343 121 269 30,120 3 Dhank 367 235 292 14,972 4 Yanqal 324 216 250 111,999 5 Mhadha 322 100 248 6,527 Al Dhahirah Sub-total 538 38,441 1 Izki 138 296 150 22,938 5 Bidbid 71 229 87 16,556 6 Adam 223 381 235 11,416 7 Al Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haima 541 636 553 4,793 Dakhliyah Sub-total 177 335 189 44,669 2 Ibra 31 Royal 178 336 190 16,475 3 Al Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,266 5 Al Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 37 495 349 44,972 9 W, Bani Kali 283 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total 288,082 Grand Total C,P, Area	1:	Rustag				
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4 Sohar 230 0 150 68,641 5 Saham 205 35 131 52,035 6 Suweiq 136 106 62 63,438 7 Barka 84 156 0 46,124 8 Shinas 284 62 210 36,703 9 Khaburah 171 63 97 39,556 10 Msanaa 112 126 38 36,458 11 Liwa 256 34 182 16,918 A1 Batinah Sub-total 436,498  1 Ibry 307 198 232 71,967 2 Buraimi 343 121 269 30,120 3 Dhank 367 235 292 14,972 4 Yanqal 324 216 250 11,999 5 Mhadha 322 100 248 6,527 A1 Dhahirah Sub-total 138 296 150 2 Bahla 208 297 220 32,765 3 Samail 92 250 104 33,541 4 Izki 138 296 150 22,938 5 Bidbid 71 229 87 16,556 6 Adam 223 381 235 11,416 7 A1 Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haima 541 636 553 4,793 Dakhliyah Sub-total 177 335 189 44,669 2 Ibra 178 336 190 16,475 3 A1 Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,266 5 Al Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 377 495 349 44,972 9 W,Bani Kali 283 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total 218,888 Grand Total C.P. Area Mussandam 23,825 Southern 16,2410	3	Al Awabi	146	178	72	
5         Saham         205         35         131         52,035           6         Suweiq         136         106         62         63,438           7         Barka         84         156         0         46,124           8         Shinas         284         62         210         36,703           9         Khaburah         171         63         97         39,356           10         Msanaa         112         126         38         36,458           11         Liwa         256         34         182         16,918           Al Batinah Sub-total         307         198         232         71,967           2         Buraimi         343         121         269         30,120           3         Dhank         367         235         292         14,972           4         Yanqal         324         216         250         11,999           5         Mhadha         322         100         248         6,527           Al Dhahirah Sub-total         174         332         186         47,160           2         Bahla         208         297         220         3			230	0	150	
6 Suweiq 136 106 62 63,438 7 Barka 84 156 0 46,124 8 Shinas 284 62 210 36,703 9 Khaburah 171 63 97 39,356 10 Msanaa 112 126 38 36,458 11 Liwa 256 34 182 16,918 A1 Batinah Sub-total 436,498  1 Ibry 307 198 232 71,967 2 Buraimi 343 121 269 30,120 3 Dhank 367 235 292 14,972 4 Yanqa1 324 216 250 11,999 5 Mhadha 322 100 248 6,527 A1 Dhahirah Sub-total 174 332 186 47,160 2 Bahla 208 297 220 32,765 3 Samail 92 250 104 33,541 4 Izki 138 296 150 22,938 5 Bidbid 71 229 87 16,556 6 Adam 223 381 235 11,416 7 A1 Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haima 541 636 553 4,793 Dakhliyah Sub-total 177 335 189 44,669 2 Ibra 178 336 190 16,475 3 A1 Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,226 5 A1 Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 337 495 349 44,972 9 W.Bani Kali 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 11,776 11 Mahirah 185 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total 238,255 Southern 162,410						
7 Barka 84 156 0 46,124 8 Shinas 284 62 210 36,703 9 Khaburah 171 63 97 39,356 10 Msanaa 112 126 38 36,458 11 Liwa 256 34 182 16,918 A1 Batinah Sub-total 436,498  1 Ibry 307 198 232 71,967 2 Buraimi 343 121 269 30,120 3 Dhank 367 235 292 14,972 4 Yanqal 324 216 250 11,999 5 Mhadha 322 100 248 6,527 A1 Dhahirah Sub-total 132,585  1 Nizuwa 174 332 186 47,160 2 Bahla 208 297 220 32,765 3 Samail 92 250 104 33,541 4 Izki 138 296 150 22,938 5 Bidbid 71 229 87 16,556 6 Adam 223 381 235 11,416 7 A1 Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haima 541 636 553 4,793 Dakhliyah Sub-total 177 335 189 44,669 2 Ibra 178 336 190 16,475 3 A1 Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,226 5 A1 Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 337 495 349 44,972 9 W.Bani Kali 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 11,776 11 Mahirah Sub-total 280 438 292 13,566 Sharquiyah Sub-total 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total 218,088 Gouthern 23,825						
8         Shinas         284         62         210         36,703           9         Khaburah         171         63         97         39,356           10         Msanaa         112         126         38         36,458           11         Liwa         256         34         182         16,918           Al         Batinah         Sub-total         436,498         436,498           1         Ibry         307         198         232         71,967           2         Buraimi         343         121         269         30,120           3         Dhank         367         235         292         14,972           4         Yanqal         324         216         250         11,999           5         Mhadha         322         100         248         6,527           Al         Dhahirah         302         100         248         6,527           Al         Dhahirah         302         106         33,541         47,160           2         Bahla         208         297         220         32,765         33         33,541         41,7160         22,938         58 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td></td<>						
9 Khaburah 10 Msanaa 112 126 38 36,458 11 Liwa 256 34 182 16,918 A1 Batinah Sub-total  1 Ibry 307 198 232 71,967 2 Buraimi 343 121 269 30,120 3 Dhank 367 235 292 14,972 4 Yanqal 324 216 250 11,999 5 Mhadha 322 100 248 6,527 Al Dhahirah Sub-total  1 Nizuwa 174 332 186 47,160 2 Bahla 208 297 220 32,765 3 Samail 92 250 104 33,541 4 Izki 138 296 150 22,938 5 Bidbid 71 229 87 16,556 6 Adam 223 381 235 11,416 7 Al Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haina 541 636 553 4,793 Dakhliyah Sub-total  1 Al Modhaili 177 335 189 44,669 2 Ibra 178 336 190 16,475 3 Al Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,226 5 Al Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Alii 308 466 320 34,145 8 Sur 337 495 349 44,972 9 W.Bani Kalii 283 441 295 5,591 10 Dihal 1 BS 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total  C.P.Area 333,354 Mussandam 521,6240						
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11 Liwa						
Al Batinah Sub-total  1						
1       Ibry       307       198       232       71,967         2       Buraimi       343       121       269       30,120         3       Dhank       367       235       292       14,972         4       Yanqal       324       216       250       11,999         5       Mhadha       322       100       248       6,527         Al Dhahirah Sub-total       174       332       186       47,160         2       Bahla       208       297       220       32,765         3       Samail       92       250       104       33,541         4       Izki       138       296       150       22,938         5       Bidbid       71       229       87       16,556         6       Adam       223       381       235       11,416         7       Al Hmra       221       316       233       11,759         8       Mamh       167       325       179       9,336         9       Haima       541       636       553       4,793         Dakhliyah Sub-total       177       335       189       44,669			230		102	
2 Buraimi 343 121 269 30,120 3 Dhank 367 235 292 14,972 4 Yanqal 324 216 250 11,999 5 Mhadha 322 100 248 6,527 Al Dhahirah Sub-total 174 332 186 47,160 2 Bahla 208 297 220 32,765 3 Samail 92 250 104 33,541 4 Izki 138 296 150 22,938 5 Bidbid 71 229 87 16,556 6 Adam 223 381 235 11,416 7 Al Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haima 541 636 553 4,793 Dakhliyah Sub-total 177 335 189 44,669 2 Ibra 178 336 190 16,475 3 Al Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,226 5 Al Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 337 495 349 44,972 9 W.Bani Kali 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total 980,435 C.P.Area 333,354 Mussandam 23,3825 Southern 162,410	AI Datin	an bub totar				450,450
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3 Dhank 367 235 292 14,972 4 Yanqa1 324 216 250 11,999 5 Mhadha 322 100 248 6,527 Al Dhahirah Sub-total 135,585  1 Nizuwa 174 332 186 47,160 2 Bahla 208 297 220 32,765 3 Samail 92 250 104 33,541 4 Izki 138 296 150 22,938 5 Bidbid 71 229 87 16,556 6 Adam 223 381 235 11,416 7 Al Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haima 541 636 553 4,793 Dakhliyah Sub-total 177 335 189 44,669 2 Ibra 178 336 190 16,475 3 Al Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,226 5 Al Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 337 495 349 44,972 9 W.Bani Kali 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total 218,088 Grand Total (C.P.Area 333,354 Mussandam 23,825 Southern 162,410	2		343	121	269	30,120
4 Yanqal       324       216       250       11,999         5 Mhadha       322       100       248       6,527         Al Dhahirah Sub-total       135,585       135,585         1 Nizuwa       174       332       186       47,160         2 Bahla       208       297       220       32,765         3 Samail       92       250       104       33,541         4 Izki       138       296       150       22,938         5 Bidbid       71       229       87       16,556         6 Adam       223       381       235       11,416         7 Al Hmra       221       316       233       11,759         8 Mamh       167       325       179       9,336         9 Haima       541       636       553       4,793         Dakhliyah Sub-total       177       335       189       44,669         2 Ibra       178       336       190       16,475         3 Al Qabil       203       361       215       10,379         4 Bidiya       260       418       272       13,226         5 Al Kamil       280       438       292       13	3	Dhank	367	235	292	
5 Mhadha       322       100       248       6,527         Al Dhahirah Sub-total       174       332       186       47,160         2 Bahla       208       297       220       32,765         3 Samail       92       250       104       33,541         4 Izki       138       296       150       22,938         5 Bidbid       71       229       87       16,556         6 Adam       223       381       235       11,416         7 Al Hmra       221       316       233       11,759         8 Mamh       167       325       179       9,336         9 Haima       541       636       553       4,793         Dakhliyah Sub-total       177       335       189       44,669         2 Ibra       178       336       190       16,475         3 Al Qabil       203       361       215       10,379         4 Bidiya       260       418       272       13,226         5 Al Kamil       280       438       292       13,566         6 Bani Bu Hass       302       460       314       17,487         7 Bani Bu Ali       308		Yanga1				
Al Dhahirah Sub-total  1 Nizuwa 174 332 186 47,160 2 Bahla 208 297 220 32,765 3 Samail 92 250 104 33,541 4 Izki 138 296 150 22,938 5 Bidbid 71 229 87 16,556 6 Adam 223 381 235 11,416 7 Al Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haima 541 636 553 4,793 Dakhliyah Sub-total 177 335 189 44,669 2 Ibra 178 336 190 16,475 3 Al Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,226 5 Al Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 337 495 349 44,972 9 W.Bani Kali 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total 218,088 Grand Total 23,825 Southern 230 32,550	5					
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3 Samail 92 250 104 33,541 4 Izki 138 296 150 22,938 5 Bidbid 71 229 87 16,556 6 Adam 223 381 235 11,416 7 Al Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haima 541 636 553 4,793 Dakhliyah Sub-total 177 335 189 44,669 2 Ibra 178 336 190 16,475 3 Al Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,226 5 Al Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 337 495 349 44,972 9 W.Bani Kali 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total Grand Total C.P.Area Mussandam C.P.Area Mussandam 23,825 Southern 16,2410			174	332	186	47,160
4       Tzki       138       296       150       22,938         5       Bidbid       71       229       87       16,556         6       Adam       223       381       235       11,416         7       Al Hmra       221       316       233       11,759         8       Mamh       167       325       179       9,336         9       Haima       541       636       553       4,793         Dakhliyah       Sub-total       177       335       189       44,669         2       Ibra       178       336       190       16,475         3       Al Qabil       203       361       215       10,379         4       Bidiya       260       418       272       13,226         5       Al Kamil       280       438       292       13,566         6       Bani Bu Hass       302       460       314       17,487         7       Bani Bu Ali       308       466       320       34,145         8       Sur       337       495       349       44,972         9       W.Bani Kali       283       441       295<		Bahla	208	297	220	32,765
5 Bidbid       71       229       87       16,556         6 Adam       223       381       235       11,416         7 Al Hmra       221       316       233       11,759         8 Mamh       167       325       179       9,336         9 Haima       541       636       553       4,793         Dakhliyah Sub-total       190,264         1 Al Modhaili       177       335       189       44,669         2 Ibra       178       336       190       16,475         3 Al Qabil       203       361       215       10,379         4 Bidiya       260       418       272       13,226         5 Al Kamil       280       438       292       13,566         6 Bani Bu Hass       302       460       314       17,487         7 Bani Bu Ali       308       466       320       34,145         8 Sur       337       495       349       44,972         9 W.Bani Kali       283       441       295       5,591         10 Dihal       185       343       197       11,776         11 Mahirah       185       343       197       5,802	3	Samail	92	250	104	33,541
5       Bidbid       71       229       87       16,556         6       Adam       223       381       235       11,416         7       Al Hmra       221       316       233       11,759         8       Mamh       167       325       179       9,336         9       Haima       541       636       553       4,793         Dakhliyah Sub-total       190,264         1       Al Modhaili       177       335       189       44,669         2       Ibra       178       336       190       16,475         3       Al Qabil       203       361       215       10,379         4       Bidiya       260       418       272       13,226         5       Al Kamil       280       438       292       13,566         6       Bani Bu Hass       302       460       314       17,487         7       Bani Bu Ali       308       466       320       34,145         8       Sur       337       495       349       44,972         9       W.Bani Kali       283       441       295       5,591         10	4	Izki	138	296	150	
6 Adam 223 381 235 11,416 7 Al Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haima 541 636 553 4,793 Dakhliyah Sub-total 177 335 189 44,669 2 Ibra 178 336 190 16,475 3 Al Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,226 5 Al Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 337 495 349 44,972 9 W.Bani Kali 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total Grand Total C.P.Area Mussandam C.P.Area Mussandam Southern  162,410	5	Bidbid	71	229	87	
7 Al Hmra 221 316 233 11,759 8 Mamh 167 325 179 9,336 9 Haima 541 636 553 4,793 Dakhliyah Sub-total 177 335 189 44,669 1 Al Modhaili 177 335 189 44,669 2 Ibra 178 336 190 16,475 3 Al Qabil 203 361 215 10,379 4 Bidiya 260 418 272 13,226 5 Al Kamil 280 438 292 13,566 6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 337 495 349 44,972 9 W.Bani Kali 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total Grand Total 23,825 C.P.Area 333,354 Mussandam 23,825 Southern 162,410	6	Adam `	223	381	235	
8 Mamh       167       325       179       9,336         9 Haima       541       636       553       4,793         Dakhliyah Sub-total       190,264         1 Al Modhaili       177       335       189       44,669         2 Ibra       178       336       190       16,475         3 Al Qabil       203       361       215       10,379         4 Bidiya       260       418       272       13,226         5 Al Kamil       280       438       292       13,566         6 Bani Bu Hass       302       460       314       17,487         7 Bani Bu Ali       308       466       320       34,145         8 Sur       337       495       349       44,972         9 W.Bani Kali       283       441       295       5,591         10 Dihal       185       343       197       11,776         11 Mahirah       185       343       197       5,802         Sharquiyah Sub-total       218,088         Grand Total       980,435         C.P.Area       333,354         Mussandam       23,825         Southern       162,410	7	Al Hmra	221	316		
9 Haima       541       636       553       4,793         Dakhliyah Sub-total       178       335       189       44,669         1 Al Modhaili       177       335       189       44,669         2 Ibra       178       336       190       16,475         3 Al Qabil       203       361       215       10,379         4 Bidiya       260       418       272       13,226         5 Al Kamil       280       438       292       13,566         6 Bani Bu Hass       302       460       314       17,487         7 Bani Bu Ali       308       466       320       34,145         8 Sur       337       495       349       44,972         9 W.Bani Kali       283       441       295       5,591         10 Dihal       185       343       197       11,776         11 Mahirah       185       343       197       5,802         Sharquiyah Sub~total       218,088         Grand Total       980,435         C.P.Area       333,354         Mussandam       23,825         Southern       162,410	8	Mamh				
Dakhliyah Sub-total       190,264         1 Al Modhaili       177 335 189       44,669         2 Ibra       178 336 190       16,475         3 Al Qabil       203 361 215       10,379         4 Bidiya       260 418 272       13,226         5 Al Kamil       280 438 292       13,566         6 Bani Bu Hass       302 460 314       17,487         7 Bani Bu Ali       308 466 320       34,145         8 Sur       337 495 349       44,972         9 W.Bani Kali       283 441 295       5,591         10 Dihal       185 343 197       11,776         11 Mahirah       185 343 197       5,802         Sharquiyah Sub~total       218,088         Grand Total       980,435         C.P.Area       333,354         Mussandam       23,825         Southern       162,410	9	Haima	541			
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5       Al Kamil       280       438       292       13,566         6       Bani Bu Hass       302       460       314       17,487         7       Bani Bu Ali       308       466       320       34,145         8       Sur       337       495       349       44,972         9       W.Bani Kali       283       441       295       5,591         10       Dihal       185       343       197       11,776         11       Mahirah       185       343       197       5,802         Sharquiyah Sub~total       218,088         Grand Total       980,435         C.P.Area       333,354         Mussandam       23,825         Southern       162,410		-				
6 Bani Bu Hass 302 460 314 17,487 7 Bani Bu Ali 308 466 320 34,145 8 Sur 337 495 349 44,972 9 W.Bani Kali 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total 218,088 Grand Total 980,435 C.P.Area 333,354 Mussandam 23,825 Southern 162,410						
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8       Sur       337       495       349       44,972         9       W.Bani Kali       283       441       295       5,591         10       Dihal       185       343       197       11,776         11       Mahirah       185       343       197       5,802         Sharquiyah Sub-total       218,088         Grand Total       980,435         C.P.Area       333,354         Mussandam       23,825         Southern       162,410		- <b></b>				
9 W.Bani Kali 283 441 295 5,591 10 Dihal 185 343 197 11,776 11 Mahirah 185 343 197 5,802 Sharquiyah Sub-total 218,088 Grand Total 980,435 C.P.Area 333,354 Mussandam 23,825 Southern 162,410						34,145
10       Dihal       185       343       197       11,776         11       Mahirah       185       343       197       5,802         Sharquiyah Sub~total       218,088         Grand Total       980,435         C.P.Area       333,354         Mussandam       23,825         Southern       162,410					349	44,972
11 Mahirah       185 343 197       5,802         Sharquiyah Sub~total       218,088         Grand Total       980,435         C.P.Area       333,354         Mussandam       23,825         Southern       162,410	9	W.Bani Kali	283	441	295	5 <b>,</b> 591
Sharquiyah Sub~total       218,088         Grand Total       980,435         C.P.Area       333,354         Mussandam       23,825         Southern       162,410	10	Dihal	185	343	197	11,776
Sharquiyah Sub~total       218,088         Grand Total       980,435         C.P.Area       333,354         Mussandam       23,825         Southern       162,410	11	Mahirah	185	343	197	5,802
Grand Total       980,435         C.P.Area       333,354         Mussandam       23,825         Southern       162,410	Sharquiy	ah Sub-total				
C.P.Area       333,354         Mussandam       23,825         Southern       162,410	Grand To	ta1				
Mussandam 23,825 Southern 162,410	C.P.Area	L				
Southern 162,410	Mussanda	ım				
	Southern	l				
	All Oman					

