APPENDIX 11 ENERGY SAVING

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As already discussed in the section on Cargo Flow, transportation by domestic coastal shipping and railways are on the decline due to the remarkable increase of trucks coming after the expansion of road networks in recent years. On the other hand, the necessity of energy-saving is actually a serious problem facing the country as Thailand is importing most of its petroleum from abroad. In order to solve the problem, the development of domestic coastal shipping, which can transport a great amount of cargo at one time at lower cost, contributes greatly to energy saving.

In comparing the amount of energy saving between domestic coastal shipping and road transport, an analysis is made based on the followings:

Road Transport		10-wheel truck
Domestic Coastal Shipping Common Carrier Service		4 types of vessels used for financial analysis except RoRo ships
Price of fuel oil	Truck:	B 7.5/Ltr
	Vessel:	US$ 185/Mton

(1) Comparison of fuel oil consumption and cost per ton/km

The calculation is made assuming full cargo load in both road transport and common carrier service by vessel.

1) Consumption (g./ton-km)

$$\text{Truck} - \frac{1 \text{ Ltr} \times \text{Specific gravity} \times 1{,}000}{\text{Mileage in km} \times \text{Payload}} \left(\frac{1 \times 0.85 \times 1{,}000}{3.5 \times 13} \right) = 18.68$$

$$\text{Vessel} - \frac{\text{Consumption/day in g}}{\text{Mileage/day in km} \times \text{Carrying Capacity}}$$

Type of vessel	1,500 DWT	1,000 DWT	700 DWT	P. Barge
Consumption	6.39 g	7.32 g	10.39 g	6.025 g

2) Cost of fuel oil (฿/ton-km)

Mode	Truck	Vessel			
Type	10 wheeler	1,500 DWT	1,000 DWT	700 DWT	P. Barge
Fuel consumption (g/ton-km)	18.68	6.39	7.32	10.39	6.025
Fuel unit price (฿/g)	$\frac{8.824}{1,000}$	$\frac{4.255}{1,000}$	$\frac{4.255}{1,000}$	$\frac{4.255}{1,000}$	$\frac{4.255}{1,000}$
Fuel cost (฿/ton-km)	$\frac{165}{1,000}$	$\frac{27}{1,000}$	$\frac{31}{1,000}$	$\frac{44}{1,000}$	$\frac{26}{1,000}$

Fuel oil consumption for vessel is 30 ∿55% in weight and 16 ∿ 27% in cost, of truck.

(2) Comparison of fuel oil consumption and costs for a trip between Bangkok and Hat Yai (Songkhla).

This calculation is also made assuming full cargo load for both directions in common carrier service a full load southbound and 10% load northbound is assumed.

1) Consumption of fuel oil (kg/ton-one trip)

Truck 18.68 g × 976 km = 18.23 kg

Vessel 1) + 2)

1) Drayage at both ends

18.68 g × 30 km × 2 = 1.12 kg

2) At Sea

$$\frac{\text{Consumption/day (Days at sea + Day in Port)} \times 10^3}{\text{Carrying Capacity} \times 1.1}$$

Mode	Truck	Vessel			
Type	10 wheeler	1,500 DWT	1,000 DWT	700 DWT	P. Barge
Diesel oil of truck	18.23 g	1.12 g	1.12 g	1.12 g	1.12 g
Fuel oil for vessel	-	11.25 g	12.56 g	16.93 g	10.58 g
Total weight	18.23 g	12.37 g	13.68 g	18.05 g	11.70 g

2) Cost of fuel oil (฿/ton-one trip)

Mode	Truck	Vessel			
Type	10 wheeler	1,500 DWT	1,000 DWT	700 DWT	P. Barge
Diesel oil	฿ 160.9	฿ 9.9	฿ 9.9	฿ 9.9	฿ 9.9
Fuel oil	-	47.9	53.4	72.0	45.0
Total cost	161	58	63	82	55

Fuel oil consumption for vessel is 64 ∿ 99% of truck in weight and 34 ∿ 51% of truck in cost.

From the above analysis, it is clear that common carrier service by vessel will contribute to the economy of Thailand in energy saving.

APPENDIX 12 PROJECTED TRADE ROUTE

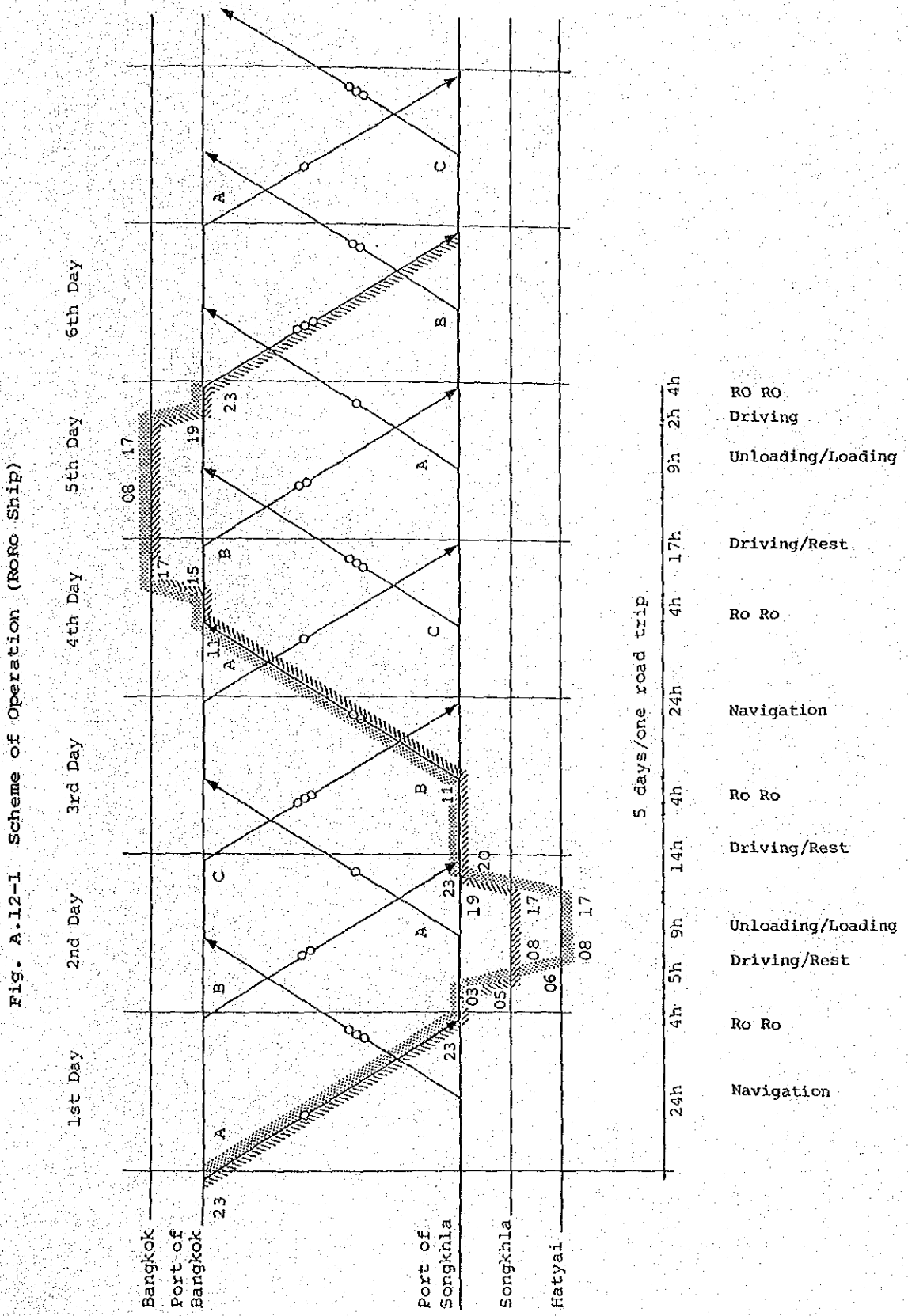
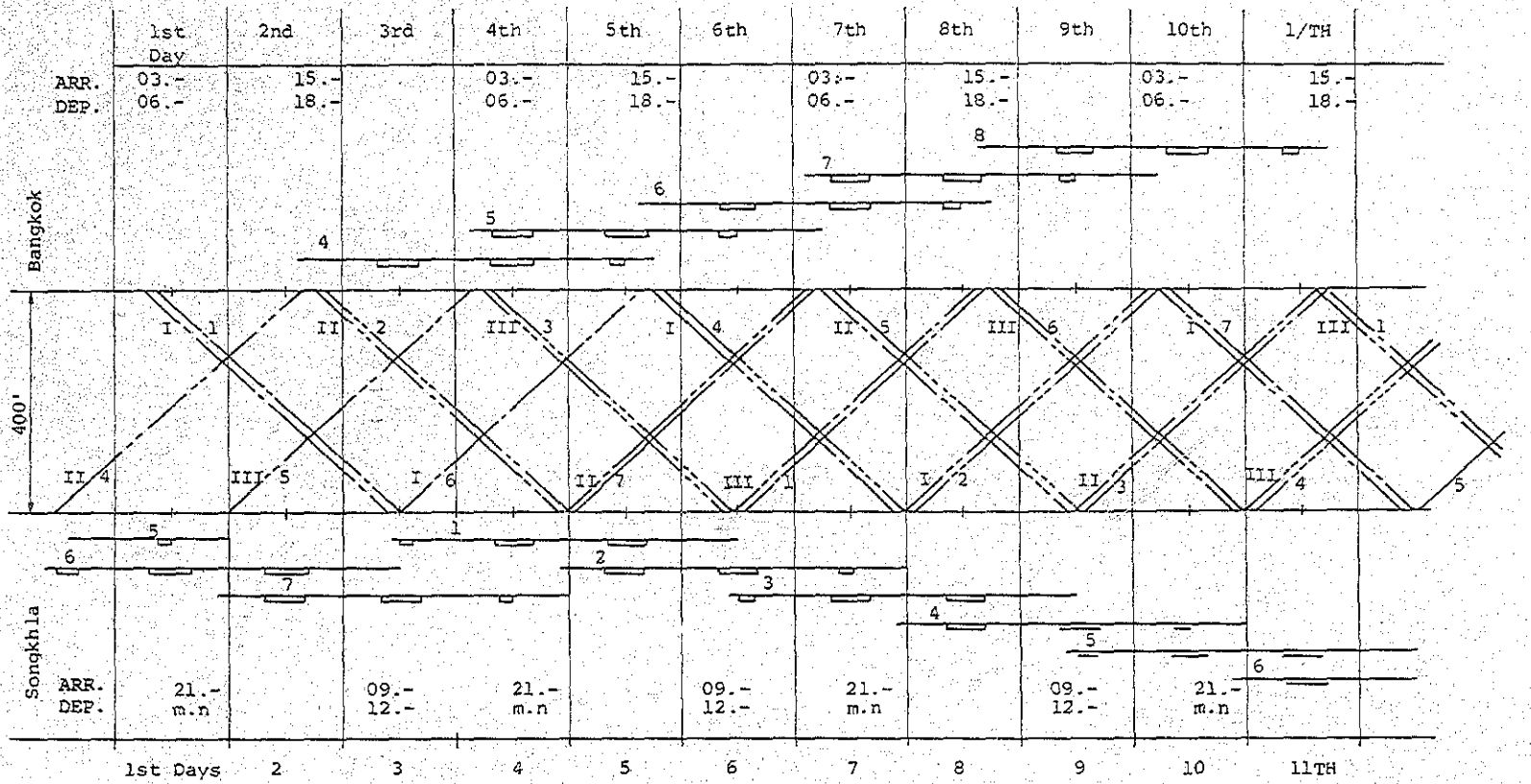