Source: Estimation by Development Council and Ministry of Communication

The following table shows the percentage of population of respective regions:

No.	Area	Population	Sub-total	% of Total
				Population
1	MCT REG	333,354		
3	Dakhliyah	190,263	·	
4	A1-Batinah	436,476		
5	Al-Dhahirah	135,586		
7	Sharquiyah	218,088	1,313,767	87.58%
6	Mussandam	23,825	-	1.59%
2	Southern	162,410		10.83%
	Total	1,500,000		

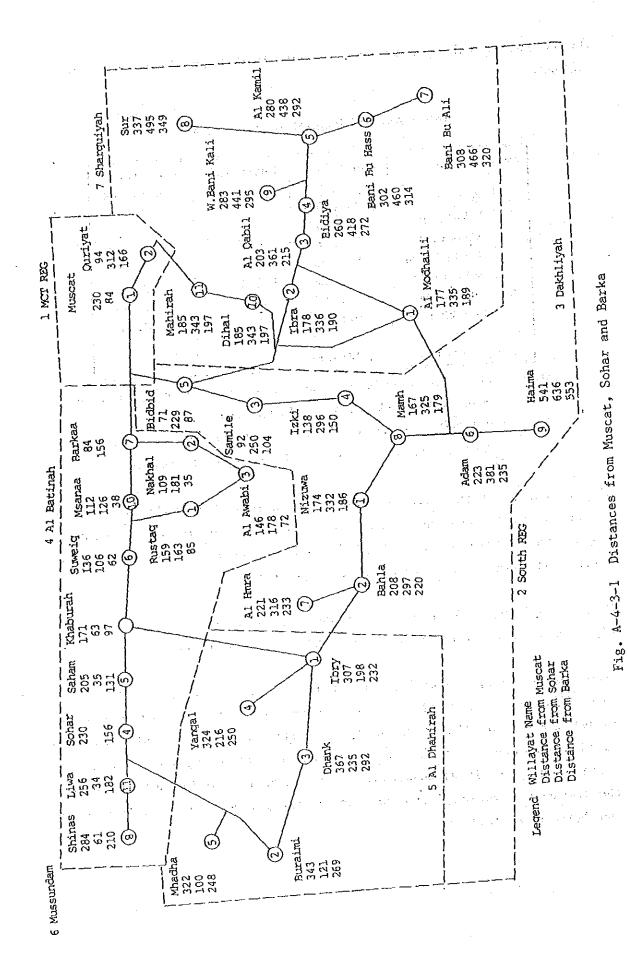
Table A-4-3-2 Population of Each Area

- Note (1) Sub-total stands for the total population of MCT REG,
  Dakhliyah, Al-Batinah and Al-Dhahirah.
  - (2) MCT REG: This shows the region of the Muscat Region with Governorate of Muscat and the Wilagat of Quriyat.

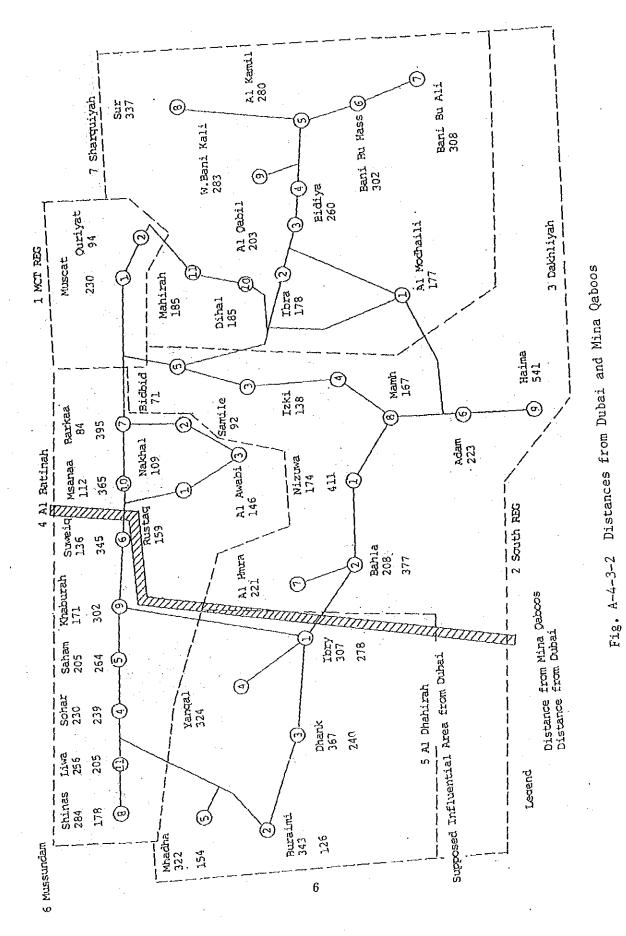
The percentage of the regional population excluding Mussandam and Southern regions is 87.58% and the population of the region excluding Mussundam and the Southern region is 1,313,767. This population seems to be the hinterland population of Mina Qaboos at present.

Fig. A-4-3-1 shows the distance from Muscat, Sohar and Barka respectively. Fig. A-4-3-2 shows the distances from Dubai and Mina Qaboos.

From Fig. A-4-3-2, the willayst where the distance from Muscat is shorter than the distance from Dubai is up to Saham in Al-Batinah, and up to Bahla in Dakhliyah. On the other hand, the willayst where the distance from Dubai is shorter than the distance from Muscat is up to Sohar in Al-Batinah, and Ibri in Al-Dhahirah. If we estimate the influential area by the distance criterion, the population in the influential areas from Muscat and Dubai is as follows:



-298-



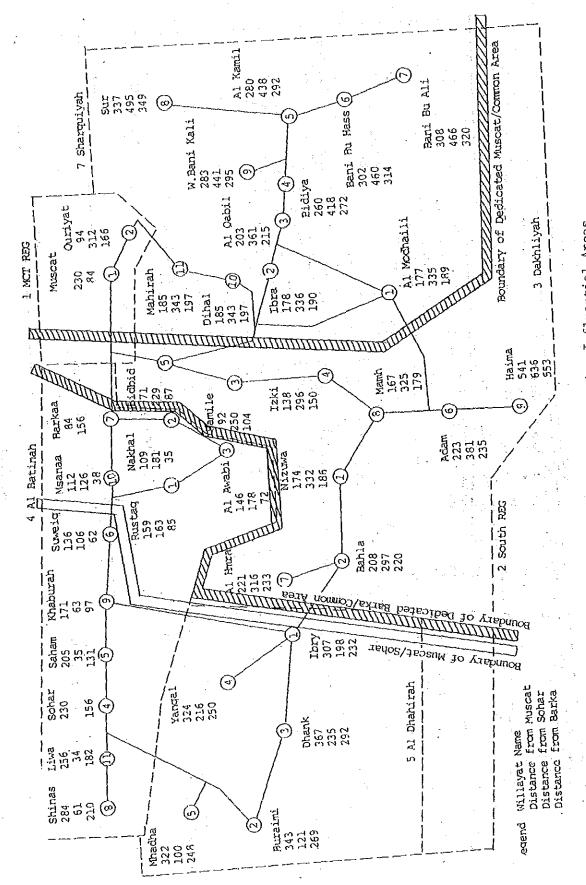


Fig. A-4-3-3 Boundary of Respective Influential Areas

Table A-4-3-3 Population in the Influential Area from Dubai Based on the Criterion of Distance

	No.	Willayat	Population	Sub-total	% of Total Population
: [	4	Sahar	68,641		
	11	Liwa	16,918		:
ł	8	Shinas	36,703	122,262	
	1	Ibry	71,967		
	2	Buraimi	30,120		
Ì	3	Dhank	14,972		
	4	Yanqa1	11,999		
1	5	Mehadha	6 <b>,</b> 527	135,586	
		Total	257,848		17.19%

- Note: 1) Population in the Influential Area from Muscat is 1,055,919
  - 2) % of Total Population in the Influential Area from Muscat is 70.39%

The population in the influential area from Dubai is 17.19% of the total population.

According to the result of interviews conducted by Weidleplan, the limit of the influential area from Dubai in Al-Batinah is up to Suweiq, that is 333 km from Dubai. The influential limit along Route 21 would be up to Bahla in the case where the influential limit is defined by a distance from Dubai shorter than 333 km.

The influential area of Dubai defined above is wider than that of the road distance. This means that Dubai has a strong economic influential force on Oman.

The population in the influential area from Dubai, in accordance with the interviews conducted by Weidleplan, is summarized in the following table.

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Table A-4-3-4 Population in the Influential Area from Dubai Based on the Criterion of Interview Results

No.	Willayat	Population	Sub-total	%	of	Tota1	Population
4	Sohar	68,641					
11	Liwa	16,918					
8	Shinas	36,703					
5	Saham	52,035					
9	Khaburah	39,356					
6	Suweiq	63,438	277,091				
1	Ibry	71,967					
2	Buraimi	30,120					
3	Dhank	14,972					
4	Yanqa1	11,999					
5	Mehadha	6,527	135,586				
2	Bahla	32,765		L			
	Total	445,442				• •	29.70%

Note: 1) Population in the Influential Area from Muscat is 868,325

2) % of Total Population in the Influential Area from Muscat is 57.89%

On the other hand, the share of import cargoes by point of entry is as follows, according to foreign trade statistics.

Table A-4-3-5 Share of Import Cargoes by Point of Entry

(Unit : %)

				(01)	IIL . 707
Point of entry	1988	1987	1986	1985	1984
I By Sea Ports	69.7	67.8	56.0'	46.4	49.5
A.Mina Qaboos	58.3	57.6	47.0	40.0	42.2.
B.Raysut	11.4	10.2	9.0	6.4	7.3
II By Road	29.6	31.4	43.2	49.2	45.6
III Others	0.7	0.8	0.8	4.4	4.9
Total	100.0	100.0	100.0	100.0	100.0

Comparing the share of import cargoes by point of entry in 1988 with the percentage of the population in the influential area from Dubai in Table A-4-3-4, the influential area interviewed by Weidleplan seems to be reasonable.

It is not possible to define the influential area after the establishment of a regional center in the Northern Part of Oman, because it is very difficult to predict the strength of influential center over the long term. Accordingly, we assumed that the influential area of a regional center will

be defined by the accessibility to respective districts, i.e., the distance from the regional center to respective districts.

If the new port is located in Sohar, the influential area from the new port and Mina Qaboos would be as follows, according to the distance from each center to respective districts:

- 1) The limit of the influential area along Route O1 from Sohar is up to Suweiq.
- 2) That along Route 21 from Sohar is up to Ibri.