Fig. A.12-1 Scheme of Operation (RoRo Ship)

Fig. A.12-2 Scheme of Operation (Pusher-Barge System)



Pusher Tugs : 3 Units (I ∿ III), Rotation 4.5 Days

Barges : 7 Units (1 ∿ 7), Rotation 10.5 Days

Service Interval: 36 Hrs.

: Loading/Discharging time

APPENDIX 13 FINANCIAL ANALYSIS OF PROJECTED TRADE ROUTE

Table A.13-1 (1) Break Down of Crew Cost

(1,500 DWT Type General Cargo Vessel)

Case 1,4,7 and 10

Unit: ¥ per Vessel

year	1983	1987		1989		Crew Expenses per Vessel per Year	
	Wages per Month	Wages per Month	(Number of Crew)	Wages per Month	(Number of Crew)	Formula: (14A+12B)×1.3	
Capt.	15,000	18,000	(1)	20,600	(1)	1987	(14× 90,200+12×21,600)×1.3=1,979,000
C/O	10,000	12,000	(1)	13,700	(1)	1988	(14× 96,600+12×23,200)×1.3=2,119,000
C/E	13,500	16,000	(1)	18,300	(1)		
2/E	9,000	11,000	(1)	12,600	(1)	1989	(14× 87,800+12×18,600)×1.3=1,888,000
Elect.	4,000	5,000	(1)	-	-	1990	(14× 93,900+12×19,900)×1.3=2,020,000
A.B.	3,500	4,200	(3)	4,800	(3)	1991	(14×100,500+12×21,300)×1.3=2,162,000
Sailer	3,000	3,600	(2)	4,100	(2)	1992	(14×107,600+12×22,800)×1.3=2,314,000
Oiler	3,500	4,200	(1)	-	-	1993	(14×115,100+12×24,400)×1.3=2,475,000
Cook	3,500	4,200	(1)	-	-	1994	(14×123,200+12×26,100)×1.3=2,649,000
Total(A)		90,200	(12)	87,800	(9)	1995	(14×131,800+12×28,000)×1.3=2,835,000
Provision						1996	(14×141,000+12×29,900)×1.3=3,033,000
¥ per Crew	1,500	1,800	× (12)	2,060	× (9)		
¥ per Vessel(B)		21,600		18,540		Total for 10 years	23,474,000

Increase Ratio 1983~1987 (4 years): 5%
1988~1996 (9 years): 7%

Table A.13-1 (2) Break Down of Crew Cost

(1,000 DWT Type General Cargo Vessel)

Case 2,5,8 and 11

Unit: ¥ per Vessel

year	1983	1987		1989	
	Wages per Month	Wages per Month	(Number of Crew)	Wages per Month	(Number of Crew)
Capt.	14,000	17,000	(1)	18,200	(1)
C/O	9,000	11,000	(1)	12,600	(1)
C/E	12,500	15,000	(1)	17,200	(1)
2/E	8,000	10,000	(1)	11,500	(1)
Elect.	-	-	-	-	-
A.B.	3,500	4,200	(3)	4,800	(3)
Sailer	3,000	3,600	(2)	-	-
Oiler	-	-	-	-	-
Cook	-	-	-	-	-
Total(A)		72,800	(9)	73,900	(7)
Provision					
¥ per Crew	1,500	1,800	× (9)	2,060	× (7)
¥ per Vessel(B)		16,200		14,420	

Crew Expenses per Vessel per Year	
	Formula: (14A+12B)×1.3
1987	(14× 72,800+12×16,200)×1.3=1,578,000
1988	(14× 77,900+12×17,400)×1.3=1,690,000
1989	(14× 73,900+12×14,400)×1.3=1,570,000
1990	(14× 79,100+12×15,400)×1.3=1,680,000
1991	(14× 84,600+12×16,500)×1.3=1,797,000
1992	(14×.90,600+12×17,700)×1.3=1,924,000
1993	(14× 96,900+12×18,900)×1.3=2,059,000
1994	(14×103,700+12×20,200)×1.3=2,202,000
1995	(14×110,900+12×21,600)×1.3=2,356,000
1996	(14×118,700+12×23,100)×1.3=2,521,000
Total for 10 years	19,377,000

Increase Ratio 1983~1987 (4 years): 5%
1988~1996 (9 years): 7%

Table A.13-1(3) Break Down of Crew Cost

(700 DWT Type General Cargo Vessel)

Case 3,6,9 and 12

Unit: ₿ per Vessel

year	1983	1987		1989		Crew Expenses per Vessel per Year Formula: (14A+12B)×1.3	
	Wages per Month	Wages per Month	(Number of Crew)	Wages per Month	(Number of Crew)		
Capt.	13,000	16,000	(1)	18,300	(1)	1987	(14×61,600+12×12,600)×1.3=1,318,000
C/O	8,000	10,000	(1)	11,400	(1)	1988	(14×65,900+12×13,500)×1.3=1,410,000
C/E	11,500	14,000	(1)	16,000	(1)		
2/E	7,000	9,000	(1)	-	-	1989	(14×55,300+12×10,300)×1.3=1,167,000
Elect.	-	-	-	-	-	1990	(14×59,200+12×11,000)×1.3=1,249,000
A.B.	3,500	4,200	(3)	4,800	(2)	1991	(14×63,300+12×11,800)×1.3=1,336,000
Sailer	-	-	-	-	-	1992	(14×67,700+12×12,600)×1.3=1,429,000
Oiler	-	-	-	-	-	1993	(14×72,500+12×13,500)×1.3=1,530,000
Cook	-	-	-	-	-	1994	(14×77,600+12×14,400)×1.3=1,637,000
Total(A)		61,600	(7)	55,300	(5)	1995	(14×83,000+12×15,500)×1.3=1,752,000
Provision						1996	(14×88,800+12 16,500)×1.3=1,874,000
₿ per Crew	1,500	1,800	× (7)	2,060	× (5)		
₿ per Vessel(B)		12,600		10,300		Total for 10 years	14,702,000

Increase Ratio 1983~1987 (4 years): 5%
1988~1996 (9 years): 7%

Table A.13-1(4) Break Down of Crew Cost

(RoRo Ship)

Case 13 and 14

Unit: ₿ per Vessel

year	1983	1987		1989	
	Wages per Month	Wages per Month	(Number of Crew)	Wages per Month	(Number of Crew)
Capt.	20,000	24,000	(1)	27,500	(1)
C/O	12,000	15,000	(1)	17,000	(1)
2/O	9,000	11,000	(1)	12,600	(1)
3/O	8,000	10,000	(1)	11,400	(1)
C/E	18,000	22,000	(1)	25,200	(1)
2/E	11,000	13,000	(1)	15,300	(1)
3/E	9,000	11,000	(1)	12,600	(1)
Elect.	5,000	6,000	(1)	6,900	(1)
R/O	10,000	12,000	(1)	13,700	(1)
Boatswain	4,000	5,000	(1)	5,700	(1)
A.B.	3,500	4,200	(4)	4,800	(4)
Sailer	3,000	3,600	(5)	4,100	(5)
No. 1 Oiler	4,000	5,000	(1)	5,700	(1)
Oiler	3,500	4,200	(3)	4,800	(3)
Chief Cook	4,000	5,000	(1)	5,700	(1)
Cook	3,500	4,200	(1)	4,800	(1)
Steward	3,000	3,600	(1)	4,100	(1)
Total(A)		194,200	(26)	222,300	(26)
Provision ₿ per Crew	1,500	1,800	× (26)	2,060	× (26)
₿ per Vessel(B)		46,800		53,560	

Increase Ratio 1983∿1987 (4 years): 5%
1988∿1996 (9 years): 7%

Crew Expenses per Vessel per Year Formula: (14A+12B)×1.3	
1987	(14×194,200+12×46,800)×1.3=4,265,000
1988	(14×207,800+12×50,100)×1.3=4,564,000
1989	(14×222,300+12×53,600)×1.3=4,882,000
1990	(14×237,900+12×57,400)×1.3=5,225,000
1991	(14×254,600+12×61,400)×1.3=5,592,000
1992	(14×272,400+12×65,700)×1.3=5,983,000
1992	(14×291,500+12×70,300)×1.3=6,402,000
1993	(14×311,900+12×75,200)×1.3=6,850,000
1994	(14×333,700+12×80,500)×1.3=7,329,000
1995	(14×357,100+12×86,100)×1.3=7,842,000
Total for 10 years	

Table A.13-1 (5) Break Down of Crew Cost

(1,000 DWT Pusher-Barge-System)

Case 15

Unit: ¥ per Pusher

year	1983	1987		1989		Crew Expenses per Vessel per Year Formula: (14A+12B)×1.3	
	Wages per Month	Wages per Month	(Number of Crew)	Wages per Month	(Number of Crew)		
Capt.	13,000	16,000	(1)	18,300	(1)	1987	(14× 71,200+12×18,600)×1.3=1,586,000
C/O	8,000	10,000	(1)	11,400	(1)	1988	(14× 76,200+12×19,900)×1.3=1,697,000
2/O	5,000	6,000	(1)	6,900	(1)		
C/E	115,000	14,000	(1)	16,000	(1)	1989	(14× 76,800+12×19,300)×1.3=1,699,000
Elect.	-	-	-	-	-	1990	(14× 82,200+12×20,700)×1.3=1,819,000
A.B.	3,500	4,200	(4)	4,800	(3)	1991	(14× 87,900+12×22,100)×1.3=1,945,000
Sailer	3,000	3,600	(2 1/3)	4,200	(2 1/3)	1992	(14× 94,100+12×23,600)×1.3=2,081,000
Oiler	-	-	-	-	-	1993	(14×100,700+12×25,300)×1.3=2,227,000
Cook	-	-	-	-	-	1994	(14×107,700+12×27,100)×1.3=2,383,000
Total(A)	-	71,200	(10 1/3)	76,800	(9 1/3)	1995	(14×115,300+12×29,000)×1.3=2,551,000
Provision						1996	(14×123,300+12×31,000)×1.3=2,728,000
¥ per Crew	1,500	1,800 ×	(10 1/3)	2,060 ×	(9 1/3)		
¥ per Vessel(B)		18,600		19,300		Total for 10 years	20,716,000

Increase Ratio 1983∿1987 (4 years): 5%
1988∿1996 (9 years): 7%

Table A.13-2 (1/2) Current and Projected Crew Wages

(Current Crew Wages)

SOURCE: Field Survey, On Aug. 1983 ~ Mar. 1984

	Trade area	Size/kind of vessel	Capt.	C/O	2/O	3/O	4/O	C/E	2/E	3/E	4/E	Elect.	R/O	Boswain No.1 oil	A.B. oiler	Sailor wipper	Total	Food Allowance ¥/Crew/Mos
60 ~ 500 GT	HOME LIMITED	Wooden cargo vessel 180 ~ 320 GT	4,000 ~ 6,500	3,000 ~ 3,500				3,000 ~ 4,000						(2) 2,500 ~ 3,000	(6) 2,000 ~ 2,500		11	600
	HOME LIMITED	Steel cargo vessel 300 ~ 500 GT	18,000	15,000	8,000	5,000		16,000	8,000	6,000			8,000	(2) 4,000	(7) 3,000	-	19	700
	LOCAL	Tug boat 250 ~ 450 HP	3,500 ~ 3,800					2,000 ~ 2,500							(2) 1,500 ~ 2,000		4	500
501 ~ 1000 GT	HOME	Steel cargo vessel 650 GT	B 15,000	C 10,000	D 8,000			B 15,000	C 9,000	D 7,000			8,000	(2) 5,000	(6) 3,500	(4) 3,000	19	Officer 1800 Rating 1200
	HOME LIMITED	Tanker 830 GT	D 7,200	D 4,500	D 2,500			C 5,600	C 3,600	D 2,500					(6) 2,200	(5) 1,800	17	1050
1001 ~ 2000 GT	HOME	Steel cargo vessel 1050 GT	A 18,000	D 15,000	D 8,000	5,000		A 16,000	C 8,000	D 6,000			8,000	(2) 4,000	(7) 3,000		17	
	HOME	Steel cargo vessel 1000 ~ 1600 GT	12,500 ~ 16,000	6,000 ~ 8,000	4,500 ~ 6,500			8,000 ~ 10,000	6,000 ~ 8,000			3,000 ~ 4,000	6,500 ~ 8,000	(2) 2,800 ~ 3,200	(8) 2,100 ~ 2,300	(3) 1,900 ~ 2,000	20	
	HOME	Steel cargo vessel 1000 ~ 3000 GT	16,000 ~ 20,000	11,500 ~ 16,000				14,500 ~ 19,500	10,300 ~ 14,800				11,500	5,700 ~ 8,000	3,400 ~ 5,700	2,300 ~ 3,400		
	HOME	Tanker 2000 GT	A 11,800	D 4,800	D 3,200			A 13,200	C 7,600	D 3,200					(6) 2,600	(12) 2,300	24	885
2000 ~ 5000 GT	FOREIGN LIMITED	Steel cargo vessel 2800 ~ 3600 GT	16,000 ~ 20,000	9,000 ~ 11,000	5,000 ~ 8,000			15,000 ~ 20,000	7,000 ~ 8,000			3,500 ~ 4,000	8,000 ~ 10,000	3,000 ~ 4,200	(9) 2,300 ~ 2,800	(7) 2,000 ~ 2,300	25	Officer 2400 ~ 3300 Rating 1200
	FOREIGN LIMITED	-do- 2940 GT	A 20,000	B 12,000	C 10,000	8,000		B 20,000	B 12,000	C 8,000	6,000		10,000	(2) 5,000	(7) 3,500	(5) 3,000	23	Officer 1800 Rating 1200
Over 5000 GT	FOREIGN	-do- 5800 GT	A 32,000	B	B	C	D(2)	A	B	C	D(2)	(2)	(1)	(3)	(9)	(7)	33	Officer 2400 Rating 1800
	FOREIGN	-do- 11000 GT	A	B	C	C	(3)	A	B	C	(3)	(2)	(1)	(3)	(11)	(9)	39	
	"	5000 GT	18,000	12,000	8,000	6,000		17,000	12,000	8,000				3,000 ~ 4,000	3,000	2,400 ~ 3,000		
	FOREIGN	-do- 10000 ~ 40000 GT	45,000 ~ 57,000	22,000 ~ 34,000	16,000 ~ 22,000	11,400 ~ 16,000		41,000 ~ 52,000	20,000 ~ 32,000	16,000 ~ 20,000	11,400 ~ 16,000		16,000 ~ 20,000	8,000 ~ 9,000	7,000 ~ 8,000	3,500 ~ 5,700		

Table A.13-2 (2/2) Current and Projected Crew Wages

(Projected crew wages)

Vessel Planed by the Study Team	Local Trade Area Vessel	Cargo vessel 1500 DN	18,000	12,000				16,000	11,000			(0)∿(1) 5,000		(0)∿(1) 4,000	(3) 3,500	(2)∿(4) 3,000	9∿13	≧1500
		-do- 1000 DN	17,000	11,000				15,000	10,000						(3) 3,500	(0)∿(2) 3,000	7∿9	-do-
		-do- 700 DN	16,000	10,000				14,000	(10)∿(11) 9,000						(2)∿(3) 3,500		5∿7	-do-
		Pusher tug for 1000 DN	15,000	8,000	5,000			13,000							(4) 3,500		8	-do-

A: Foreign Trade Master or 1st Class Engineer Certificates
B: Foreign Chief Mate or 2nd Class Engineer Certificates
C: Foreign Trade 2nd Mate or 3rd Class Engineer Certificates
D: Local Trade Master or Special Class Eng-driver Certificates

Table A.13-3 Administrative Expenses
(Overhead)

1. Organization

	G. Affairs	Traffic & Sales	Marine & Maintenance	
Managing directors (2)				2
Manager	(1)	(1)	(1)	3
Staff	(2)	(5)	(3)	10
Driver	(2)			2
Maid	(2)			2
Total	7	6	4	17+2

2. Office space 80 m^2 × 200 ฿ = 16,000 ฿/month
192,000 ฿/year
(Deposit 16,000 ∿ 32,000 ฿)

3. Personal expenditures

Managing director	30,000 ฿ × 2 =	60,000 ฿/month
Manager	15,000 ฿ × 3 =	45,000 ฿/ "
Staff	5,000 ฿ × 10 =	50,000 ฿/ "
Others	3,000 ฿ × 4 =	12,000 ฿/ "
Total		167,000 ฿/ "
Bonus of 2 months	167,000 ฿ × 14 =	2,338,000 ฿
Retirement allowance and others - 3%	2,338,000 × 1.03 =	2,408,140 ฿/yen

4. Office equipment 500,000 ฿
Depreciation over 5 years 50,000 ฿/year

5. Hear, Light and water expenses at 10,000 ฿/month
120,000 ฿/year

6. Car, 2 units at 300,000 ฿ × 2 = 600,000
Depreciation over 10 years 60,000 ฿
Gas/Maintenance at 5,000 × 2 × 12 = 120,000
180,000 ฿/year

7.	Communications at 20,000 ฿/month (Tel./Telex)		240,000 ฿/year
8.	Transportation and others 5,000 ฿/month		60,000 ฿/year
9.	Entertainment at 10,000 ฿/month		120,000 ฿/year
10.	Other expenses at 10,000 ฿/month		120,000 ฿/year
	Office Expenses Total	2 ∿ 10	3,490,140 ฿/year

Table A.13-4 Profit after Depreciation of Fleet Bases during 10 Years, Based on ETO Tariffes