In the case, the population in the influential area from Sohar is as shown in the following table.

Table A-4-3-6 Population	of	the	Influential	Area	from	Sohar
--------------------------	----	-----	-------------	------	------	-------

	No.	Name of Willayat	Population	% of Total Population
Ì	4,5,6	Sohar, Saham, Suweiq		
1	8,9,11	Shinas, Khaburah, Liwa	277,091	
.	1-5	Ibry, Buraimi,Dhank,		
1		Yanqal, Bahla	135,586	
		Total	412,677	27.51%

- Note: 1) Population in the Influential Area from Mina Qaboos is 901,090.
  - 2) % of Total Population in the Influential Area from Mina Qaboos is 60.07%.

If the new port is located in Barka, the influential area from the new port and Mina Qaboos is as follows:

- 1) The influential area from the new port only is Al-Batinah area and the Al-Dhahirah area.
- 2) The influential area from Mina Qaboos only is the Sharquiyah area.
- 3) The area of Dakhliyah is influenced by the new port and Mina Qaboos.
- 4) Some parts of MCT REG area also influenced by the new port.

If we suppose that 50% of Dakhliyah and 10% of MCT REG belong to the influential area of the new port, the populations in the influential areas from the new port and Mina Qaboos are as follows:

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Table A-4-3-7 Population of the Influential Areas from Barka

			A. C. Transport		
	No.	Area Name	Population	Popu.New Port	Popu. Mina Qaboos
	4	Al-Batinah	436,476	436,476	
	5	Al-Dhahirah	135,586	135,586	
	3	Dakhliyah	190,263	95,132	95,131
	1	MCT REG	333,354	33,335	300,019
e .	7	Sharquiyah	218,088	4	218,088
		Total	1,313,767	700,529	613,238
%	of T	otal Populati	on 87.58%	46.70%	40.88%

- Note 1) Popu. New Port stands for the population in the influential area from the new port.
  - 2) Popu. Mina Qaboos stands for the population in the influential area from Mina Qaboos.

Fig. A-4-3-3 shows the distance from Muscat, Sohar and Barka to the respective districts, and the boundary of respective influential areas of Muscat-Sohar Case and Muscat Haradi Case.

Accordingly, if the new port in Sohar were playing its role in import cargo handling, the population in the influential population from Sohar would be almost the same as the influential population from Dubai as defined in Table A-4-3-4, so the population in the influential area from Mina Qaboos is the same as the population without the new port.

If the new port in Barka were playing a role in import cargo handling, the population in the influential area from Mina Qaboos would decrease from 868,325 to 613,238.

The distance from the new port in Barka to the willayats in Al-Dhahirah is greater than that from Dubai, so Al-Dhahirah would be in the influential area from Dubai even if the new port in Barka were operating now.

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# (2) Future Geographical Population Distribution in the Hinterland

There is no clear projection of population distribution. But the total population of Oman was projected such that the increase rate p.a. will be 3.5% during the next decade.

Under the assumption that the increasing rate will continue up to 2010, the total population of Oman can be calculated as follows:

Population in 2010: 
$$x = 1,500,000(1+0.035)^{22}$$
  
= 3,197,267  
(Population in 2015 = 3,797,351)

The population in MCT REG was 53,000 in 1970, and increased to 123,000 in 1975, 241,000 in 1983 and 333,000 in 1988.

The rate of increase during these periods is as follows:

Table A-4-3-8 Population Rate Increase in MCT REG

	A.L	·			
Year	1970	1975	1983	1988	Units
Population	53,000	123,000	241,000	333,000	people
Rate to 1970	,	2.3208	4.•5474	6.2830	times
Duration	<del>.</del> .	5	13	- 18	years
Average Growth Rate	_ · v.:	10.0	12.4	10.7	%
Rate to 1975	11.*	-	1.9593	2.7073	times
Duration	· .		8	13	years
Average Growth Rate	•	<del>-</del>	8.8	8.0	%
Rate to 1983			-	1.3817	times
Duration			-	5	years
Average Growth Rate				6.7	%

If the population in MCT REG increases at the same rate during 1983 and 1988, the population in 2010 will be as follows:

$$x = 333,354 (1 + 0.067)^{22} = 1,388,427$$

In this case, the share of MCT REG will be 43.4%

The following table shows the population in MCT REG under various rates of increase.

Table A-4-3-9 Population Increase in MCT REG According to Various Rates of Increase

I.Ratio	Population MCT	MCT Share %	Times/1988_
6.5%	1,332,285	41.7%	3.9966
6.0	1,201,254	37.6	3.6035
5.5	1,082,579	33.9	3.2475
5.0	975,147	30.5	2.9253
4,5	877,938	27.5	2.6337
4.0	790,022	24.7	2.3699
3.5	710,548	22.2	2.1315
3.0	638,741	20.0	1.9161
2.5	573,893	17.0	1.7216
2.0	515,359	56.1	1.5460

As Fig. A-4-3-4 shows, the case in which the rate of increase of the population in MCT REG is 4% is the strong population concentration to MCT REG. In this case, the population in other region in the range of the objective area excluding MCT REG will be 2,011,245.

The case in which the increasing rate of the population in MCT REG is 3.0% represents weak population concentration in MCT REG. In this case, the population in other regions in the range of the objective area will be 2,162,526.

The case in which the increasing rate of the population in MCT REG is 3.5% represents medium concentration in MCT REG. In this case, the population in other regions in the range of the objective area will be 2,089,809.

We will assume the three following cases as population growth scenarios:

Scenario A : Medium Concentration

scenario B : Weak Concentration

Scenario C : Strong Concentration

The population and the population increasing rate are summarized in the following table.

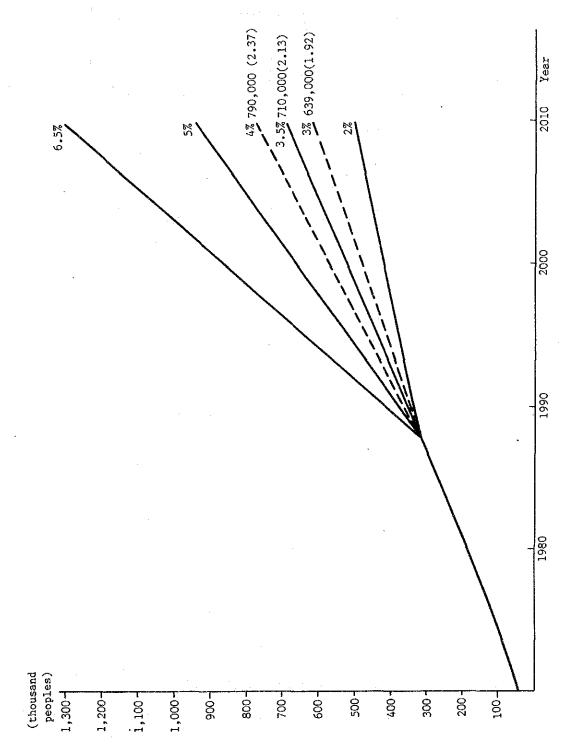


Fig. A~5-3-4 Population Increase in MCT REG According to Various Rates of Increase

Table A-4-3-10 Scenario of Population Growth Rate

No.	Case	Population in MCT REG	Inc. rate	Population in other REG	Inc. Rate	Note
2	Scenario A Scenario B Scenario C	710,548 638,741 790,022	3.5% 3.0% 4.0%	2,089,809 2,162,526 2,011,245	3.50% 3.65% 3.31%	Medium Weak Strong
1	Present	333,354		980,435		

In the above table, we assumed also that the rate of population increase in Southern and Mussundam is 3.5%, so the population of Southern and Mussundam would be 348,000 and 51,000, respectively, in 2010.

In considering the future geographical population distribution, the use of the same population increase rate is not realistic. From Table  $\Lambda$ -4-3-1, we see that the population of the willayats varies from willayat to willayat.

The following table shows the numbers of willayats in various population ranges:

Table A-4-3-11 Distribution of Present Willayat Population

No.	Range of	Population	No. of Willayat
1	<del></del>	10,000	6
2		20,000	.12
3		30,000	2
4		40,000	7
5	***	50,000	5 .
6		60,000	1
7		70,000	2
8		80,000	1
9	80,000	<del></del> ·	0
	. Total		36

The average population increase rate should not be used for all willayats equally, because willayats with rather bigger populations have more growth potential than other willayats.

The difference between the population increasing rates of respective willayats is not clear. So we assumed that the difference between a range

1 willayat and range 8 willayat would be 2% and 1% by taking into consideration various population increase reports.

By introducing the above assumption, the population increasing rate in each population range is obtained as follows:

Table A-4-3-12 Population Increase Rate in Each Case

No.	Range of Population	Scenario A	Scenario B	Scenario C
1	0 - 10,000	2.50(3.00)	2.65(3.15)	2.31(2.81)
2	- 20,000	2.79(3.14)	2.94(3.29)	2.60(2.95)
3	- 30,000	3.07(3.29)	3,22(3,44)	2.88(3.10)
4	- 40,000	3.36(3.43)	3.51(3.58)	3.17(3.24)
5	- 50,000	3.64(3.57)	3.79(3.72)	3.45(3.38)
6	- 60,000	3.93(3.71)	4.08(3.86)	3.74(3.52)
7	- 70,000	4.21(3.86)	4.36(4.01)	4.02(3.67)
8	- 80,000	4.50(4.00)	4.65(4.15)	4.31(3.81)
	Mean	3.5%	3.65%	3.31%

# (3) Potential Evaluation of Import Cargoes

Most import cargoes in Oman are consumer's goods. They are transported to where people live, though they are tentatively transported to traders' offices. The traders' intention to trade import goods also minimizes the cost of trade, so unnecessary transportation will be reduced. After formulating well-developed regional centers, the distribution centers would be established in the vicinity of the regional centers. Import cargoes must be handled in a port area because of the sea route. If the well-developed port functions, the traders would like to locate their distribution centers in the vicinity of the new port area. Therefore the product of the distance from the new port to the consumer's residences multiplied by the population of respective willayats shall represent the negative locational potential regarding import goods from the view-point of the national economy.

We will call this criterion the negative locational potential. Then the definition of the negative locational potential regarding import goods when two ports will be in operation is as follows:

 $C = \Sigma Pi * D1i + \Sigma Pi * D2i$ 

where C: Negative locational potential

Pi: Population of region "i"

Dli: Distance from Mina Qaboos to region "i"

D2i: Distance from a new port to region "i"

The negative locational potential represents the total transportation cost of import consumer goods from two ports, namely Mina Qaboos and the new port, to the respective final consumption places.

The following tables show the calculated results in various cases:

Table A-4-3-13 Calculation Results Scenario A (2%)

Population a No. Na		A-Rev.	A-M*Dis	A-S*Dis	A-M*Dis	A-B*Dis
	staq	108081	17184.893	0	0	9186.8925
2 Na		40177	4379.3134	0		1406.2015
	Awabi	10806	1577.6526	0		778.02046
4 So		168571	0	. 0		26297.077
5 Sa		120445	0	4215.5727		15778.286
	weiq	155793	. 0	16514.089	0	9659.1844
7 Ba	·	100397	8433.381	0	0	0
	inas	75275	0	4667.0327	0	15807.691
	aburah	80716	0	5085.0952	0	7829.4324
10 Ms		74772	8374.4916	0	.0	2841.3454
11 Li		30723	0	1044.5749	0	5591.5478
AlBatinah Su		965756	0	0	0	0
1 Ib		187882	0	37200.567		43588.543
	raimi	61774	. 0	7474.5995	0	16617.085
3 Dh		27189	0	6389.3887	0	7939.1553
4 Ya		21790	0	4706.6341	0	5447.4931
The state of the s	adha	11139	0	1113.8616	0	2762.3767
AlDhahirah S		309773	. 0	0	0	0
1 Ni		102652	17861.524	. 0	8930.7621	9546.6767
2 Ba		67198	13977.23	. 0	6988.6148	7391.8041
. 3 Sa		68790	6328.655	0	3164.3275	3577.0659
4 Iz		44224	6102.9145	0	3051.4572	3316.8013
5 Bi		30065	2134.6437	. 0	1067.3218	1307.8451
6 Ad		20731	4623.0698	0	2311.5349	2435.9224
7 Al	Hmra	21354	4719.2642	0	2359.6321	2487.7569
8 Ma	mh	15932	2660.694	0	1330.347	1425.9408
9 Ha	ima	8179	4425.092	0	2212.546	2261.6228
Dakhliyah Su	b-total	379127	0	0	0	0
	Modhaili	97230	17209.766		17209.766	0
2 Ib	ra	29918	5325.4591	0	5325.4591	0
3 A1	Qabil	18848	3826.1605		3826.1605	0
	diya	24018	6244.7276	0	6244.7276	0
5 A1	Kami l	24636	6897.9727	. 0	6897.9727	0
6 Ba	n i BuHass	31756	9590.3373	. 0	9590.3373	, 0
7 Ba	n i BuAl·i	70028	21568.772	0	21568.772	0
8 Su	r	97890	32988.88	0	32988.88	0
9 W.	BaniKali	9541	2700.1851	0	2700.1851	0
10 Di	hal	21385	3956.2266	0	3956.2266	0
	hirah	9901	1831.7537	, 0	1831.7537	0
Sharquiyah S	ub-total	435153	0	0	0	0
Grand Total		2089809	214923.06	88411.416	143556.78	205281.77
C.P.Area		710548				5968,60
Mussandam		50783				
Southern		346179		•		
Oman All		3197319				0.0000 55
Comparison				303334.48		348838.55
		•				354807.15

Negative locational potential = 354,807,150 man·km

Table A-4-3-14 Calculation Results
Scenario B (2%)