Unit: ₿ 1,000

Case	1	2	3	4	5	6	7	8
Type of ships	GCS 1500TS (100%)	GCS 1000TS (100%)	GCS 700TS (100%)	GCS 1500TS (100%)	GCS 1000TS (100%)	GCS 700TS (100%)	GCS 1500TS (50%)	GCS 1000TS (50%)
Route / Year	BK-SK-BK	BK-SK-BK	BK-SK-BK	BK-SK-ST -BK	BK-SK-ST -BK	BK-SK-ST -BK	BK-SK-ST	BK-SK-BK
1	28,148	25,746	23,702	14,833	2,750	-8,190	40,108	40,422
2	30,232	28,098	25,669	17,570	5,640	-5,798	41,436	41,844
3	33,792	31,836	29,981	22,890	10,800	897	44,248	44,658
4	35,920	34,182	31,990	25,648	13,610	3,341	45,616	46,080
5	37,980	36,474	33,943	28,301	16,300	5,590	46,924	47,454
6	42,220	41,168	38,206	33,803	21,870	10,647	50,408	51,222
7	46,572	45,972	42,602	39,403	27,560	15,808	54,016	55,098
8	51,060	50,928	47,138	45,143	33,340	21,060	57,748	59,130
9	55,680	56,010	51,772	51,023	39,230	26,364	61,612	63,288
10	59,336	59,880	55,307	55,097	42,980	29,458	65,068	66,912
Total	420,940	410,292	380,310	333,711	214,080	99,177	507,184	516,108

Unit = ¥ 1,000

9	10	11	12	13	14	15
GCS 700TS (50%)	GCS 1500TS (50%)	GCS 1000TS (50%)	GCS 700TS (50%)	RORO (100%)	RORO (50%)	Barge (100%)
BK-SK-BK	BK-SK-ST -BK	BK-SK-ST -BK	BK-SK-ST -BK	BK-SK-BK	BK-SK-BK	BK-SK-BK
37,009	35,763	27,210	16,523	-81,252	-5,166	31,355
38,143	37,177	28,550	17,368	-72,048	-756	33,335
41,615	41,188	32,170	22,503	-63,000	3,501	35,639
42,784	42,616	33,440	23,387	-54,126	7,581	37,587
43,904	43,953	34,600	24,089	-45,450	11,463	39,505
47,327	48,132	38,630	27,586	-32,166	19,950	43,408
50,876	52,430	42,770	31,174	-18,717	28,602	47,559
54,572	56,847	47,010	34,866	-5,106	37,422	51,782
58,373	61,404	51,360	38,623	8,682	46,419	56,146
61,684	65,128	54,700	41,301	15,624	52,083	59,729
476,287	484,638	390,440	277,420	-347,559	201,099	436,105

Table A.13-5 (1) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case I

Unit = ₱ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	19698	20289	20898	21525	22171	23280	24444	25666	26949	28296	233216
(b) Operating ex											
(1) Port charge	264	269	275	280	286	291	297	303	309	316	2890
(2) Stevedorage	3637	3819	4010	4210	4421	4642	4874	5118	5374	5642	45747
(3) Fuel	2901	3046	4198	3358	3526	3702	3888	4082	4286	4500	36487
(4) Agency fee	591	609	627	646	665	698	733	770	809	849	6997
(5) Other exp.	985	1015	1045	1076	1108	1163	1221	1282	1346	1413	11654
(6) Total	8378	8758	9155	9570	10006	10496	11013	11555	12124	12720	103775
(c) Ope. profit (a) - (b)	11320	11531	11743	11955	12165	12784	13431	14111	14825	15576	129441
(d) Vessel ex											
(1) Crew cost	1979	2119	1888	2020	2161	2312	2474	2647	2832	3030	23462
(2) Maintenance	691	726	762	800	840	882	926	972	1021	1072	8692
(3) Insurance	346	346	346	346	346	346	346	346	346	346	3460
(4) Adm. exp.	1010	1060	1114	1169	1228	1289	1353	1421	1492	1567	12703
(5) Others	691	726	762	800	840	882	926	972	1021	1072	8692
(6) Total	4717	4977	4872	5135	5415	5711	6025	6358	6712	7087	57009
(e) Interest	3214	2837	2461	2083	1707	1330	954	577	200	100	15463
(f) Pro bef dep (c)-(d+e)	3389	3717	4410	4737	5043	5743	6452	7176	7913	8389	56969
(g) Depreciation	2765	2765	2765	2765	2765	2765	2765	2765	2765	2765	27650
(h) Pro aft dep (f)-(g)	624	952	1645	1972	2278	2978	3687	4411	5148	5624	29319
(i) Income tax	250	381	658	789	911	1191	1475	1764	2059	2250	11728
(j) Profit (h)-(i)	374	571	987	1183	1367	1787	2212	2647	3089	3374	17591

Table A.13-5 (2) Profit after Depreciation Per Vessel during 10 Years, Based on Prevaling Market Rates

Case 2

Unit = ₤ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	14604	15042	15493	15958	16437	17259	18122	19028	19979	20978	172900
(b) Operating ex											
(1) Port charge	245	250	255	260	265	270	276	281	287	293	2682
(2) Stevedorage	2696	2831	2972	3121	3277	3441	3613	3794	3983	4182	33910
(3) Fuel	2401	2521	2647	2779	2918	3064	3218	3378	3547	3725	30198
(4) Agency fee	438	451	465	479	493	518	544	571	600	630	5189
(5) Other exp.	730	752	775	798	822	863	906	951	999	1049	8645
(6) Total	6510	6805	7114	7437	7775	8156	8557	8975	9416	9879	80624
(c) Ope. profit (a)-(b)	8094	8237	8379	8521	8662	9103	9565	10053	10563	11099	92276
(d) Vessel ex. (1) Crew cost	1578	1690	1570	1680	1798	1924	2059	2203	2357	2522	19381
(2) Maintenance	565	593	623	654	687	721	757	795	835	876	7106
(3) Insurance	283	283	283	283	283	283	283	283	283	283	2830
(4) Adm. exp.	673	707	742	779	818	859	902	947	994	1044	8465
(5) Others	565	593	623	654	687	721	757	795	835	876	7106
(6) Total	3664	3866	3841	4050	4273	4508	4758	5023	5304	5601	44888
(e) Interest	2630	2321	2013	1705	1397	1089	780	472	164	82	12653
(f) Pro bef dep (c)-(d+e)	1800	2050	2525	2766	2992	3506	4027	4558	5095	5416	34735
(g) Depreciation	2262	2262	2262	2262	2262	2262	2262	2262	2262	2262	22620
(h) Pro aft dep (f)-(g)	-462	-212	263	504	730	1244	1765	2296	2833	3154	12115
(i) Income tax	0	0	105	202	292	498	706	918	1133	1262	5116
(j) Profit (h)-(i)	-462	-212	158	302	438	746	1059	1378	1700	1892	6999

Table A.13-5 (3) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 3

Unit = ฿ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	12227	12594	12972	13361	13762	14450	15173	15932	16729	17565	144765
(b) Operating ex											
(1) Port charge	76	78	79	81	82	84	86	87	89	91	833
(2) Stevedorage	2257	2370	2488	2613	2743	2881	3025	3176	3335	3501	28389
(3) Fuel	2710	2845	2988	3137	3294	3459	3632	3813	4004	4204	34086
(4) Agency fee	367	378	389	401	413	434	456	479	503	528	4348
(5) Other exp.	611	629	648	667	687	721	757	795	835	877	7227
(6) Total	6021	6300	6592	6899	7219	7579	7956	8350	8766	9201	74883
(c) Ope. profit (a)-(b)	6206	6294	6380	6462	6543	6871	7217	7582	7963	8364	69882
(d) Vessel ex											
(1) Crew cost	1318	1410	1167	1249	1336	1430	1530	1637	1752	1875	14704
(2) Maintenance	440	462	485	509	535	562	590	619	650	683	5535
(3) Insurance	220	220	220	220	220	220	220	220	220	220	2200
(4) Adm. exp.	577	606	636	668	701	736	773	812	852	895	7256
(5) Others	440	462	485	509	535	562	590	619	650	683	5535
(6) Total	2995	3160	2993	3155	3327	3510	3703	3907	4124	4356	35230
(e) Interest	2045	1806	1566	1326	1087	847	607	367	128	64	9843
(f) Pro bef dep (c)-(d+e)	1166	1328	1821	1981	2129	2514	2907	3308	3711	3944	24809
(g) Depreciation	1759	1759	1759	1759	1759	1759	1759	1759	1759	1759	17590
(h) Pro aft dep (f)-(g)	-593	-431	62	222	370	755	1148	1549	1952	2185	7219
(i) Income tax	0	0	25	89	148	302	459	620	781	874	3298
(j) Profit (h)-(i)	-593	-431	37	133	222	453	689	929	1171	1311	3921

Table A.13-5 (4) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 4

Unit = ₩ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	14845	15290	15749	16221	16708	17543	18420	19341	20308	21323	175748
(b) Operating ex											
(1) Port charge	246	251	256	261	266	272	277	283	288	294	2694
(2) Stevedorage	3158	3316	3482	3656	3839	4030	4232	4444	4666	4899	39722
(3) Fuel	2901	3046	3198	3358	3526	3702	3888	4082	4286	4500	36487
(4) Agency fee	445	458	472	436	501	526	552	580	609	639	5268
(5) Other exp.	742	764	787	811	835	877	921	967	1015	1066	8785
(6) Total	7492	7835	8195	8572	8967	9407	9870	10356	10864	11398	92956
(c) Ope. profit (a)-(b)	7353	7455	7554	7649	7741	8136	8550	8985	9444	9925	82792
(d) Vessel ex											
(1) Crew cost	1979	2119	1888	2020	2161	2312	2474	2647	2832	3030	23462
(2) Maintenance	691	726	762	800	840	882	926	972	1021	1072	8692
(3) Insurance	346	346	346	346	346	346	346	346	346	346	3460
(4) Adm. exp.	577	606	636	668	701	736	773	812	852	895	7256
(5) Others	691	726	762	800	840	882	926	972	1021	1072	8692
(6) Total	4284	4523	4394	4634	4888	5158	5445	5749	6072	6415	51562
(e) Interest	3214	2837	2461	2083	1707	1330	954	577	200	100	15463
(f) Pro bef dep (c)-(d+e)	-145	95	699	932	1146	1648	2151	2659	3172	3410	15767
(g) Depreciation	2765	2765	2765	2765	2765	2765	2765	2765	2765	2765	27650
(h) Pro aft dep (f)-(g)	-2910	-2670	-2066	-1833	-1619	-1117	-614	-106	407	645	-11883
(i) Income tax	0	0	0	0	0	0	0	0	163	258	421
(j) Profit (h)-(i)	-2910	-2670	-2066	-1833	-1619	-1117	-614	-106	244	387	-12304

Table A.13-5 (5) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 5

Unit = ฿ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	10611	10929	11257	11595	11943	12540	13167	13825	14516	15242	125625
(b) Operating ex											
(1) Port charge	214	218	223	227	232	236	241	246	251	256	2344
(2) Stevedorage	2257	2370	2488	2613	2743	2881	3025	3176	3335	3501	28389
(3) Fuel	2323	2439	2561	2689	2824	2965	3113	3269	3432	3604	29219
(4) Agency fee	318	328	338	348	358	376	395	415	436	458	3770
(5) Other exp.	531	547	563	580	597	627	658	691	726	762	6282
(6) Total	5643	5902	6173	6457	6754	7085	7432	7797	8180	8581	70004
(c) Ope. profit (a)-(b)	4968	5027	5084	5138	5189	5455	5735	6028	6336	6661	55621
(d) Vessel ex											
(1) Crew cost	1578	1690	1570	1680	1798	1924	2059	2203	2357	2522	19381
(2) Maintenance	565	593	623	654	687	721	757	795	835	876	7106
(3) Insurance	283	283	283	283	283	283	283	283	283	283	2830
(4) Adm. exp.	404	424	445	468	491	516	541	568	597	627	5081
(5) Others	565	593	623	654	687	721	757	795	835	876	7106
(6) Total	3395	3583	3544	3739	3946	4165	4397	4644	4907	5184	51504
(e) Interest	2630	2321	2013	1705	1397	1089	780	472	164	82	12653
(f) Pro bef dep (c)-(+e)	-1057	-877	-473	-306	-154	201	558	912	1265	1395	1464
(g) Depreciation	2262	2262	2262	2262	2262	2262	2262	2262	2262	2262	22620
(h) Pro aft dep	-3319	-3139	-2735	-2568	-2416	-2061	-1704	-1350	-997	-867	-21156
(i) Income tax	0	0	0	0	0	0	0	0	0	0	0
(j) Profit (h)-(i)	-3319	-3139	-2735	-2568	-2416	-2061	-1704	-1350	-997	-867	-21156

Table A.13-5 (6) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 6

Unit = ₿ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	8004	8244	8491	8746	9008	9458	9931	10428	10949	11496	94755
(b) Operating ex											
(1) Port charge	79	81	82	84	86	87	89	91	93	94	866
(2) Stevedorage	1703	1788	1878	1971	2070	2174	2282	2396	2516	2642	21420
(3) Fuel	2390	2509	2635	2767	2905	3050	3203	3363	3531	3708	30061
(4) Agency fee	240	247	254	262	270	284	298	313	329	345	2842
(5) Other exp.	400	412	424	437	450	473	497	522	548	575	4738
(6) Total	4812	5037	5273	5521	5781	6068	6369	6685	7017	7364	59927
(c) Ope. profit (a)-(b)	3192	3207	3218	3225	3227	3390	3562	3743	3932	4132	34828
(d) Vessel ex											
(1) Crew cost	1318	1410	1167	1249	1336	1430	1530	1637	1752	1875	14704
(2) Maintenance	440	462	485	509	535	562	590	619	650	683	5535
(3) Insurance	220	220	220	220	220	220	220	220	220	220	2200
(4) Adm. exp.	311	327	343	360	378	397	417	438	459	482	3912
(5) Others	440	462	485	509	535	562	590	619	650	683	5535
(6) Total	2729	2881	2700	2847	3004	3171	3347	3533	3731	3943	31886
(e) Interest	2045	1806	1566	1326	1087	847	607	367	128	64	9843
(f) Pro bef dep (c)-(d+e)	-1582	-1480	-1048	-948	-864	-628	-392	-157	73	125	-6901
(g) Depreciation	1759	1759	1759	1759	1759	1759	1759	1759	1759	1759	17590
(h) Pro aft dep (f)-(g)	-3341	-3239	-2807	-2707	-2623	-2387	-2151	-1916	-1686	-1634	-24491
(i) Income tax	0	0	0	0	0	0	0	0	0	0	0
(j) Profit (h)-(i)	-3341	-3239	-2807	-2707	-2623	-2387	-2151	-1916	-1686	-1634	-24491

Table A.13-5 (7) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 7

Unit = ₱ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	19698	20289	20898	21525	22171	23280	24444	25666	26949	28296	233216
(b) Operating ex											
(1) Port charge	264	269	275	280	286	291	297	303	309	316	2890
(2) Stevedorage	3637	3819	4010	4210	4421	4642	4874	5118	5374	5642	45747
(3) Fuel	2901	3046	3198	3358	3526	3702	3888	4082	4286	4500	36487
(4) Agency fee	591	609	627	646	665	698	733	770	809	849	6997
(5) Other exp.	985	1015	1045	1076	1108	1163	1221	1282	1346	1413	11654
(6) Total	8378	8758	9155	9570	10006	10496	11013	11555	12124	12720	103775
(c) Ope. profit (a)-(b)	11320	11531	11743	11955	12165	12784	13431	14111	14825	15576	129441
(d) Vessel ex											
(1) Crew cost	1979	2119	1888	2020	2161	2312	2474	2647	2832	3030	23462
(2) Maintenance	691	726	762	800	840	882	926	972	1021	1072	8692
(3) Insurance	346	346	346	346	346	346	346	346	346	346	3460
(4) Adm. exp.	1010	1060	1114	1169	1228	1289	1353	1421	1492	1567	12703
(5) Others	691	726	762	800	840	882	926	972	1021	1072	8692
(6) Total	4717	4977	4872	5135	5415	5711	6025	6358	6712	7087	57009
(e) Interest	1607	1419	1230	1042	854	666	476	288	100	50	7732
(f) Pro bef dep (c)-(d+e)	4996	5135	5641	5778	5896	6407	6930	7465	8013	8439	64700
(g) Depreciation	1382	1382	1382	1382	1382	1382	1382	1382	1382	1382	13820
(h) Pro aft dep (f)-(g)	3614	3753	4259	4396	4514	5025	5548	6083	6631	7057	50880
(i) Income tax	1446	1501	1704	1758	1806	2010	2219	2433	2652	2823	20352
(j) Profit (h)-(i)	2168	2252	2555	2638	2708	3015	3329	3650	3979	4234	30528

Table A.13-5 (8) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 8

Unit = ₩ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	14604	15042	15493	15958	16437	17259	18122	19028	19979	20978	172900
(b) Operating ex											
(1) Port charge	245	250	255	260	265	270	276	281	287	293	2682
(2) Stevedorage	2696	2831	2972	3121	3277	3441	3613	3794	3983	4182	33910
(3) Fuel	2401	2521	2647	2779	2918	3064	3218	3378	3547	3725	30198
(4) Agency fee	438	451	465	479	493	518	544	571	600	630	5189
(5) Other exp.	730	752	775	798	822	863	906	951	999	1049	8645
(6) Total	6510	6805	7114	7437	7775	8156	8557	8975	9416	9879	80624
(c) Ope. profit (a)-(b)	8094	8237	8379	8521	8662	9103	9565	10053	10563	11099	92276
(d) Vessel ex											
(1) Crew cost	1578	1690	1570	1680	1798	1924	2059	2203	2357	2522	19381
(2) Maintenance	565	593	623	654	687	721	757	795	835	876	7106
(3) Insurance	283	283	283	283	283	283	283	283	283	283	2830
(4) Adm. exp.	673	707	742	779	818	859	902	947	994	1044	8465
(5) Others	565	593	623	654	687	721	757	795	835	876	7106
(6) Total	3664	3866	3841	4050	4273	4508	4758	5023	5304	5601	44888
(e) Interest	1315	1161	1007	853	698	544	390	236	82	41	6327
(f) Pro bef dep	3115	3210	3531	3618	3691	4051	4417	4794	5177	5457	41061
(g) Depreciation	1131	1131	1131	1131	1131	1131	1131	1131	1131	1131	11310
(h) Pro aft dep (f)-(g)	1984	2079	2400	2487	2560	2920	3286	3663	4046	4326	29751
(i) Income tax	794	832	960	995	1024	1168	1314	1465	1618	1730	11900
(j) Profit (h)-(i)	1190	1247	1440	1492	1536	1752	1972	2198	2428	2596	17851

Table A.13-5 (9) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 9

Unit = ₱ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	12227	12594	12972	13361	13762	14450	15173	15932	16729	17565	144765
(b) Operating ex											
(1) Port charge	76	78	79	81	82	84	86	87	89	91	833
(2) Stevedorage	2257	2370	2488	2613	2743	2881	3025	3176	3335	3501	28389
(3) Fuel	2710	2845	2988	3137	3294	3459	3632	3813	4004	4204	34086
(4) Agency fee	367	378	389	401	413	434	456	479	503	528	4348
(5) Other exp.	611	629	648	667	687	721	757	795	835	877	7227
(6) Total	6021	6300	6592	6899	7219	7579	7956	8350	8766	9201	74883
(c) Ope. profit (a)-(b)	6206	6294	6380	6462	6543	6871	7217	7582	7963	8364	69882
(d) Vessel ex											
(1) Crew cost	1318	1410	1167	1249	1336	1430	1530	1637	1752	1875	14704
(2) Maintenance	440	462	485	509	535	562	590	619	650	683	5535
(3) Insurance	220	220	220	220	220	220	220	220	220	220	2200
(4) Adm. exp.	577	606	636	668	701	736	773	812	852	895	7256
(5) Others	440	462	485	509	535	562	590	619	650	683	5535
(6) Total	2995	3160	2993	3155	3327	3510	3703	3907	4124	4356	35230
(e) Interest	1023	903	783	663	543	423	304	184	64	32	4922
(f) Pro bef dep (c)-(d+e)	2188	2231	2604	2644	2673	2938	3210	3491	3775	3976	29730
(g) Depreciation	880	880	880	880	880	880	880	880	880	880	8800
(h) Pro aft dep (f)-(g)	1308	1351	1724	1764	1793	2058	2330	2611	2895	3096	20930
(i) Income tax	523	540	690	706	717	823	932	1044	1158	1238	8371
(j) Profit (h)-(i)	785	811	1034	1058	1076	1235	1398	1567	1737	1858	12559