Danulation	and Diator		cidiato b	2.07		
-	n and Distar					
No		B-Rev.	B-M*Dis	B-S*Dis		B-B*Dis
	***************************************		17775.001		~	9502.3593
	Nakhal		4530.4902			1454.7446
	Al Awabi		1632.4044	· · · · · · · · · · · · · · · · · · ·	0	805.02135
	Sohar	174329			0	27195.357
	Saham	124570		4359.9435		16318.646
	Suweiq	161115		17078 193	0	9989.1317
	Barka	103845	8722.973	0		0
	Shinas	77866	. 0	4827.7087	: 1 - 0	16351.917
9	Khaburah	83495		5260.1643		8098.9831
10	Msanaa	77346	8662.8076	0	0	2939.1669
11	Liwa	31786	. 0	1080.7284	0	5785.0755
AlBatinah	Sub-total	998890	. 0	0	.0	0
. 1	lbry	194282	0	38467.922		45073.525
.2	Buraimi	63900		7731.9341		17189.176
	Dhank	28130	ŏ	6610.5304		8213.9356
	Yangal	22544		4869.5343		75636.035
	Mhadha	11525		1152.5177		2858.2439
	h Sub-total		ŏ			
,	Nizuwa		18474.867			
	Bahla	60512	14458.436		9237.4336	
	Samail	71150	6546.5372		7229.2179	
	lzki	11100	6313,5912		3273.2686	
	Bidbid	21106	2208.5254		3156.7956	
	Adam				1104.2627	
	AlHmra		4783.0778		2391.5389	
	Mamh		4882.6016		2441.3008	
the second of th	Haima		2753.0323	•	1376.5162	
	Sub-total.		4578.6631	0	2289,3316	2340.1116
		392194	:	0	0	0
	AlModhaili	100569	17800.729	0	17800.729	. 0
	Ibra		5509.7773	0	5509.7773	0
	AlQabil		3958.5868		3958.5868	0
	Bidiya	24849	6460.8624	0	6460.8624	0
	AlKamil		7136 7169	0	7136.7169	- 0
	Bani BuHass	32855	9922.2662	0	9922.2662	0
	Bani BuAli.	72439	22311.339	0	22311.339	0
	Sur	101251	34121.678		34121.678	0
	W.BaniKali	9872	2793.894	0	2793.894	0
	Dihal		4093.1546		4093.1546	0
	Mahirah	10245	1895.324	0	1895.324	0
	n Sub-total	450150	0	.0	0	0
Grand Tota	al ·	2161616	222327.34	91439.176	148503.99	212326.36
C.P.Area		638741	0	0	0	5365.42
Mussandam		50783	0	0	ŏ	5305.42 0
Southern		346179	0.	0	0	ŏ
Oman Ali	•	3197319	0	0	0	ŏ
Comparisor	n.	0	0	313766.51	ó :	360830.35
						366195.77 !
						200722-11

Negative locational potential = 366,195,771 man·km

Table A-4-3-15 Calculation Results
Scenario C (2%)

		90	enarro e (z	<i>(</i> 0)		
Population	and Dista	nce.				
No.		C-Rev.	C-M*Dis	C-S*Dis	C-M*Dis	C-B*Dis
	Rustaq	103974	16531807	0	0	8837759
	Nakhal	38642	4211943	0	. 0	1352459
	Al Awabi	10391	1517014	0	0	748117
· ·	Sohar	162201		ŏ	0	25303288
	Saham	115881	0	4055823	V . 0	15180368
the second of th	Suweiq	149906	0	15890008	. 0	9294156
					. 0	
	Barka	96582	8112883	0	-	0
	Shinas	72406	0	4489178	0	
	Khaburah	77640	0	4891308	· <u>0</u>	
	Msanaa	71923	8055350	0	. 0	2733065
	Liwa	29545	0	1004542	0	
AlBatinah		929089	0.	0	Ō	. 0
	Ibry	180802	0	35798717	0	41945972
2	Buraimi	59419	0	7189752	0	15983828
3	Dhank	26147	0	6144516	0	7634888
4	Yanqal	20955	0	4526253	. 0	5238719
5	Mhadha	10710	0	1071050	0	2656203
AlDhahirah	Sub-total	298033	0	0	0	0
	Nizuwa	98751	17182724	· · · · · 0	8591362	9183870
	Bahla	64637	13444574	0	6722287	
	Samail	66168	6087478	0	3043739	3440748
	Izki	42534	5869671	Ō	2934835	3190038
	Bidbid	28913	2052834	Ö	1026417	1257722
•	Adam	19937	4445891	ŏ	2222946	
	AlHmra	20536	4538399	` 0	2269200	
	Mamh	15320	2558428	0	1279214	
	the second second		the state of the s	· .	•	
	Haima	7865	4255010	0	2127505	2174696
	Sub-total	364661		0	.0	. 0
	AlModhaili	93535	16555735	0	16555735	0
	Ibra	28772	5121362	. 0	5121362	0
	AlQabil	18126	3679523.	the state of the s	3679523	· 0
	Bidiya	23098	6005399	. 0	6005399	0
•	AlKamil	23691		0	6633609	
· ·	Ban i BuHass	30539	9222789	0	9222789	. 0
•	BaniBuAli	67360	· ·	0	20746812	. 0
	Sur	94170	31735187	4, 4, 4, 4 0	31735187	0
	W.BaniKali	9175	2596402	0	2596402	0
10	Dihal	20565	3804605	. 0	3804605	. 0
1.1	Mahirah	9521	1761349	. 0	1761349	0.
Sharquiyah	Sub-total	418551	0	0	0	
·Grand Tota			206726778	85061146	138080276	197485713
C.P.Area		790022	0	0	0	6636200
Mussandam		50783	0		ő	. 0
Southern		346179	0	Ŏ	ŏ	0
Oman All		3197318	Õ	0	0.	. 0.
Comparison	· ·	0	*	291787924	•	335565989
		Ĭ	. *		Ů	•
						342202189

Negative locational potential = 342,202,189 man·km

Table A-4-3-16 Calculation Results
Scenario A (1%)

			· .	•		
No.	Name	A1	M*Dis	S≉Dis	M*Dis	B*Dis
1	Rustaq		17038176	0	0	9108458.7
2	Nakhal		4611996.7	. 0		1480916.4
3	Al Awabi	· ·	1766465.5	Ö		871133.68
	Sohar			Ö	ŏ	
	Saham	157389.67	0		•	
	Suweiq	115754.21	0	4051397.3	0	
		145459.51	0	15418708		9018489,3
•	Barka	99540.242	8361380.3	0	. 0	. 0
	Shinas	76839.689	0	4764060.7	0	16136335
. 9	Khaburah	82393.886		5190814.8	0	7992206.9
10	Msanaa		8548598.1	0		2900417.2
. 11	Liwa	33327.516		1133135.5	-	6065607.9
AlRatinah	Sub-total	- 10 P. L.		1133130.0	0	
	lbry	948600.8	0		=	
	Buraimi	170082.38	0	33676311	0	
		63057.827	0	7629997.1	0	
	Dhank	29494.004	0	6931091	0	8612249.3
	Yanqal	23637.36	. 0	5105669.8	0	5909340.1
5	Mhadha	12471.682	0	1247168.2	0	
AlDhahira	h Sub-total	298743.25	ŏ	0	0	0
1	Nizuwa			0		9465171.2
	Bahla	101776.03	17709030	_		
	Samail	68595.276	14267817			7545480.3
	Izki	the state of the s	6460228.3			3651433.4
		46573.745	6427176.9			3493030.9
	Bidbid	32614.396	2315622.1	. 0	1157811.1	1418726.2
	Adam	22488.883	5015020.9	0	2507510.4	2642443.7
	AlHmra	23164.574	5119370.8			2698672.8
8	Mamh		2979124.9			1596596.9
9	Haima		4954685.6		the state of the s	2532293.1
Dakhliyah	Sub-total	392430.24	4934063.0	. 0	0	0
	AlModhaili		•	-		
	lbra	96400.205	17062836		17062836	0
	AlQabil		5776959.8		5776959.8	0
		20446.051	4150548.3	0	4150548.3	0
	Bidiya	26054.482	6,774165.3	0	6774165.3	0
	AlKamil	26724.263	7482793.6	0	7482793.6	- 0
6	Ban i BuHass	34448.414	10403421	0	10403421	0
7	BaniBuAli	71484.379	22017189	()	22017189	0
8	Sur	97054.11	32707235		32707235	ŏ
9	W.BaniKali	-				ő
	Dihal		3023342.4		3023342.4	
	Mahirah	23198.063		-	4291641.6	0
	h Sub-total	11086.364	2050977.3	. 0	2050977.3	0
		450034.35	0	. 0	0	0
Grand Tot	a i	2089808.6	221315803	85148353	148365148	202370237
C.P.Area		710547.91	0	0	0	5968602.4
Mussandam		50783.263	0	0	0	0
Southern		346178.79	ő	ŏ	Ď	ŏ
Oman All		3197318.6	ő	0	0	0
Compariso	n		-		-	•
Jone and And	••	0		306464156		350735385
		0	0	0	. 0	356703988

Negative locational potential =  $356,703,988 \text{ man} \cdot \text{km}$ 

Table A-4-3-17 Calculation Results Scenario B (1%)

No .	Name	B1-Rev.	M*Dis	S*Dis	M*Dis	B*Dis
	Rustaq	110838	17623	0	0	9421
	Nakhal	43778	4772	0	ŏ	1532
	Al Awabi	12517	1827	ŏ	ŏ	901
=			0	0	. 0	25394
•	Sohar	162779	0	4190	ő	15684
	Saham	119723	•		ő	9327
	Suweig	150441	.0040	15947	o	0
	Barka	102958	8648	0	0	16691
	Shinas	79481	0	4928	0	8267
=	Khaburah	85227	0	5369	0	3000
•	Msanaa	78951	8843	- 0	•	
	Liwa	34476		1172	0	6275
	Sub-total	.0	0	0	0	.0
	Ibry	175899	0	34828	0	40809
	Buraimi	65226	0		0	17546
	Dhank	30511	. 0	7170	0	8909
	Yanqal	24452	0	5282	0	6113
. 5	Mhadha	12902	0	1290	0	3200
AlDhahira	h Sub-total	0	0	0	0	0
. 1	Nizuwa	105271	18317	0	9159	9790
2	Bahla	70954	14758	0	7379	7805
3	Samail	72634	6682	0	3341	3777
. 4	Izki	48187	6650	0	3325	3614
5	Bidbid	33739	2395	0	1198	1468
6	Adam	23264	5188	0	2594	2734
7	AlHmra	23963	5296	0	2648	2792
8	Mamh :	18455	3082	. 0	1541	1652
· · · · · · · · · · · · · · · · · · ·	Haima	9475	5126	0	2563	2620
Dakhliyah		0	0	0	0	0
	AlModhaili	99710	17649	0	17649	0
	Ibra	33574	5976	. 0	5976	0
	AlQabil	21151	4294	0	4294	0
	Bidiya	26953	7008	0	7008	0
	Al Kamil	27645	7741	ő	7741	0
	BaniBuHass	35636	10762	ő	10762	0.
	Bani BuAli	73942	22774	ŏ	22774	o ·
	Sur	100386	33830		33830	
_	W.BaniKali	11052	3128	. 0	3128	ŏ
	Dihal	= -: -:	<del></del>	0	4440	Ö
		23998		0	2122	ő
	Mahirah	11469	2122		0	ŏ
	s Sub-total	0151616	0 0 0 0 0 0		153470	209319
Grand Tota	9.1	2161616	228930		155410	5365
C.P.Area	•	638741	0	0	0	9309 0
Mussandam		50783	0	U	v	V
Southern	•	346179				
Oman All		3197319		0.0000		969900
Compariso	n			316999		362788
						368154

Negative locational potential =  $368,154,000 \text{ man} \cdot \text{km}$ 

Table A-4-3-18 Calculation Results
Scenario C (1%)

No.		Name	C.	l Rev.	M≫Dis	S*Dis	MakDis	B*Dis
140.	1	Rustag			16390.401			8762.1642
		Nakhal		40707	4437.102		0 0	1424.7575
		Al Awabi			1698.9251		0 0	837.82609
		Sohar		151423			o o	23621.943
*		Saham		111360		3897.584		14588.101
		Suweig		139945		14834.15		8676.5804
		Barka			8043.489			0
. :		Shinas	. •	73914		4582.6		15521 98
		Khaburah	44.14	79257		4993.186		7687.9219
		Msanaa			8223.1297			2789.9904
·=·		Liwa		32055		1089.871		5834.0193
AlBatir		Sub-total		0				38 3 3 4 4 9
Albarii		Ibry	1.	163643		32401.3		37965.241
		Buraimi		60657		7339.502		16316.745
s * - * -		Dhank	2.2	28368		6666.457		8283.4284
		Yangal		22735		4910.732		5683.7179
		Mhadha	100	11995		1199.48		2974.7178
AlDhahi		Sub-total		11550	.0		0 0	
Albhani		Nizuwa			17035.75		0 8517.8752	
. •		Bahla			13724.603		0 6862.3014	
		Samail			6214.2699		0 3107.1349	
j .		Izki			6183.4475		0 3091.7237	
		Bidbid			2227.2103		0 1113.6051	and the first of the control of the
• :- :		Adam			4823.5444		0 2411,7722	
* -:		AlHmra			4923.9101		0 2461.9551	
· .		Mámh			2865.2188		0 1432.6094	
		Haima			4765.2443		0 1432.6094	
Dolch Lity		-maima ∵Sub-total :		0000	4700.2440		0 -6:57 . 70	
Dakiiii		AlModhaili			16414.124		0 16414.124	
		Ibra			5556.392		0.5556.392	
		AlQabil			3992.0779			
		Bidiya			6515,5236		3992.0779	· · · · · · · · · · · · · · · · · · ·
		AlKamil					0 6515,5236	
•		the second secon			7197.096		7197.096	
		BaniBuHass BaniBuAli					0 10006.212	•
		Sur			21178.935 31463.739		21178.935	
		W.BaniKali					31463.739	0
					2907,7456		2907.7456	
		Dihal Mahirah			64127.7842 1972.5587		0 4127,7842	
Charaui		maniian Sub-total		10002	1972,3387		) 1972.5587 ) 0	
Grand T			r ,		•	91015 02	142713.79	104679 41
C.P.Are		7.1		790022	212000.43		) 142713.79	6636.184
Mussand				50783			- · · · · · · · · · · · · · · · · · · ·	()
Souther				346179			) '0	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
Oman Al				3197319	-			0
Compari		1		9197319		 . 294803.4		337392.19
- comban r	301	1	٠	0	0			344028.38
				0	Ü	'	, 0	014020.00

Negative locational potential = 344,028,380 man km

The comparison is listed in the following table

Table A-4-3-19 Comparison of Various Cases

(Unit: 1,000 man km)

Other Region's				
Growth Range		2%	1	%
	Qaboos/Sohar	Qaboos/Haradi	Qaboos/Sohar	Qaboos/Haradi
Scenario A	303,334	354,808	306,464	356,704
Scenario B	313,767	366,196	316,999	368,154
Scenario C	291,788	342,202	294,803	344,028

In every cae, a new port in Sohar is more economical than a port in Haradi.

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## Appendix 4-3-3 Transshipment Cargo Function

# (1) General

Presently, transshipment cargoes are handled mainly by CMA (Campagnie Maritime & Affretement) in Mina Qaboos. Also, ports in the UAE are now handling transshipment cargoes, as shown in the following tables.

Table A-4-3-20 Transshipment Cargoes in Mina Qaboos and Ports in the UAE

	(Unit	: thous	sand toni	nes/TEUs)
	1986	1987	1988	1989
Mina Qaboos (TEU)	28	77	.80	
(FRT)	287	713	604	
Port Rashid (FRT)	1,840	<b>*</b> 2,453	**2,643	** 3,069
(Dubai)(TEU)	146	72	70	**** 66
Jebel Ali Port (FRT)	****1,332	665	505	**** 478
Port of Fujairah(TEU)	64	73	<b>7</b> 5	** 89
Port Khor Fakan (TEU)	NA	NA	NA	30

<sup>\*</sup> January/November

From the above table, Port Rashid (Dubai) has an overwhelming share of transshipment cargoes and many major shipping lines use Port Rashid as a transshipment base. But Oman has a geographically locational advantage over all other Gulf countries as a transshipment base. Accordingly, in this section, we intend to analyze the potential of a new port as a transsipment port as follows:

- 1) From the view-point of the possibility of allocating the new port to the present users in Mina Qaboos.
- 2) From the view-point of the relationship between mother vessels and feeder vessels.