Table A.13-5 (10) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 10

Unit = ฿ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	14845	15290	15749	16221	16708	17543	16420	19341	20308	21323	175748
(b) Operating ex											
(1) Port charge	246	251	256	261	266	272	277	283	288	294	2694
(2) Stevedorage	3158	3316	3482	3656	3839	4030	4232	4444	4666	4899	39722
(3) Fuel	2901	3046	3198	3358	3526	3702	3888	4082	4286	4500	36487
(4) Agency fee	445	458	472	486	501	526	552	580	609	639	5268
(5) Other exp.	742	764	787	811	835	877	921	967	1015	1066	8785
(6) Total	7492	7835	8195	8572	8967	9407	9870	10356	10864	11398	92956
(c) Ope. profit (a)-(b)	7353	7455	7554	7649	7741	8136	8550	8985	9444	9925	82792
(d) Vessel ex											
(1) Crew cost	1979	2119	1888	2020	2161	2312	2474	2647	2832	3030	23462
(2) Maintenance	691	726	762	800	840	882	926	972	1021	1072	8692
(3) Insurance	346	346	346	346	346	346	346	346	346	346	3460
(4) Adm. exp.	577	606	636	668	701	736	773	812	852	895	7256
(5) Others	691	726	762	800	840	882	926	972	1021	1072	8692
(6) Total	4284	4523	4394	4634	4888	5158	5445	5749	6072	6415	51562
(e) Interest	1607	1419	1230	1042	854	666	476	288	100	50	7732
(f) Pro bef dep (c)-(d+e)	1462	1513	1930	1973	1999	2312	2629	2948	3272	3460	23498
(g) Depreciation	1382	1382	1382	1382	1382	1382	1382	1382	1382	1382	13820
(h) Pro aft dep (f)-(g)	80	131	548	591	617	930	1247	1566	1890	2078	9678
(i) Income tax	32	52	219	236	247	372	499	626	756	831	3870
(j) Profit (h)-(i)	48	79	329	355	370	558	748	940	1134	1247	5808

Table A.13-5 (11) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 11

Unit = ₿ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	10611	10929	11257	11595	11943	12540	13167	13825	14516	15242	125625
(b) Operating ex											
(1) Port charge	214	218	223	227	232	236	241	246	251	256	2344
(2) Stevedorage	2257	2370	2488	2613	2743	2881	3025	3176	3335	3501	28389
(3) Fuel	2323	2439	2561	2689	2824	2965	3113	3269	3432	3604	29219
(4) Agency fee	318	328	338	348	358	376	395	415	436	458	3770
(5) Other exp.	531	547	563	580	597	627	658	691	726	762	6282
(6) Total	5643	5902	6173	6457	6754	7085	7432	7797	8180	8581	70004
(c) Ope. profit (a)-(b)	4968	5027	5084	5138	5189	5455	5735	6028	6336	6661	55621
(d) Vessel ex											
(1) Crew cost	1578	1690	1570	1680	1798	1924	2059	2203	2357	2522	19381
(2) Maintenance	565	593	623	654	687	721	757	795	835	876	7106
(3) Insurance	283	283	283	283	283	283	283	283	283	283	2830
(4) Adm. exp.	404	424	445	468	491	516	541	568	597	627	5081
(5) Others	565	593	623	654	687	721	757	795	835	876	7106
(6) Total	3395	3583	3544	3739	3946	4165	4397	4644	4907	5184	41504
(e) Interest	1315	1161	1007	853	698	544	390	236	82	41	6327
(f) Pro bef dep (c)-(d+e)	258	283	533	546	545	146	948	1148	1347	1436	7790
(g) Depreciation	1131	1131	1131	1131	1131	1131	1131	1131	1131	1131	11310
(h) Pro aft dep	-873	-848	-598	-585	-586	-385	-183	17	216	305	-3520
(i) Income tax	0	0	0	0	0	0	0	7	86	122	215
(j) Profit (h)-(i)	-873	-848	-598	-585	-586	-385	-183	10	130	183	-3735

Table A.13-5 (12) Profit after Depreciation of Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 12

Unit = ₱ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	8004	8244	8491	8746	9008	9458	9931	10428	10949	11496	94755
(b) Operating ex											
(1) Port charge	79	81	82	84	86	87	89	91	93	94	866
(2) Stevedorage	1703	1788	1878	1971	2070	2174	2282	2396	2516	2642	21420
(3) Fuel	2390	2509	2635	2767	2905	3050	3203	3363	3531	3708	30061
(4) Agency fee	240	247	254	262	270	284	298	313	329	345	2842
(5) Other exp.	400	412	424	437	450	473	497	522	548	575	4738
(6) Total	4812	5037	5273	5521	5781	6068	6369	6685	7017	7364	59927
(c) Ope. profit (a)-(b)	3192	3207	3218	3225	3227	3390	3562	3743	3932	4132	34828
(d) Vessel ex											
(1) Crew cost	1318	1410	1167	1249	1336	1430	1530	1637	1752	1875	14704
(2) Maintenance	440	462	485	509	535	562	590	619	650	683	5535
(3) Insurance	220	220	220	220	220	220	220	220	220	220	2200
(4) Adm. exp.	311	327	343	360	378	397	417	438	459	482	3912
(5) Others	440	462	485	509	535	562	590	619	650	683	5535
(6) Total	2729	2881	2700	2847	3004	3171	3347	3533	3731	3943	31886
(e) Interest	1023	903	783	663	543	423	304	184	64	32	4922
(f) Pro bef dep (c)-(d+e)	-560	-577	-265	-285	-320	-204	-89	26	137	157	-1980
(g) Dpreciation	880	880	880	880	880	880	880	880	880	880	8800
(h) Pro aft dep (f)-(g)	-1440	-1457	-1145	-1165	-1200	-1084	-969	-854	-743	-723	-10780
(i) Income tax	0	0	0	0	0	0	0	0	0	0	0
(j) Profit (h)-(i)	-1440	-1457	-1145	-1165	-1200	-1084	-969	-854	-743	-723	-10780

Table A.13-5 (13) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 13

Unit = ₩ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	51520	53066	54658	56298	57987	60886	63930	67127	70483	74007	609962
(b) Operating ex											
(1) Port charge	1731	1766	1801	1837	1874	1911	1949	1988	2028	2069	18954
(2) Stevedorage	0	0	0	0	0	0	0	0	0	0	0
(3) Fuel	25453	26726	28062	29465	30938	32485	34109	35815	37606	39486	320145
(4) Agency fee	1546	1592	1640	1689	1740	1827	1918	2014	2115	2221	18302
(5) Other exp.	2576	2653	2733	2815	2899	3044	3196	3356	3524	3700	30496
(6) Total	31306	32737	34236	35806	37451	39267	41172	43173	45273	47476	387897
(c) Ope. profit (a)-(b)	20214	20329	20422	20492	20536	21619	22758	23954	25210	26531	222065
(d) Vessel ex											
(1) Crew cost	4265	4564	4883	5225	5591	5982	6401	6849	7328	7841	58929
(2) Maintenance	5864	6157	6465	6788	7128	7484	7858	8251	8664	9097	73756
(3) Insurance	2932	2932	2932	2932	2932	2932	2932	2932	2932	2932	29320
(4) Adm. exp.	1347	1414	1485	1559	1637	1719	1805	1895	1990	2090	16941
(5) Others	5864	6157	6465	6788	7128	7484	7858	8251	8664	9097	73756
(6) Total	20272	21224	22230	23292	24416	25601	26854	28178	29578	31057	252702
(e) Interest	27269	24073	20877	17681	14485	11289	8092	4897	1701	850	131214
(f) Pro bef dep (c)-(d+e)	-27327	-24968	-22685	-20481	-18365	-15271	-12188	-9121	-6069	-5376	-161851
(g) Depreciation	23457	23457	23457	23457	23457	23457	23457	23457	23457	23457	234570
(h) Pro aft dep (f)-(g)	-50784	-48425	-46142	-43938	-41822	-38728	-35645	-32578	-29526	-28833	-396421
(i) Income tax	0	0	0	0	0	0	0	0	0	0	0
(j) Profit (h)-(i)	-50784	-48425	-46142	-43938	-41822	-38728	-35645	-32578	-29526	-28833	-396421

Table A.13-5 (14) Profit after Depreciation Per Vessel during 10 Years, Based on Prevailing Market Rates

Case 14

Unit = ₱ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	51520	53066	54658	56298	57987	60886	63930	67127	70483	74007	609962
(b) Operating ex											
(1) Port charge	1731	1766	1801	1837	1874	1911	1949	1988	2028	2069	18954
(2) Stevedorage	0	0	0	0	0	0	0	0	0	0	0
(3) Fuel	25453	26726	28062	29465	30938	32485	34109	35815	37606	39486	320145
(4) Agency fee	1546	1592	1640	1689	1740	1827	1918	2014	2115	2221	18302
(5) Other exp.	2576	2653	2733	2815	2899	3044	3196	3356	3524	3700	30496
(6) Total	31306	32737	34236	35806	37451	39267	41172	43173	45273	47476	387897
(c) Ope. profit	20214	20329	20422	20492	20536	21619	22758	23954	25210	26531	222065
(d) Vessel ex											
(1) Crew cost	4265	4564	4883	5225	5591	5982	6401	6849	7328	7841	58929
(2) Maintenance	5864	6157	6465	6788	7128	7484	7858	8251	8664	9097	73756
(3) Insurance	2932	2932	2932	2932	2932	2932	2932	2932	2932	2932	29320
(4) Adm. exp.	1347	1414	1485	1559	1637	1719	1805	1895	1990	2090	16941
(5) Others	5864	6157	6465	6788	7128	7484	7858	8251	8664	9097	73756
(6) Total	20272	21224	22230	23292	24416	25601	26854	28178	29578	31057	252702
(e) Interest	13635	12037	10438	8840	7242	5645	4047	2449	850	425	65608
(f) Pro bef dep (c)-(d+e)	-13693	-12932	-12246	-11640	-11122	-9627	-8143	-6673	-5218	-4951	-96245
(g) Depreciation	11729	11729	11729	11729	11729	11729	11729	11729	11729	11729	117290
(h) Pro aft dep (f)-(g)	-25422	-24661	-23975	-23369	-22851	-21356	-19872	-18402	-16947	-16680	-213535
(i) Income tax	0	0	0	0	0	0	0	0	0	0	0
(j) Profit (h)-(i)	-25422	-24661	-23975	-23369	-22851	-21356	-19872	-18402	-16947	-16680	-213535

Table A.13-5 (15) Profit after Depreciation of Fleet Bases during 10 years, Based on Prevailing Market Rates

Case 15

Unit = ₱ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	73689	75900	78177	80522	82938	87085	91439	96011	100812	105853	872426
(b) Operating ex											
(1) Port charge	1106	1128	1151	1174	1197	1221	1246	1270	1296	1322	12111
(2) Stevedorage	15246	16008	16809	17649	18532	19458	20431	21453	22525	23652	191763
(3) Fuel	10021	10522	11048	11601	12181	12790	13429	14101	14806	15546	126045
(4) Agency fee	2211	2277	2345	2415	2487	2611	2742	2879	3023	3174	26164
(5) Other exp.	3684	3795	3909	4026	4147	4354	4572	4801	5041	5293	43622
(6) Total	32268	33730	35262	36865	38544	40434	42420	44504	46691	48987	399705
(c) Ope. profit (a)-(b)	41421	42170	42915	43657	44394	46651	49019	51507	54121	56866	472721
(d) Vessel ex											
(1) Crew cost	4758	5091	5097	5454	5836	6245	6682	7150	7651	8187	62151
(2) Maintenance	2315	2431	2552	2680	2814	2955	3102	3257	3420	3591	29117
(3) Insurance	1158	1158	1158	1158	1158	1158	1158	1158	1158	1158	11580
(4) Adm. exp.	4040	4242	4454	4677	4911	5156	5414	5685	5969	6267	50815
(5) Others	2315	2431	2552	2680	2814	2955	3102	3257	3420	3591	29117
(6) Total	14586	15353	15813	16649	17533	18469	19458	20507	21618	22794	182780
(e) Interest	10765	9503	8242	6980	5718	4456	3195	1933	671	336	51799
(f) Pro bef dep (c)-(d+e)	16070	17314	18860	20028	21143	23726	26366	29067	31832	33736	238142
(g) Depreciation	9261	9261	9261	9261	9261	9261	9261	9261	9261	9261	92610
(h) Pro aft dep (f)-(g)	6809	8053	9599	10767	11882	14465	17105	10806	22571	24475	145532
(i) Income tax	2724	3221	3840	4307	4753	5786	6842	7922	9028	9790	58213
(j) Profit (h)-(i)	4085	4832	5759	6460	7129	8679	10263	11884	13543	14685	87319

Table A.13-6 (1) Profit "0" Calculation

Case 1

Unit = B 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	17007	17517	18043	18584	19142	20099	21104	22159	23267	24430	201352
(b) Operating ex											
(1) Port charge	264	269	275	280	286	291	297	303	309	316	2890
(2) Stevedorage	3637	3819	4010	4210	4421	4642	4874	5118	5374	5642	45747
(3) Fuel	2901	3046	3198	3358	3526	3702	3888	4082	4286	4500	36487
(4) Agency fee	510	525	541	557	574	603	633	665	698	733	6030
(5) Other exp.	850	876	902	929	957	1005	1055	1108	1163	1221	10066
(6) Total	8162	8535	8926	9334	9764	10243	10747	11276	11830	12412	101229
(c) Ope. profit (a)-(b)	8845	8982	9117	9250	9378	9856	10357	10883	11437	12018	100123
(d) Vessel ex											
(1) Crew cost	1979	2119	1888	2020	2161	2312	2474	2647	2832	3030	23462
(2) Maintenance	691	726	762	800	840	882	926	972	1021	1072	8692
(3) Insurance	346	346	346	346	346	346	346	346	346	346	3460
(4) Adm. exp.	1010	1060	1114	1169	1228	1280	1353	1421	1492	1567	12703
(5) Others	691	726	762	800	840	882	926	972	1021	1072	8692
(6) Total	4717	4977	4872	5135	5415	5711	6025	6358	6712	7087	57009
(e) Interest	3214	2837	2461	2083	1707	1330	954	577	200	100	15463
(f) Pro bef dep (c)-(d+e)	914	1168	1784	2032	2256	2815	3378	3948	4525	4831	27651
(g) Depreciation	2765	2765	2765	2765	2765	2765	2765	2765	2765	2765	27650
(h) Pro aft dep	-1851	-1597	-981	-733	-509	50	613	1183	1780	2066	1
(i) Income tax	0	0	0	0	0	20	245	473	704	826	2268
(j) Profit (h)-(i)	-1851	-1597	-981	-733	-509	30	368	710	1056	1240	-2267

Table A.13-6 (2) Profit "0" Calculation

Case 2

Unit = ¥ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	13492	13897	14314	14743	15185	15944	16741	17578	18457	19380	159731
(b) Operating ex											
(1) Port charge	245	250	255	260	265	270	276	281	287	293	2682
(2) Stevedorage	2696	2831	2972	3121	3277	3441	3613	3794	3983	4182	33910
(3) Fuel	2401	2521	2647	2779	2918	3064	3218	3378	3547	3725	30198
(4) Agency fee	405	417	430	443	456	479	503	528	554	582	4797
(5) Other exp.	675	695	716	737	759	797	837	879	923	969	7987
(6) Total	6422	6714	7020	7340	7675	8051	8447	8860	9294	9751	79574
(c) Ope. profit (a)-(b)	7070	7183	7294	7403	7510	7893	8294	8718	9163	9629	80157
(d) Vessel ex											
(1) Crew cost	1578	1690	1570	1680	1798	1924	2059	2203	2357	2522	19381
(2) Maintenance	565	593	623	654	687	721	757	795	835	876	7106
(3) Insurance	283	283	283	283	283	283	283	283	283	283	2830
(4) Adm. exp.	673	707	742	779	818	859	902	947	994	1044	8465
(5) Others	565	593	623	654	687	721	757	795	835	876	7106
(6) Total	3664	3866	3841	4050	4273	4508	4758	5023	5304	5601	44888
(e) Interest	2630	2321	2013	1705	1397	1089	780	472	164	82	12653
(f) Pro bef dep (c)-(d+e)	776	996	1440	1648	1840	2296	2756	3223	3695	3946	22616
(g) Depreciation	2262	2262	2262	2262	2262	2262	2262	2262	2262	2262	22620
(h) Pro aft dep (f)-(g)	-1486	-1266	-822	-614	-422	34	494	961	1433	1684	-4
(i) Income tax	0	0	0	0	0	14	193	384	573	674	1843
(j) Profit (h)-(i)	-1486	-1266	-822	-614	-422	20	296	577	860	1010	-1847

Case 3

Table A.13-6 (3) Profit "0" Calculation

Unit = ฿ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	11566	11913	12270	12638	13017	13668	14351	15069	15822	16613	136927
(b) Operating ex											
(1) Port charge	76	78	79	81	82	84	86	87	89	91	833
(2) Stevedorage	2257	2370	2488	2613	2743	2881	3025	3176	3335	3501	28389
(3) Fuel	2710	2845	2988	3137	3294	3459	3632	3813	4004	4204	34086
(4) Agency fee	347	357	368	379	390	410	431	453	476	500	4111
(5) Other exp.	578	595	613	631	650	683	717	753	791	831	6842
(6) Total	5968	6245	6536	6841	7159	7517	7891	8282	8695	9127	74261
(c) Ope. Profit (a)-(b)	5598	5668	5734	5797	5858	6151	6460	6787	7127	7486	62666
(d) Vessel ex											
(1) Crew cost	1318	1410	1167	1249	1336	1430	1530	1637	1752	1875	14704
(2) Maintenance	440	462	485	509	535	562	590	619	650	683	5535
(3) Insurance	220	220	220	220	220	220	220	220	220	220	2200
(4) Adm. exp.	577	606	636	668	701	736	773	812	852	895	7256
(5) Others	440	462	485	509	535	562	590	619	650	683	5535
(6) Total	2995	3160	2993	3155	3327	3510	3703	3907	4124	4356	35230
(e) Interest	2045	1806	1566	1326	1087	847	607	367	128	64	9843
(f) Pro bef dep (c)-(d+e)	558	702	1175	1316	1444	1794	2150	2513	2875	3066	17593
(g) Depreciation 1759	1759	1759	1759	1759	1759	1759	1759	1759	1759	1759	17590
(h) Prof aft day (f)-(G)	-1201	-1057	-584	-443	-315	35	391	754	1116	1307	3
(i) Income tax	0	0	0	0	0	14	156	302	446	523	1441
(i) Profit (h)-(i)	-1201	-1057	-584	-443	-315	21	235	452	670	784	-1438