<sup>\*\*</sup> January/October

<sup>\*\*\*</sup> Includes Restowed Containers

<sup>\*\*\*\*</sup> January/May

(2) Analysis from the View-Point of the Possibility to Allocate the New Port to the Present Users in Mina Qaboos.

At present, the CMA is operating container services on the following trade routes with regard to Mideast Trade:

- 1) Europe Mideast Far East Service
- 2) Mideast Feeder Service
- 3) Far East Mideast Indian Subcontinent Service.

The first service is operated by the following 8 vessels:

- 1. Ville de Mercure 1,600 TEUs Full C 17.2 knots Built 1986
- 2. Ville de Pluton 1,600 TEUs Full C 17.2 knots Built 1987
- 3. Ville de Saturn 1,600 TEUs Full C 17.2 knots Built 1987
- 4. Ville de Jupiter 1,600 TEUs Full C 17.2 knots Built 1986
- 5. Ville de Neptune 1,800 TEUs Full C 17.2 knots Built 1988
- 6. Ville de Mars 1,800 TEUs Full C 17.2 knots Built 1988
- 7. Ville de Venus 1,800 TEUs Full C 17.2 knots Built 1988
- 8. Ville de Vega 1,950 TEUs Full C 18.0 knots Built 1984

The service frequency at present is once per every 10 days, as shown in the following timetable:

Table A-4-3-21 Time Table of CMA

JUPITER 9114 24.10 28.10 29.10 31.10 02.11 03.11 09.11 11.11 17.11 23.11 27.11 28.11 29.11 30.11 01.12 VEGA 9214 04.11 08.11 09.11 11.11 13.11 14.11 20.11 22.11 28.11 04.12 08.12 09.12 10.12 11.12 12.13 MERCURE 9414 15.11 19.11 20.11 22.11 24.11 25.11 01.12 03.12 09.12 15.12 19.12 30.12 21.12 22.12 23.12 NEPTUNE 9514 25.11 29.11 30.11 02.12 04.12 05.12 11.12 13.12 19.12 25.12 29.12 30.12 31.12 01.01 02.0 PLUTON 9614 05.12 09.12 10.12 12.12 14.12 15.12 11.12 13.12 19.12 25.12 29.12 30.12 31.12 01.01 12.0 SATURNE 9714 15.12 19.12 20.12 22.12 24.12 25.12 31.12 02.01 06.01 14.01 18.01 19.01 20.01 21.01 12.0 VENUS 9914 04.01 08.01 09.01 11.01 13.01 14.01 20.01 22.01 28.01 28.01 29.01 30.01 31.01 10.01 12.0 VESSEL AUH BAH KWT DAM DX8 MNQ Local TIS SIN HKG KEE YOK KOB PUS KAO MERCURE 9414 28.11 29.11 30.11 01.12 02.12 13.12 14.12 13.12 15.12 25.12 29.12 31.12 04.01 05.01 14.01 15.01 15.01 17.01 12.0 NEPTUNE 9514 09.12 10.12 11.12 12.12 13.12 14.12 15.12 25.12 25.12 29.12 31.12 04.01 05.01 10.01 12.01 NEPTUNE 9514 09.12 10.12 11.12 12.12 13.12 16.12 25.12 25.12 29.12 31.12 04.01 05.01 07.01 12.0 NEPTUNE 9514 09.12 10.12 11.13 12.11 12.12 13.12 16.12 25.12 04.01 08.01 10.01 14.01 15.01 17.01 22.0 NEPTUNE 9514 09.12 11.02 11.13 12.12 13.12 16.12 25.12 04.01 08.01 10.01 14.01 15.01 17.01 22.0 NEPTUNE 9514 09.12 11.02 11.13 12.12 13.12 16.12 25.12 04.01 08.01 10.01 14.01 15.01 17.01 22.0 NEPTUNE 9514 09.12 11.02 11.13 12.12 13.12 16.12 25.12 04.01 18.01 10.01 14.01 15.01 17.01 12.0 SATURNE 9714 30.12 31.12 01.01 02.01 03.01 05.01 14.01 18.01 20.01 24.01 25.01 25.01 27.01 01.00 SATURNE 9914 1.09.01 10.01 11.01 12.01 13.01 15.01 15.01 14.01 18.01 20.01 24.01 25.01 25.01 27.01 01.00 SATURNE 9914 . 19.01 20.01 11.01 12.01 13.01 15.01 15.01 14.01 18.01 20.01 13.02 13.02 14.02 25.02 25.01 27.01 01.00 SATURNE 9914 . 19.01 20.01 10.01 11.01 12.01 13.01 15.01 15.01 13.01 14.01 18.01 20.01 23.02 13.02 14.02 25.01 27.01 10.00 SATURNE 9914 . 19.01 20.01 10.01 11.01 12.01 13.01 15.01 15.01 13.01 13.01 14.01 18.01 18.01 20.01 13.02 13.0						'.	~				-						
VEGA   9214   24.10   28.10   29.10   31.10   02.11   03.11   03.11   03.11   11.11   12.11   22.11   27.11   28.11   29.11   29.11   29.11   01.11   01.11			• .			••	<u>; · · ·                                </u>	4.5.	12 2	4 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		- 1-	·		<u> </u>	: :	
VEGA         9214         04.11         08.11         09.11         11.11         13.11         14.11         20.11         22.11         28.11         08.12         09.12         10.12         11.12         12.11           MERCURE         9414         15.11         19.11         20.11         22.11         24.11         25.11         09.12         15.12         19.12         20.12         21.12         23.12           NEPTUNE         9514         25.11         29.11         30.11         02.12         04.12         05.12         11.12         13.12         19.12         25.12         29.12         30.12         21.12         23.12           PLUTON         9614         05.12         19.12         20.12         22.12         24.12         25.12         23.12         04.01         06.01         14.01         18.01         19.01         20.01         12.01           MARAS         9814         25.12         29.12         30.12         20.10         03.01         14.01         20.01         28.01         28.01         29.01         30.01         31.01         10.01           VENUS         9914         04.01         06.01         10.01         12.01         22.01         <	VESSEL		BAR	LEH	ROT	нам	FLX	ANT	MRS	NAP	JED	MNG	DXB	AUH	ван	KWT	DAM
MERCURE 9414 15.11 19.11 20.11 22.11 24.11 25.11 01.12 03.12 09.12 15.12 19.12 20.12 21.12 23.12 23.12 NEPTUNE 9514 25.11 29.11 30.11 02.12 04.12 11.12 13.12 19.12 25.12 29.12 30.12 31.12 01.01 02.0 PLUTON 9614 09.12 19.12 29.12 12.12 14.12 15.12 11.12 13.12 19.12 25.12 29.12 30.12 31.12 01.01 12.0 SATURNE 9714 15.12 19.12 20.12 22.12 24.12 25.12 31.12 02.01 08.01 14.01 18.01 19.01 20.01 10.01 12.0 MARS 9814 25.12 29.12 30.12 01.01 03.01 04.01 10.01 12.01 18.01 14.01 18.01 19.01 20.01 20.01 VENUS 9914 04.01 08.01 08.01 08.01 11.01 13.01 14.01 02.00 12.01 28.01 29.01 29.01 30.01 31.01 10.01 12.01 18.01 19.01 19.01 20.01 11.01 12.01 VESSEL 8.88 8.88 8.88 8.88 8.88 8.88 8.88 8.	JUPITER	9114	24.10	28.10	29.10	31.10	02,11	03.11	09.11	11.11	17,11	23.11	27,11	28,11	29.11	30,11	01.12
NEPTUNE 9514 25.11 29.11 30.11 02.12 04.12 05.12 11.12 13.12 19.12 25.12 29.12 30.12 31.12 01.01 02.0 PLUTON 9614 05.12 09.12 10.12 12.12 14.12 15.12 21.12 23.12 29.12 04.01 08.01 09.01 10.01 11.01 12.0 SATURNE 9714 15.12 19.12 20.12 20.12 24.12 25.12 31.12 02.01 08.01 14.01 18.01 19.01 20.01 22.0 MARS 9814 25.12 29.12 30.12 01.01 03.01 04.01 10.01 12.01 18.01 24.01 28.01 29.01 30.01 31.01 01.02 VENUS 9914 04.01 08.01 09.01 11.01 13.01 14.01 20.01 22.01 28.01 03.02 07.02 08.02 09.02 10.02 11.02 VESSEL	VEGA	9214	04.11	08.11	09,11	11.11	13,11	14.11	20.11	22.11	28,11	04.12	08,12	09.12	10,12	11,12	12.12
PLUTON 9614 05.12 09.12 10.12 12.12 14.12 15.12 23.12 23.12 04.01 08.01 09.01 10.01 11.01 12.0  SATURNE 9714 15.12 19.12 20.12 22.12 24.12 25.12 31.12 02.01 08.01 14.01 18.01 19.01 20.01 21.01 22.0  MARS 9814 25.12 29.12 30.12 01.01 03.01 04.01 10.01 12.01 18.01 24.01 28.01 29.01 30.01 31.01 01.02  VENUS 9914 04.01 08.01 09.01 11.01 13.01 14.01 20.01 22.01 28.01 09.02 07.02 08.02 09.02 10.02 11.02  VESSEL	MERCURE	9414	15.11	19,11	20,11	22.11	24.11	25.11	01.12	03.12	09,12	15.12	19.12.	20.12	21,12	22:12	23.12
SATURNE 9714 15.12 19.12 20.12 22.12 24.12 25.12 31.12 02.01 08.01 14.01 18.01 19.01 20.01 21.01 22.01 MARS 9814 25.12 29.12 30.12 01.01 03.01 04.01 10.01 12.01 18.01 24.01 28.01 29.01 30.01 31.01 01.02 VENUS 9914 04.01 08.01 09.01 11.01 13.01 14.01 20.01 22.01 28.01 09.02 07.02 08.02 09.02 10.02 11.02 VENUS 9914 04.01 08.01 09.01 11.01 13.01 14.01 20.01 22.01 28.01 09.02 07.02 08.02 09.02 10.02 11.02 VENUS 9914 04.01 08.01 09.01 11.01 12.0	NEPTUNE	9514	25.11	29,11	30.11	02.12	04.12	05.12	11,12	13.12	19,12	25.12	29.12	30.12	31.12	01.01	02.01
MARS 9814 25.12 29.12 30.12 01.01 03.01 04.01 10.01 12.01 18.01 24.01 28.01 29.01 30.01 31.01 01.02 VENUS 9914 04.01 08.01 09.01 11.01 13.01 14.01 20.01 22.01 28.01 03.02 07.02 08.02 09.02 10.02 11.02 VESSEL	PLUTON	9614	05.12	09.12	10.12	12.12	14.12	15.12	21,12	23.12	29.12	04.01	08.01	09.01	10.01	11,01	12.01
VENUS 9914 04.01 08.01 09.01 11.01 13.01 14.01 20.01 22.01 28.01 03.02 07.02 08.02 09.02 10.02 11.02 VESSEL	SATURNE	9714	15.12	19.12	20.12	22,12	24.12	25.12	31.12	02.01	08.01	14.01	18.01	19.01	20.01	21.01	22.01
VESSEL    AUH   BAH   KWT   DAM   DXB   MNQ   Local   T/S   SIN   HKG   KEE   YOK   KOB   PUS   KAO	MARS	9814	25.12	29.12	30.12	01.01	03.01	04.01	10,01	12.01	-18.01	24,01	28.01	29.01	30,01	31.01	01.02
VEGA 9214	YENUS	9914	04.01	08.01	09.01	.11.01	13.01	14.01	20.01	22.01	28.01	03.02	07. 02	08.02	09.02	10.02	11.02
MERCURE 9414 28.11 29.11 30.11 01.12 02.12 05 12 15.12 25.12 29.12 31.12 04.01 05.01 07.01 12.0  NEPTUNE 9514 09.12 10.12 11.14 1 12.11 13.11 16.12 25.12 04.01 08.01 10.01 14.01 15.01 17.01 22.0  PLUTON 9614 20.12 21.12 22.12 23.12 24.12 26.12 04.01 14.01 18.01 20.01 24.01 25.01 27.01 01.0  SATURNE 97.14 30.12 31.12 01.01 02.01 03.01 05.01 14.01 24.01 28.01 30.01 03.02 04.02 06.02 11.0  MARS 9814 09.01 10.01 11.01 12.01 13.01 15.01 24.01 03.02 07.02 09.02 13.02 14.02 16.02 21.01  VENUS 9914 19.01 20.01 21.01 22.01 23.01 25.01 03.02 13.02 17.02 19.02 23.02 44.02 26.02 03.01  JUPITER 9115 29.01 30.01 31.01 01.02 02.02 04.02 13.02 23.02 27.02 01.03 05.03 06.03 08.03 13.02  VESSEL YOK KO9 PUS KEE KAO HKG SIN COL DX8 MNQ AUH BAH KWT DAM  PLUTON 9613 01.11 02.11 04.11 07.11 09.11 10.11 15.11 19.11 25.11 26.11 28.11 29.11 30.11 01.12 12.12  MARS 9813 22.11 23.11 25.11 28.11 30.11 01.12 25.11 29.11 05.12 07.12 09.12 10.12 11.12 12.12  VENUS 9913 03.12 04.12 06.12 09.12 11.12 12.12 12.12 12.12 12.12 27.12 28.12 30.12 06.01 07.01 09.01 10.01 11.01 12.01  JUPITER 9114 13.12 14.12 16.12 19.12 21.12 22.12 27.12 31.12 06.01 07.01 09.01 10.01 11.01 12.01  MERCURE 9414 04.01 05.01 07.01 10.01 12.01 13.01 18.01 12.01 18.01 19.01 20.01 21.01 02.01  MERCURE 9414 04.01 05.01 07.01 10.01 12.01 13.01 18.01 12.01 18.01 19.01 20.01 21.01 02.01	VESSEL	Ī .		AUH	ван	KWT	DAM	DX8			SIN	HKG	KEE	YOK	ков	PUS	KAO
NEPTUNE 9514 09.12 10.12 11.12 12.12 13.12 16.12 25.12 04.01 08.01 10.01 14.01 15.01 17.01 22.0  PLUTON 9614 20.12 21.12 22.12 23.12 24.12 26.12 04.01 14.01 18.01 20.01 24.01 25.01 27.01 01.01  SATURNE 9714 30.12 31.12 01.01 02.01 03.01 05.01 14.01 24.01 28.01 30.01 03.02 04.02 06.02 11.01  MARS 9814 09.01 10.01 11.01 12.01 13.01 15.01 24.01 03.02 07.02 09.02 13.02 14.02 16.02 21.02  VENUS 9914 19.01 20.01 21.01 22.01 23.01 25.01 03.02 13.02 17.02 19.02 23.02 44.02 26.02 03.02  JUPITER 9115 29.01 30.01 31.01 01.02 02.02 04.02 13.02 27.02 01.03 05.03 06.03 08.03 13.02  VESSEL YOK KOB PUS KEE KAO HKG SIN COL DXB MNO AUH BAH KWY DAM  PLUTON 9613 01.11 02.11 04.11 07.11 09.11 10.11 15.11 19.11 25.11 26.11 28.11 29.11 30.11 01.12  SATURNE 9713 11.11 12.11 14.11 17.11 19.11 20.11 25.11 29.11 05.12 07.12 09.12 10.12 11.12 12.12  MARS 9813 22.11 23.11 25.11 28.11 30.11 01.12 06.12 10.12 16.12 18.12 20.12 21.12 21.12 12.12  VENUS 9913 03.12 04.12 06.12 09.12 11.12 12.12 17.12 21.12 27.12 28.12 30.12 31.12 01.010 02.01  JUPITER 9114 13.12 14.12 16.12 19.12 21.12 22.12 27.12 31.12 06.01 07.01 09.01 10.01 11.01 12.01  VEGA 9214 24.12 25.12 27.12 30.12 01.01 12.01 13.01 18.01 17.01 18.01 19.01 20.01 31.01 01.02 11.01  MERCURE 9414 04.01 05.01 07.01 10.01 12.01 13.01 18.01 17.01 18.01 19.01 20.01 31.01 01.02 11.01	VEGA .	9214		18 11	19.11	20,11	21.11	22 11	.24,11	04.12	14,12	18.12	20.12	24,12	25.12	27.12	01.01
PLUTON 9614 20.12 21.12 22.12 23.12 24.12 26.12 04.01 14.01 18.01 20.01 24.01 25.01 27.01 01.01 SATURNE 97.14 30.12 31.12 01.01 02.01 03.01 05.01 14.01 24.01 28.01 30.01 03.02 04.02 06.02 11.01 MARS 9814 09.01 10.01 11.01 12.01 13.01 15.01 24.01 03.02 07.02 09.02 13.02 14.02 16.02 21.01 VENUS 9914 19.01 20.01 21.01 22.01 23.01 25.01 03.02 13.02 17.02 19.02 23.02 44.02 26.02 03.01 JUPITER 9115 29.01 30.01 31.01 01.02 02.02 04.02 13.02 23.02 27.02 01.03 05.03 06.03 08.03 13.01 VESSEL YOK KOB PUS KEE KAO HKG SIN COL DXB MNQ AUH BAH KWY DAM PLUTON 9613 01.11 02.11 04.11 07.11 09.11 10.11 15.11 19.11 25.11 26.11 28.11 29.11 30.11 01.12 SATURNE 9713 11.11 12.11 14.11 17.11 19.11 20.11 25.11 29.11 05.12 07.12 09.12 10.12 11.12 12.12 MARS 9813 22.11 23.11 25.11 28.11 30.11 01.12 06.12 10.12 16.12 18.12 20.12 21.12 22.12 23.12 VENUS 9913 03.12 04.12 06.12 09.12 11.12 12.12 17.12 21.12 27.12 28.12 30.12 01.01 02.01 11.01 12.01 UPITER 9114 13.12 14.12 16.12 19.12 21.12 22.12 27.12 28.12 30.12 01.01 02.01 11.01 12.01 12.01 UPITER 9114 13.12 14.12 16.12 19.12 21.12 22.12 27.12 28.12 30.12 01.01 02.01 11.01 12.01 UPITER 9114 13.12 14.12 16.12 19.12 21.12 22.12 27.12 31.12 06.01 07.01 09.01 10.01 11.01 12.01 UPITER 9114 13.12 14.12 16.12 19.12 22.12 27.12 31.12 06.01 07.01 09.01 10.01 11.01 12.01 UPITER 9114 04.01 05.01 07.01 10.01 12.01 13.01 18.01 22.01 28.01 29.01 30.01 31.01 01.02 11.01 12.01 UPITER 9114 04.01 05.01 07.01 10.01 12.01 13.01 18.01 22.01 28.01 29.01 30.01 31.01 01.02 11.01 12.01 UPITER 9114 04.01 05.01 07.01 10.01 12.01 13.01 18.01 22.01 28.01 29.01 30.01 31.01 01.02 11.01 12.01 13.01 18.01 22.01 28.01 29.01 30.01 31.01 01.02 11.01 12.01 13.01 18.01 22.01 28.01 29.01 30.01 31.01 01.02 11.01 12.01 13.01 18.01 22.01 28.01 29.01 30.01 31.01 01.02 11.01 12.01 13.01 18.01 22.01 28.01 29.01 30.01 31.01 01.02 11.01 12.01	MERCURE	9414		28.11	29.11	30.11	01.12	02.12	05 12	15.12	25.12	- 29.12	31,12	04.01	05.01	07.01	12.01
SATURNE 97.14 30,12 31,12 01.01 02.01 03.01 05.01 14.01 24.01 28.01 30.01 03.02 04.02 06.02 11.03 MARS 98.14 09.01 10.01 11.01 12.01 13.01 15.01 24.01 03.02 07.02 09.02 13.02 14.02 16.02 21.03 VENUS 99.14 19.01 20.01 21.01 22.01 23.01 25.01 03.02 13.02 17.02 19.02 23.02 44.02 26.02 03.03 JUPITER 91.15 29.01 30.01 31.01 01.02 02.02 04.02 13.02 23.02 27.02 01.03 05.03 06.03 08.03 13.03 VESSEL YOK KOB PUS KEE KAO HKG SIN COL DXB MNQ AUH BAH KWY DAM PLUTON 96.13 01.11 02.11 04.11 07.11 09.11 10.11 15.11 19.11 25.11 26.11 28.11 29.11 30.11 01.12 SATURNE 97.13 11.11 12.11 14.11 17.11 19.11 20.11 25.11 29.11 05.12 07.12 09.12 10.12 11.12 12.12 MARS 98.13 22.11 23.11 25.11 28.11 30.11 01.12 06.12 10.12 16.12 18.12 20.12 21.12 22.12 23.12 VENUS 99.13 03.12 04.12 06.12 09.12 11.12 12.12 17.12 12.12 17.12 12.12 17.1	NEPTUNE	9514		09.12	10.12	11.12	12.12	13.12	16,12	25.12	04.01	08.01	10.01	14.01	15.01	17.01	22.01
MARS 9814 09.01 10.01 11.01 12.01 13.01 15.01 24.01 03.02 07.02 09.02 13.02 14.02 16.02 21.01 02.01 13.01 15.01 24.01 03.02 13.02 17.02 19.02 23.02 14.02 16.02 21.01 02.01 13.01 12.01 13.01 15.01 03.02 13.02 17.02 19.02 23.02 14.02 16.02 03.02 13.02 17.02 19.02 13.02 14.02 16.02 17.02 19.02 13.02 17.02 19.02 13.02 14.02 16.02 17.02 19.02 13.02 17.02 19.02 13.02 14.02 16.02 17.02 19.02 13.02 14.02 14.02 16.02 17.02 19.02 13.02 17.02 19.02 13.02 14.02 14.02 16.02 17.02 19.02 13.02 14.02 14.02 16.02 17.02 19.02 13.02 14.02 14.02 16.02 17.02 19.02 13.02 14.02 14.02 16.02 17.02 19.02 13.02 14.02 14.02 16.02 17.02 17.02 19.02 13.02 14.02 14.02 16.02 13.02 13.02 17.02 19.02 13.02 14.02 14.02 16.02 13.02 17	PLUTON	9614		20.12	21.12	22.12	23,12	24.12	26,12	04.01	14.01	18.01	20.01	24.01	25.01	27.01	01.02
VENUS 9914 . 19.01 20.01 21.01 22.01 23.01 25.01 03.02 13.02 17.02 19.02 23.02 44.02 26.02 03.03 13.01 10.02 02.02 04.02 13.02 23.02 27.02 01.03 05.03 06.03 08.03 13.03 13.01 01.02 02.02 04.02 13.02 23.02 27.02 01.03 05.03 06.03 08.03 13.03 13.03 10.01 01.02 02.02 04.02 13.02 23.02 27.02 01.03 05.03 06.03 08.03 13.03 13.03 10.01 01.02 02.02 04.02 13.02 23.02 27.02 01.03 05.03 06.03 08.03 13.03 13.03 10.01 01.02 02.02 04.02 13.02 23.02 27.02 01.03 05.03 06.03 08.03 13.03	SATURNE	97.14	9 : 1	30,12	31.12	01.01	02.01	03.01	05.01	14.01	24.01	28.01	30,01	03.02	04.02	06.02	11.02
JUPITER 9115 29.01 30.01 31.01 01.02 02.02 04.02 13.02 23.02 27.02 01.03 05.03 06.03 08.03 13.01 02.02 02.02 04.02 13.02 23.02 27.02 01.03 05.03 06.03 08.03 13.01 02.01 04.01 07.01 09.01 10.01 15.01 19.01 25.01 26.01 28.01 29.01 30.01 01.02 02.02 04.02	MARS	9814		09.01	10.01	11.01	12.01	13 01	15.01	24.01	03.02	07.02	09.02	13.02	14.02	16.02	21.02
VESSEL         YOK         KOB         PUS         KEE         KAO         HKG         SIN         COL         DXB         MNQ         AUH         BAH         KWT         DAM           PLUTON         9613         01.11         02.11         04.11         07.11         09.11         10.11         15.11         19.11         25.11         26.11         28.11         29.11         30.11         01.12           SATURNE         9713         11.11         12.11         14.11         17.11         19.11         20.11         25.11         29.11         05.12         07.12         09.12         10.12         12.12           MARS         9813         22.11         23.11         25.11         28.11         30.11         01.12         06.12         10:12         16.12         18.12         20.12         21.12         22.12         23.12           VENUS         9913         03.12         04.12         06.12         09.12         11.12         12.12         17.12         21.12         27.12         28.12         30.12         31.12         01.010         02.01           JUPITER         9114         13.12         16.12         19.12         21.12         22.12	VENUS	9914	-	19.01	20.01	21.01	22.01	23.01	25.01	03.02	13.02	17.02	19.02	23.02	44,02	25.02	03.03
PLUTON 9613 01.11 02.11 04.11 07.11 09.11 10.11 15.11 19.11 25.11 26.11 28.11 29.11 30.11 01.12    SATURNE 9713 11.11 12.11 14.11 17.11 19.11 20.11 25.11 29.11 05.12 07.12 09.12 10.12 11.12 12.12    MARS 9813 22.11 23.11 25.11 28.11 30.11 01.12 06.12 10.12 16.12 18.12 20.12 21.12 22.12 23.12    VENUS 9913 03.12 04.12 06.12 09.12 11.12 12.12 17.12 21.12 27.12 28.12 30.12 01.01 02.01    JUPITER 9114 13.12 14.12 16.12 19.12 21.12 22.12 27.12 31.12 06.01 07.01 09.01 10.01 11.01 12.01    VEGA 9214 24.12 25.12 27.12 30.12 01.01 02.01 07.01 11.01 17.01 18.01 19.01 20.01 21.01 22.01    MERCURE 9414 04.01 05.01 07.01 10.01 12.01 13.01 18.01 22.01 28.01 29.01 29.01 30.01 31.01 01.021	JUPITER	9115		29.01	30.01	31.01	01.02	02.02	04.02	13.02	23.02	27.02	01.03	05.03	06.03	08.03	13.03
SATURNE 9713 11.11 12.11 14.11 17.11 19.11 20.11 25.11 29.11 05.12 07.12 09.12 10.12 11.12 12.12 MARS 9813 22.11 23.11 25.11 28.11 30.11 01.12 06.12 10.12 16.12 18.12 20.12 21.12 22.12 23.12 VENUS 9913 03.12 04.12 06.12 09.12 11.12 12.12 17.12 21.12 27.12 28.12 30.12 31.12 01.010 02.01 JUPITER 9114 13.12 14.12 16.12 19.12 21.12 22.12 27.12 21.12 06.01 07.01 09.01 10.01 11.01 12.01 VEGA 9214 24.12 25.12 27.12 30.12 01.00 02.01 12.01 13.01 18.01 22.01 29.01 29.01 30.01 31.01 01.021	VESSEL		YOK	ков	PUS	KEE	KAO	HKG ·	SIN	COL	DX8	MNO	AUH	BAH	KWY	DAM	
MARS 9813 22.11 23.11 25.11 28.11 30.11 01.12 06.12 10.12 16.12 18.12 20.12 21.12 22.12 23.12 VENUS 9913 03.12 04.12 06.12 19.12 11.12 12.12 17.12 21.12 27.12 28.12 30.12 31.12 01.010 02.01 JUPITER 9114 13.12 14.12 16.12 19.12 21.12 22.12 27.12 31.12 06.01 07.01 09.01 10.01 11.01 12.01 VEGA 9214 24.12 25.12 27.12 30.12 01.01 12.01 13.01 18.01 22.01 28.01 29.01 29.01 30.01 31.01 01021 15.01 MERCURE 9414 04.01 05.01 07.01 10.01 12.01 13.01 18.01 22.01 28.01 29.01 29.01 30.01 31.01 01021	PLUTON	9613	01,11	02.11	-04,11	07.11	09,11	10,11	15.11	19.11	25,11	26,11.	28.11	29.11	30.11	01,12	
VENUS 9913 03.12 04.12 06.12 09.12 11.12 12.12 17.12 21.12 27.12 28.12 30.12 31.12 01.010 02.01  JUPITER 9114 13.12 14.12 16.12 19.12 21.12 22.12 27.12 31.12 06.01 07.01 09.01 10.01 11.01 12.01  VEGA 9214 24.12 25.12 27.12 30.12 01.01 02.01 07.01 11.01 17.01 18.01 19.01 20.01 21.01 22.01  MERCURE 9414 04.01 05.01 07.01 10.01 12.01 13.01 18.01 22.01 28.01 29.01 29.01 30.01 31.01 01021	SATURNE	9713	11,11	12.11	14.13	.17.11	19.11	20.11	25.11	29.11	05.12	07.12	09.12	10.12	11.12	12.12	
JUPITER         9114         13.12         14.12         16.12         19.12         21.12         22.12         27.12         31.12         06.01         07.01         09.01         10.01         11.01         12.01           VEGA         9214         24.12         25.12         27.12         30.12         01.01         07.01         11.01         17.01         18.01         19.01         20.01         21.01         22.01           MERCURE         9414         04.01         05.01         07.01         10.01         12.01         13.01         18.01         22.01         29.01         29.01         30.01         31.01         01021	MARS	9813	22.11	23.11	25.11	28.11	30.11	01,12	06.12	10.12	16.12	18.12	20.12	21.12	22/12	23.12	
VEGA 9214 24.12 25.12 27.12 30.12 01.01 02.01 07.01 11.01 17.01 18.01 19.01 20.01 21.01 22.01 MERCURE 9414 04.01 05.01 07.01 10.01 12.01 13.01 18.01 22.01 28.01 29.01 29.01 30.01 31.01 01021	VENUS	9913	03.12	04.12	06.12	09,12	11.12	12.12	17.12	21.12	27.12	28.12	30,12	31,12	01.010	02.01	
MERCURE 9414 04.01 05.01 07.01 10.01 12.01 13.01 18.01 22.01 28.01 29.01 29.01 30.01 31.01 01021	JUPITER	9114	13.12	14,12	16.12	19,12	21.12	22.12	27.12	31,12	06.01	07.01	09.01	10.01	11.01	12.01	
MERCURE 9414 04.01 05.01 07.01 10.01 12.01 13.01 13.01 22.01 22.01 23.01 23.01 23.01	VEGA	9214	24.12	25.12	27.12	30.12	01.01	02.01	07.01	11.01	17.01	18,01	19.01	20.01	21.01	22.01	
NEPTUNE 9514 14.01 15.01 17.01 20.01 22.01 23.01 28.01 01.02 07.02 08.02 08.02 09.02 10.02 11.02	MERCURE	94141	04.01	05.01	07.01	10.01	12.01	13.01	18.01	22.01	28.01	29.01	29.01	30.01	31,01	01021	
	NEPTUNE	9514	14.01	15.01	17.01	20.01	22.01	23,01	28.01	01,02	07.02	08.02	08.02	09.02	10.02	11.02	

The routes of the vessels are as follows, as shown in the above tables.

Bash gas I to the

Barcelona - Le Havre - Rotterdam - Hamburg - Felixstowe - Antowerp - Marseilles - Naples - Jeddah - Mina Qaboos - Singapore - Hong Kong - Keelung - Yokohama - Kobe - Pusan - Kaohsiung - Hong Kong - Singapore - Colombo - Dubai - Mina Qaboos - to Europe

In order to provide the service at intervals of every 10 days by using 8 vessels, the period for round trips shall be as follows, as shown in Fig. A-A-3-5.

P (for round trips) =  $8 \times 10 \text{ days} = 80 \text{ days}$ 

Vessel No. 1 2 3 4 5 6 7 8 1

days

Service Interval

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Period of Round Trip = 80 days

Fig. A-4-3-5 Relationship between Regular Service Interval and Period of Round Trip and Number of Fleet.

From the above schedule, the Vega started from Mina Qaboos on 04/12 on 9214 voyage to the Far East. The Vega arrived in Yokohama and started on 24/12. It took 20 days to travel from Mina Qaboos to Yokohama. It again arrived in Mina Qaboos and started on 18/01. It took 25 days to travel from Yokohama to Mina Qaboos. Accordingly, 45 days are allocated for the Far East trip.

Based on the relationship between regular service interval and period of round trips and number of fleets, the period for the Europe trips shall be 35 days. On the other hand, the Vega started from Barcelona on 04/11. Then, 30 days are used for the trip from Barcelona to Mina Qaboos. Is it possible to travel within 5 days from Mina Qaboos to Barcelona? The distance from Mina Qaboos to Port Said is 2,629 N Miles and that from Port Said to Barcelona is 1,629 N Mines. The distance from Mina Qaboos to Barcelona is 4,258 N Miles. The necessary period for travelling this distance can be calculated as follows:

- (1) At 17.2 knots
  - 4,258 N Miles = 247.6 hours = 10.3 days
- (2) At 23 knots

4.258 N Miles = 185.1 hours = 7.7 days

Therefore, it is not possible to make a round trip to Europe within 35 days based on the following schedule:

Barcelona )4 days Le Harve )1 Rotterdam )2 Hamburg )2 Felixstowe )1 Antwerp )6 Marseille )2 Naples )6 Jedda )6 Mina Qaboos

Total 30 days

In this case, one more vessel is necessary for continuing the present service. So the service shall be as shown in Fig. A-4-3-6.

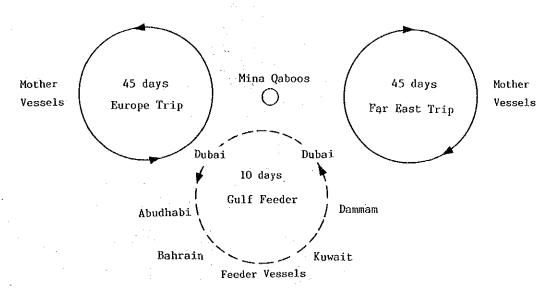


Fig. A-4-3-6 Transshipment Pattern

The CMA now takes an irregular route for the return trip from the Far East. Mother vessels first come to Dubai and then to Mina Qaboos because of the draft restriction in Mina Qaboos. Fig. A-4-3-7 shows the pattern of Gulf Trade.

Presently, mother vessels come from Jeddah to Mina Qaboos and are bound for Singapore. From the above timetable, the following schedules are fixed:

Jeddah - Mina Qaboos 6 days Mina Qaboos - Singapore 10 days

The distances between Jeddah, Mina Qaboos and Singapore are as follows:

Jeddah - Mina Qaboos 1,941 N Miles Mina Qaboos - Singapore 3,168 N Miles

The necessary voyage time based on the speed of 17.2 knots shall be as follows:

Jeddah - Mina Qaboos 112.8 hours = 4.7 days Mina Qaboos - Singapore 184.2 hours = 7.7 days

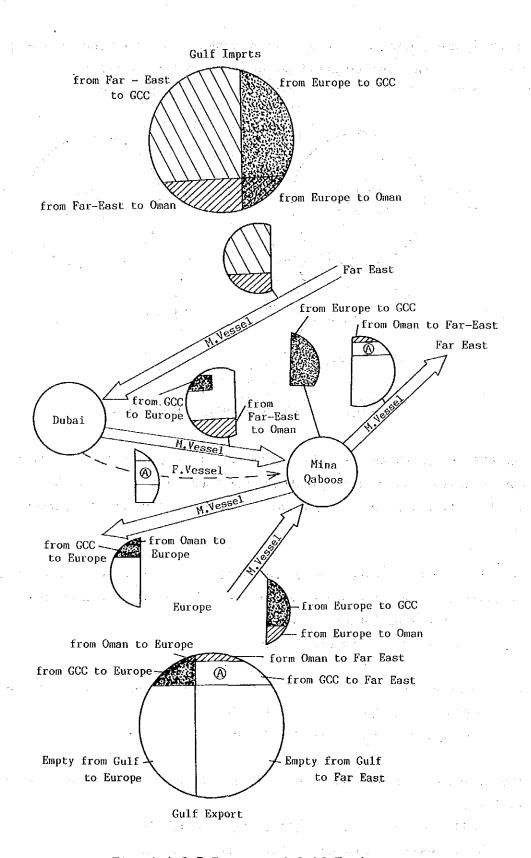


Fig. A-4-3-7 Pattern of Gulf Trade

By using the speed of 15.0 knots, the required times are as follows:

Jeddah - Mina Qaboos 129.4 hours = 5.4 days

Mina Qaboos - Singapore 211.2 hours = 8.8 days

If the new port is located in Majis, mother vessels would have to travel into the Gulf 240 km (130 N Miles) more.

If the new port is located in Haradi, mother vessels would have to travel into the Gulf 75 km (40.5 N Miles) more.

The additional required voyage times are as follows:

17.2 knots 15

15 knots

Majis 15.1 hours = 0.63 days 17.3 hours = 0.72 days

Haradi 4.7 hours = 0.20 days 5.4 hours = 0.23 days

The required voyage times in case of using new ports as a Hub port instead of Mina Qaboos are as follows:

Majis as a New Port

17.2 knots

15knots

Jeddah -- Majis 120.4 hours = 5.0 days 138.1 hours = 5.8 days

Majis - Singapore 191.8 hours = 8.0 days 220.0 hours = 9.2 days

Haradi as a New Port

17.2 knots

15 knots

Jeddah - Haradi 115.2 hours = 4.8 days 132.1 hours = 5.5 days

Haradi - Singapore 186.6 hours = 7.8 days 213.9 hours = 8.9 days

Comparing the above required times with the fixed schedule, the required voyage time in each new port does not seem to be so great a restriction. The following required time is calculated under the assumption of Dubai Hub Port instead of Mina Qaboos.

17.2 knots

15 knots

Jeddah - Dubai

130.9 hours = 5.5 days 150.1 hours = 6.3 days

Dubai -Singapore 202.3 hours = 8.4 days 231.9 hours = 9.7 days

Comparing this required times with that at a new port in Batinah coast, the

difference of required voyage times is about 1 day. Therefore, if it is possible to give incentives to shipping lines by introducing various strategies, there would be surely good potentials for transshipment in the new ports on the Batinah coast.

(3) Analysis from the Viewpoint of the Relationship between Mother Vessels and Feeder Vessels

## A. General

At present, Dubai plays the role of a major hub port in the Gulf region. As analyzed above, Mina Qaboos also plays the role of a major hub port and has a geographically advantageous location for a hub port. In order to analyze the potential of transshipment in a new port, the cost comparison of mother vessels with feeder vessels will be treated by using a mathematical model in this section. To simplify the model, the following three trade patterns will be assumed:

- 1) Mina Qaboos and Dubai are both hub ports (Hub Hub Case)
- 2) Mina Qaboos is a hub port and Dubai is a feeder port (Mina Qaboos Hub Case)
- 3) Dubai is a hub port and Mina Qaboos is a feeder port (Dubai Hub Case)

The conceptual drawing is shown in Fig. A-4-3-8.

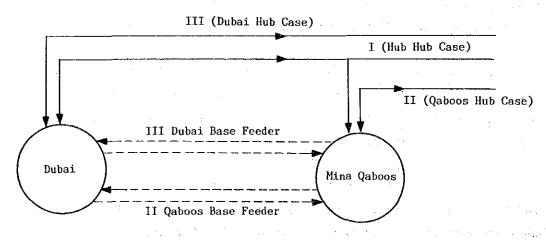


Fig. A-4-3-8 Conceptual Drawing for Examination

In comparing the costs of respective cases, costs common to all cases will be excluded. For example, the mother vessel cost up to the entrance of Mina Qaboos will be excluded. Also the cargo handling cost will be excluded, except for the special additional cost for transshipment.

## B. Premises

The premises for the model are as follows:

1	Mother vessels	2) Feeder vessels
a)Vessel type	1,900 TEU-type	600 TEU-Type
	33,000 DWT	13,000 DWT
	30,000 GRT	10,000 GRT
b)Charterage	U\$16,000/day	U\$6,000/day
c)Fuel consumption	on US 4,941/day	U\$1,724/day
	(FO 60 KT/day	20 KT/day)
	(DO 1.5KT/day	1.0KT/day)
	(FO:U\$ 78.5 per KT	i
	(DQ:U\$154 per KT	<b>)</b>
and the second s	· · · · · · · · · · · · · · · · · · ·	

Fuel is assumed to be consumed only during navigation; not while the ship is in port.

d) Speed	18 knot	15 knot
e) Port Charge	U\$6,000	U\$3,00

The actual port charges for these vessels are as follows:

Mina Qaboos	U\$2,285	7.1	U\$1,496
Dubai	U\$2.504	•	U\$1,469

The above actual port charges are also used in the analysis.

The distance from Mina Qaboos and Dubai is supposed to be 311 N Miles. The declared distance tables by respective port authorities are different in some cases. so the distance table between ports in the Gulf of our estimation is shown in the following table:

Table A-4-3-22 Distance Table between Arabian - Bay Ports

										(Un	(Unit: Nautical Miles)	tical	Miles)
Port Name	5/	2	2	#	ſ.	φ	2	Ø	6	10.	11	72	23
(1) Mina Qaboos						-						· :	
(2) Fujairah	740							·					
(3) Khor Fakhan	203	73											
(4) Sharjah	297	177	164										
(5) Dubai	311	191	178	14	<i></i>								
(6) Jebel Ali	321	202	191	33	46	1	_/						
(7) Abu Dhabi	365	253	240	80	22	45							2.2
(8) Doha (Qatar)	478	960	350	210	195	185	175						
(9) Mina Sulman (Bahrain)	529	7408	401	287	261	230	247	124					
(10) Дашшаш	578	760	431	310	284	250	297	174	50	7			
(11) Kuwait	.713	591	578	Z9 <del>1</del> 7	456	456	457	344	284	550		/	
(12) Bushire	586	468	439	345	529	355	.332	229	176	166	153		
(13) Bandar Abas:	546	123	110	110	124	169	202	293	544	996	529	402	

By using this distance and the respective vessel speed the required navigation time can be calculated as follows:

f) Navigation Time 34.6 hrs. = 1.44 days 41.4 hrs. = 1.73 days (round trip) (round trip)

Cargo handling costs will be excluded, because of the above mentioned reason, but the vessel cost arising from cargo handling must be included because the vessel costs vary from mother vessels to feeder vessels.

The cargo handling productivity is assumed to be 70 TEUs/hour/berth and the required time for preparation for cargo handling and departure is assumed to be 3 hours. Accordingly, the vessel cost in a port can be calculated by using the following formula:

g) Vessel Cost in a Port.

$$VCP = \frac{(x/70 + 3) * Ci}{24}$$

Where; VCP: Vessel Cost in a Port (U\$)

x : Cargo Volume which shall be Handled in a Port (TEU)

Ci: Charterage for i vessel (U\$ / day)

For example, in case that the cargo volume is 100 TEUs, the vessel cost in a port can be calculated as follows:

1) For mother vessels

$$VCPm = \frac{(100/70 + 3)}{24} \times 16,000$$

$$= \frac{4.43 \times 16,000}{24} = 0.185 \times 16,000$$

$$= 0.185 \times 16,000$$

$$= 0.185 \times 16,000$$

2) For feeder vessels

$$VCPf = \frac{(100/70 + 3) \times 6,000 = U\$1,107}{24}$$

For mother vessels, the vessel cost arising once in a port, but for feeder vessels, the vessel cost shall be double-counted, because the transshipment cargo handling shall be done both in a hub port and a feeder port.

One more other cargo handling cost must be taken into account. It is a cargo handling cost for transshipment, because this cost does not come out in the Hub Hub Case. We assumed then, the following cargo handling cost for transshipment:

h) Transshipment cost U\$100/TEU

This transshipment cost is for double handling, loading and unloading.

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- i) Navigation Cost The navigation cost can be calculated by using the navigation time (f), the charterage (b), and the fuel consumption (c) as follows:
- 1) For mother vessels  $Vm = (16,000 + 4,941) \times 1.44 = U$30,155$
- 2) For feeder vessels  $Vf = (6,000 + 1,724) \times 1.73 = U$13,363$

#### C. Model

By using the above value and formulae in the premises, the formulation of model for comparison will be dealt with in the following cases:

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#### a) Hub Hub Case

The costs in this case take into account the movements of mother vessels and cargoes. A mother vessel is supposed to approach to Mina Qaboos. The cost of the vessel up to the entrance of Mina Qaboos is excluded because of the above-mentioned reason. Port charges must be taken into account. The cargo handling cost should be excluded because it is necessary for all cases where the same volume cargo is handled. The navigation cost between Mina Qaboos and Dubai must be taken into account. Port charges in Dubai must also be included, and vessel costs in each port must be included. The necessary costs, accordingly, are as follows:

1) Port charge in two ports

- 2) Navigation cost between two ports
- 3) Vessel cost in each ports.

Therefore, the following formula is defined for required cost for shipping corporations.

$$C = Pq + Pd + Vm + Cm \left( \frac{x}{1,680} + 0.25 \right)$$

Where, C: Total Cost (U\$)

Pq: Port Charge for a Mother Vessel in Mina Qaboos (U\$)

Pd: Port Charge for a Mother Vessel in Dubai (U\$)

Vm: Navigation Cost of a Mother Vessel between Two Ports (U\$)

Cm: Charterage of a Mother Vessel per Day (U\$/day)

x: Total Cargo Volume Handled in Two Ports (TEUs)

Because the mother vessel cost is derived from the following calculation:

$$VCPq = Cm \frac{(xq/70 + 3)}{24}$$

$$VCPd = Cm (xd/70 + 3)$$

$$24$$

Where VCPq: Vessel Cost in Mina Qaboos (U\$)

VCPd: Vessel Cost in Dubai (U\$)

Cm: Charterage of a Mother Vessel per Day (U\$/day)

xq: Cargo Volume Handled in Mina Qaboos (TEUs)

xd: Cargo Volume Handled in Dubai (TEUs)

$$VCP = VCPf + VCPd = Cm(\frac{xq + xd}{1,680} + \frac{6}{24})$$

$$= Cm(\frac{x + 0.25}{1,680})$$

The unit cost per TEU can be defined as follows:

$$\left(\frac{C}{x}\right)$$
Hub Hub =  $\frac{(Pq + Pd + Vm + 0.25 Cm) + Cm}{x}$  1,680

b) Mina Qaboos Hub Case

In considering this case, the cost necessary for a mother vessel is at first taken into account.

As the mother vessel only visits and discharges/loads, the total cargoes includes transshipment cargoes and the base cargoes for Mina Qaboos. The necessary costs for the mother vessel are as follows:

- 1) Port charges in Mina Qaboos
- 2) Vessel costs in Mina Qaboos
- 3) Additional transshipment costs for cargo handling.

On the other hand, the necessary costs for feeder vessel are as follows:

- 1) Port charges in two ports
- 2) Vessel costs for transshipment in two ports
- 3) Navigation costs between two ports.

The transshipment cost can be classified either in a mother vessel cost or in a feeder vessel cost. In this case, we put it in the mother vessel cost.

The total mother vessel cost can be formulated as follows:

$$C1 = Pq + Cm \left( \frac{x + 0.125}{1,680} \right) + 100 xd$$

Where C1: Total Mother Vessel Cost (U\$)

Pq: Port Charge for a Mother Vessel in Mina Qaboos (U\$)

Cm : Charterage of a Mother Vessel per Day (U\$/day)

x: Total Cargo Volume Handled in Two Ports (TEUs)

xd : Transshipment Cargo Volume (TEUs)

The mother vessel must handle the total cargoes in Mina Qaboos. Then, the required time in Mina Qaboos is as follows:

$$Tq = x/70 + 3 = x + 0.125$$
 $24$ 

Where Tq: Required Time in Mina Qaboos (Day)

x : Total Cargo Volume Handled in Two Ports (TEUs)

Then the above formula will be a little bit different from that in the Hub Hub Case.

The total feeder vessel cost can be formulated as follows:

C2 = pq +pd + Vf + 2 
$$(xd + 0.125)$$
 \* Cf  $1,680$ 

where, C2: total Feeder Vessel Cost (U\$)

pq: Port Charge for a Feeder Vessel in Mina Qaboos (U\$)

pd: Port charge for a Feeder Vessel in Dubai (U\$)

xd: Transshipment Cargo Volume for Dubai (TEU)

Cf: Charterage of a Feeder Vessel per Day (U\$/day)

Accordingly, the total cost can be calculated by the following formula: C = C1 + C2 = Pq + pq + pd + Vf + 0.125 Cm + 0.25 Cf

$$+ \frac{\text{Cm}}{1,680} \times + (\frac{2\text{Cf}}{1,680} + 100) \text{ xd}$$

The unit cost per TEU can be defined as follows.

$$\left(\frac{C}{x}\right)_{Qaboos} = \frac{(Pq + pq + pd + Vf + 0.125 Cm + 0.25 Cf)}{x}$$

$$\frac{+ Cm + (2Cf + 100) (xd)}{1,680 1,680}$$

# c) Dubai Hub Case

In the same way, the necessary cost for the mother vessel in this case is as follows:

- 1) Port charge in Dubai
- 2) Vessel cost in Dubai
- 3) Additional transshipment costs for cargo handling
- 4) Navigation cost between two ports

The necessary cost for the feeder vessel is as follows:

1) Port charges in two ports

- 2) Vessel costs for transshipment in two ports
- 3) Navigation cost between two ports

The formulae for each vessels can be derived as the same way as in the Qaboos Hub Case.

C1 = Pd + Cm ( 
$$x + 0.125$$
) +  $100xq + Vm$   
1,680  
C2 = pq + pd + Vf + 2 (  $xq + 0.125$ ) \* Cf  
1,680  
C = C1 + C2 = Pd + pq + pd + Vm + Vf + 0.125 Cm + 0.25 Cf  
+ Cm  $x + (2 Cf + 100) xq$   
1,680

The unit cost per TEU can be defined as follows:

$$\left(\frac{C}{x}\right)_{\text{Dubai}} = \frac{(\text{Pd} + \text{pq} + \text{pd} + \text{Vm} + \text{Vf} + 0.125 \text{ Cm} + 0.25 \text{ Cf})}{x}$$

$$+ \frac{\text{Cm}}{1,680} + \frac{(2\text{Cf} + 100)}{(x,680)} + \frac{(xq)}{(x)}$$

- D. Comparison with respective cases
- 1) Comparison of Hub Hub Case with Qaboos Hub Case. By comparing the unit cost of Hub Hub Case with that of Qaboos Hub Case, which case is preferable for shipping corporations shall be analysed.

$$\frac{\binom{C}{x}_{Hub} \text{ Hub}}{\binom{C}{x}_{Qaboos}} \frac{-\binom{C}{x}_{Qaboos}}{\binom{C}{x}_{Qaboos}} \frac{\text{Hub}}{\sqrt{\frac{C}{x}_{Qaboos}}} = \frac{\binom{C}{x}_{Qaboos}}{\binom{C}{x}_{Qaboos}} \frac{\binom{C}{x}_{Qaboos}}{\sqrt{\frac{C}{x}_{Qaboos}}} \frac{\binom{C$$

If the above value is positive, Qaboos Hub would be preferable for shipping corporation.

As x is positive, so shipping corporations would take Qaboos Hub Case under

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the following conditions:

$$xd < \frac{(Pd - pq - pd + Vm - Vf + 0.125 Cm - 0.25 Cf)}{(2 Cf + 100)}$$

In other words, if the volume of transshipment cargoes to Dubai is less than the value of the right—hand side, the shipping corporations would prefer Qaboos Hub Case to Hub Hub Case.

By using the value in the premises, the result is as follows:

$$xd < \frac{(6,000 - 3,000 - 3,000 + 30,155 -13,363 + 2,000 - 1,500)}{\frac{2 \times 6,000}{1,680} + 100}$$
$$= 17,292/107.1429 = 161.4 \text{ TEUs}$$

Therefore, in the cases where the transshipment cargo volume to Dubai is less than or equal to 161 TEUs, Qaboos Hub would be selected. In the cases where the transshipment cargo volume to Dubai is greater than 161 TEUs, two Hubs would be selected.

By using the actual port charge, the value of criteria will be as follows:

$$\frac{(2,504 - 1,496 - 1,469 + 30,155 - 13,363 + 2,000 - 1,500)}{107.1429}$$
=  $16,831/107.1429 = 157.1$  TEUs

Therefore, in this case, the following selection would be done:

$$xd \leq 157 \text{ TEUs} \dots$$
 Qaboos Hub  
 $xd > 157 \text{ TEus} \dots$  Hub Hub

When we consider a new port along Batinah cost, Vm and Vf would be changed as follows:

# a) Majis New Port:

Distance between Dubai and the New Port

$$= 311 - 130 = 181$$
 N Miles

Navigation Time (Round Trip) by Mother Vessels

$$= 2 \times 181 / 18 = 20.11 \text{ hrs.} = 0.84 \text{ days}$$

Navigation time (Round Trip) by Feeder Vessels

$$= 2 \times 181 / 15 = 24.13 \text{ hrs.} = 1.006 \text{ days}$$

$$Vm = (16,000 + 4,941) \times 0.84 = 17,548 U$$
\$

$$Vf = (6,000 + 1,724) \times 1.006 = 7,767 U$$
\$

The value of criteria under the same rest conditions, will be as follows:

$$xd \leq 91$$
 TEUs .... Majis New Hub Port

# b) Haradi New Port:

Distance between Dubai and the New Port

$$= 311 - 40.5 = 270.5$$
 N Miles

Navigation Time (Round Trip) by Mother Vessels

$$= 2 \times 270.5 / 18 = 30.06 \text{ hrs.} = 1.25 \text{ days}$$

Navigation Time (Round Trip) by Feeder Vessels

$$= 2 \times 270.5 / 15 = 36.08 \text{ hrs.} = 1.50 \text{ days}$$

$$Vm = (16,000 + 4,941)x 1.25 = 26,225 U$$
\$

$$Vf = (6,000 + 1,724)x 1.50 = 11,608 U$$
\$

Then the value of criteria is as follows:

2) Comparison of Qaboos Hub Case with Dubai Hub Case

In the same way as the above, the unit cost comparison is as follows:

$$\left(\frac{C}{x}\right)_{Qaboos} \left(\frac{C}{x}\right)_{Dubai}$$

$$= \frac{(Pq - Pd + Vf - Vm)}{x} + (\frac{2Cf}{1,680} + \frac{100}{x}) \frac{(xd - xq)}{x}$$

The selection criterion of Mina Qaboos Hub rather than Dubai is as follows:

$$(xd - xq) < \frac{(Pd - Pq + Vm - Vf)}{(2Cf + 100)}$$

By using the values in premises, the result is as follows:

$$(xd - xq) < \frac{(6,000-6,000+30,155 - 13,363)}{\frac{2 \times 6,000}{1,680} + 100}$$

$$= 16,792/107.1429 = 156.7 \text{ TEUs}$$

Therefore, if the difference between the transshipment cargo volume to Dubai and the transshipment cargo volume to Qaboos is less than or equal to 156 TEUs, the selection of Qaboos Hub would be made over Dubai Hub. other words, in the cases where the difference between Dubai base cargoes and Qaboos base cargoes is less than or equal to 156 TEUs, Mina Qaboos would be selected as a hub port over Dubai.

By using the actual port charges, the criterion will be as follows:

$$(xd-xq) < \frac{(2,504-2,283+30,155-13,363)}{107,1429}$$

= 17,013/107.1429 = 158.8 TEUs

a) Majis New Port

$$(xd-xm) < \frac{(2,504 - 2,283 + 17,548 - 7,767)}{107.1429}$$
  
= 10,002/107.1429 = 93.4 TEUs

b) Haradi New Port

$$(xd-xh) < \frac{(2,504 - 2,283 + 26,225 - 11,608)}{107.1429}$$
  
= 14,838/107.1429 = 138.5 TEUs

3) Comparison of Hub Hub Case with Dubai Hub case

In the same way as the above, the unit cost comparison is as follows:

$$\frac{\left(\frac{c}{x}\right)_{\text{Hub Hub}} \left(\frac{c}{x}\right)_{\text{Dubai Hub}}}{\left(\frac{c}{x}\right)_{\text{Dubai Hub}}} = \frac{(\text{Pq - pq - pd - Vf + 0.125 Cm - 0.25 Cf})}{x}$$

$$-\frac{(2 \text{ Cf + 100})}{1,680} \frac{(\text{xq})}{x}$$

The condition which Hub Hub Case is selected is as follows:

$$\frac{(Pq - pq - pd - Vf + 0.125 Cm - 0.25 Cf)}{\frac{(2 Cf + 100)}{1.680}} < xq$$

By using the values in the premises, the result is as follows:

$$\frac{(6,000-3,000-3,000-13,363+2,000-1,500)}{107.1429} < xq$$
i.e. 
$$\frac{-12,863}{107.1429} < xq$$

Therefore, the Hub Hub Case is always better than the Dubai Hub Case under the conditions of comparison with feeder services.

In case of using actual port charges, the result is as follows:

$$(2,283 - 1,496 - 1,469 - 13,363 + 2,000 - 1,500) < 0$$

The Hub Hub Case becomes always better than the Dubai Hub Case.

#### E. Conclusion

In the above section, we compared the Hub Hub case with the Qaboos Hub Case. But the above analysis is based on a simple model including only 2 ports. There are lots of ports in the Gulf and transshipment is now carried out in various ports. Accordingly, the comparison with Hub Hub Case is not so important, and the comparison of Qaboos Hub with Dubai Hub is more important.

From the result using the actual port charges, the following

conclusions are introduced:

- 1) Mina Qaboos; locational advantage vis-a vis Dubai is estimated at 158 TEUs. Even in case of lesser base cargo volumes than Dubai base cargoes by 158 TEUs, Mina Qaboos would have the advantage needed to become a hub port.
- 2) From the criterion formula, the difference between port charges is sensitive to the criterion value. But it is not preferable for port management. The sensitivity of the difference between navigation costs of mother and feeder vessels is greater than that of the difference between port charges.

Therefore, the bigger the mother vessels that are analysed, the more locational advantages are expected.

3) The transshipment cargo handling cost in a denominator of the criterion formula is very sensitive to the criterion value. If the transshipment cargo handling cost is reduced from U\$100/TEU in the formula to U\$50/TEU, the locational advantages would increase from 158 TEUs to 297 TEUs immediately.

For the potential of a new port, a similar conclusion is presented in the following cases:

#### a) For Majis New Port

- 1) Majis New Port's locational advantage over Dubai is estimated at 93 TEUs. The advantage is not bigger than that of Mina Qaboos. But there is still effective potential for transshipment.
- 2) As stated in the above conclusions regarding Mina Qaboos, the sensitivity of the difference between navigation costs of mother vessels and feeder vessels is greater than that of the difference between port charges. Accordingly, the new port must be equipped with well-developed facilities that can accommodate very large mother vessels. The advantages will then surely increase drastically.

- 3) The transshipment cargo handling costs shall be lowered as far as possible.
- 4) Marketing efforts needed to obtain base cargoes are very important in order to compete with Dubai.

## b) For Haradi New Port

1) Haradi New Port's locational advantage over Dubai is estimated at 138 TEUs. This is surely more advantageous than Majis. But the value is very similar to the advantage of Mina Qaboos.

Accordingly, Haradi New Port might be competitive with Mina Qaboos after the completion of better facilities than those at Mina Qaboos.