Case 7

Table A.13-6 (4) Profit "0" Calculation

Unit = ¥ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	15028	15479	15943	16421	16914	17760	18648	19580	20559	21587	177919
(b) Operating ex											
(1) Port charge	264	269	275	280	286	291	297	303	309	316	2890
(2) Stevedorage	3637	3819	4010	4210	4421	4642	4874	5118	5374	5642	45747
(3) Fuel	2901	3046	3198	3358	3526	3702	3888	4082	4286	4500	36487
(4) Agency fee	451	465	479	493	508	533	560	588	617	648	5342
(5) Other exp.	751	774	797	821	846	888	932	979	1028	1079	8895
(6) Total	8004	8373	8759	9162	9587	10056	10551	11070	11614	12185	99361
(c) Ope. profit (a)-(b)	7024	7106	7184	7259	7327	7704	8097	8510	8945	9402	78558
(d) Vessel ex											
(1) Crew cost	1979	2119	1888	2020	2161	2312	2474	2647	2832	3030	23462
(2) Maintenance	691	726	762	800	840	882	926	972	1021	1072	8692
(3) Insurance	346	346	346	346	346	346	346	346	346	346	3460
(4) Adm. exp.	1010	1060	1114	1169	1228	1289	1353	1421	1492	1567	12703
(5) Others	691	726	762	800	840	882	926	972	1021	1072	8692
(6) Total	4717	4977	4872	5135	5415	5711	6025	6358	6712	7087	57009
(e) Interest	1607	1419	1230	1042	854	666	476	288	100	50	7732
(f) Pro bef dep (c)-(d+e)	700	710	1082	1082	1058	1327	1596	1864	2133	2265	13817
(g) Depreciation	1382	1382	1382	1382	1382	1382	1382	1382	1382	1382	13820
(h) Pro aft dep (f)-(g)	-682	-672	-300	-300	-324	-55	214	482	751	883	-3
(i) Income tax	0	0	0	0	0	0	86	193	300	353	932
(j) Profit (h)-(i)	-682	-672	-300	-300	-324	-55	128	289	451	530	-935

Table A.13-6 (5) Profit "0" Calculation

Case 8

Unit = ¥ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	11872	12228	12595	12973	13362	14030	14732	15469	16242	17054	140557
(b) Operating ex											
(1) Port charge	245	250	255	260	265	270	276	281	287	293	2682
(2) Stevedorage	2696	2831	2972	3121	3277	3441	3613	3794	3983	4182	33910
(3) Fuel	2401	2521	2647	2779	2918	3064	3218	3378	3547	3725	30198
(4) Agency fee	356	367	378	389	401	421	442	464	487	511	4216
(5) Other exp.	594	612	630	649	668	701	736	773	812	853	7028
(6) Total	6292	6581	6882	7198	7529	7897	8285	8690	9116	9564	78034
(c) Ope. profit (a)-(b)	5580	5647	5713	5775	5833	6133	6447	6779	7126	7490	62523
(d) Vessel ex											
(1) Crew cost	1578	1690	1570	1680	1798	1924	2059	2203	2357	2522	19381
(2) Maintenance	565	593	623	654	687	721	757	795	835	876	7106
(3) Insurance	283	283	283	283	283	283	283	283	283	283	2830
(4) Adm. exp.	673	707	742	779	818	859	902	947	994	1044	8465
(5) Others	565	593	623	654	687	721	757	795	835	876	7106
(6) Total	3664	3866	3841	4050	4273	4508	4758	5023	5304	5601	44888
(e) Interest	1315	1161	1007	853	698	544	390	236	82	41	6327
(f) Pro bef dep (c)-(d+e)	601	620	865	872	862	1081	1299	1520	1740	1848	11308
(g) Depreciation	1131	1131	1131	1131	1131	1131	1131	1131	1131	1131	11310
(h) Pro aft dep (f)-(g)	-530	-511	-266	-259	-269	-50	168	389	609	717	-2
(i) Income tax	0	0	0	0	0	0	67	156	244	287	754
(j) Profit (h)-(i)	-530	-511	-266	-259	-269	-50	101	233	365	430	-756

Case 9

Table A.13-6 (6) Profit "0" Calculation

Unit = ₿ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	10306	10615	10933	11261	11599	12179	12788	13427	14098	14803	122009
(b) Operating ex											
(1) Port charge	76	78	79	81	82	84	86	87	89	91	833
(2) Stevedorage	2257	2370	2488	2613	2743	2881	3025	3176	3335	3501	28389
(3) Fuel	2710	2845	2988	3137	3294	3459	3632	3813	4004	4204	34086
(4) Agency fee	309	318	328	338	348	365	383	402	422	443	3656
(5) Other exp.	515	530	546	562	579	608	638	670	704	739	6091
(6) Total	5867	6141	6429	6731	7046	7397	7764	8148	8554	8978	73055
(c) Ope. pfofit (a)-(b)	4439	4474	4504	4530	4553	4782	5024	5279	5544	5825	48954
(d) Vessel ex											
(1) Crew cost	1318	1410	1167	1249	1336	1430	1530	1637	1752	1875	14704
(2) Maintenance	440	462	485	509	535	562	590	619	650	683	5535
(3) Insurance	220	220	220	220	220	220	220	220	220	220	2200
(4) Adm. exp.	577	606	636	668	701	736	773	812	852	895	7256
(5) Others	440	462	485	509	535	562	590	619	650	683	5535
(6) Total	2995	3160	2993	3155	3327	3510	3703	3907	4124	4356	35230
(e) Interest	1023	903	783	663	543	423	304	184	64	32	4922
(f) Pro bef dep (c)-(d+e)	421	411	728	712	683	849	1017	1188	1356	1437	8802
(g) Depreciation	880	880	880	880	880	880	880	880	880	880	8800
(h) Pro aft dep (f)-(g)	-459	-469	-152	-168	-197	-31	137	308	476	557	2
(i) Income tax	0	0	0	0	0	0	55	123	190	223	591
(j) Profit (h)-(i)	-459	-469	-152	-168	-197	-31	82	185	286	334	-589

Table A.13-6 (7) Profit "0" Calculation

Case 10

Unit = ฿ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	13957	14376	14807	15251	15709	16494	17319	18185	19094	20049	165241
(b) Operating ex											
(1) Port charge	246	251	256	261	266	272	277	283	288	294	2694
(2) Stevedorage	3158	3316	3482	3656	3839	4030	4232	4444	4666	4899	39722
(3) Fuel	2901	3046	3198	3358	3526	3702	3888	4082	4286	4500	36487
(4) Agency fee	419	432	445	458	472	496	521	547	574	603	4967
(5) Other exp.	698	719	741	763	786	825	866	909	954	1002	8263
(6) Total	7422	7764	8122	8496	8889	9325	9784	10265	10768	11298	92133
(c) Ope. profit (a)-(b)	6535	6612	6685	6755	6820	7169	7535	7920	8326	8751	73108
(d) Vessel ex											
(1) Crew cost	1979	2119	1888	2020	2161	2312	2474	2647	2832	3030	23462
(2) Maintenance	691	726	762	800	840	882	926	972	1021	1072	8692
(3) Insurance	346	346	346	346	346	346	346	346	346	346	3460
(4) Adm. exp.	577	606	636	668	701	736	773	812	852	895	7256
(5) Others	691	726	762	800	840	882	926	972	1021	1072	8692
(6) Total	4284	4523	4394	4634	4888	5158	5445	5749	6072	6415	51562
(e) Interest	1607	1419	1230	1042	854	666	476	288	100	50	7732
(f) Pro bef dep (c)-(d+e)	644	670	1061	1079	1078	1345	1614	1883	2154	2286	13814
(g) Depreciation	1382	1382	1382	1382	1382	1382	1382	1382	1382	1382	13820
(h) Pro aft dep (f)-(g)	-738	-712	-321	-303	-304	-37	232	501	772	904	-6
(i) Income tax	0	0	0	0	0	0	93	200	309	362	964
(j) Profit (h)-(i)	-738	-712	-321	-303	-304	-37	139	301	463	542	-970

Table A.13-6 (8) Profit "0" Calculation

Case 15

Unit = ¥ 1,000

	1	2	3	4	5	6	7	8	9	10	Total
(a) Revenue	73689	75900	78177	80522	82938	87085	91439	96011	100812	105853	872426
(b) Operating ex											
(1) Port charge	1106	1128	1151	1174	1197	1221	1246	1270	1296	1322	12111
(2) Stevedorage	15246	16008	16809	17649	18532	19458	20431	21453	22525	23652	191763
(3) Fuel	10021	10522	11048	11601	12181	12790	13429	14101	14806	15546	126045
(4) Agency fee	2211	2277	2345	2415	2487	2611	2742	2879	3023	3174	26164
(5) Other exp.	3684	3795	3909	4026	4147	4354	4572	4801	5041	5293	43622
(6) Total	32268	33730	35262	36865	38544	40434	42420	44504	46691	48987	399705
(c) Ope. profit (a)-(b)	41421	42170	42915	43657	44394	46651	49019	51507	54121	56866	472721
(d) Vessel ex											
(1) Crew cost	4758	5091	5097	5454	5836	6245	6682	7150	7651	8187	62151
(2) Maintenance	2315	2431	2552	2680	2814	2955	3102	3257	3420	3591	29117
(3) Insurance	1158	1158	1158	1158	1158	1158	1158	1158	1158	1158	11580
(4) Adm. exp.	4040	4242	4454	4677	4911	5156	5414	5685	5969	6267	50815
(5) Others	2315	2431	2552	2680	2814	2955	3102	3257	3420	3591	29117
(6) Total	14586	15353	15813	16649	17533	18469	19458	20507	21618	22794	182780
(e) Interest	10765	9503	8242	6980	5718	4456	3195	1933	671	336	51799
(f) Pro bef dep (c)-(d+e)	16070	17314	18860	20028	21143	23726	26366	29067	31832	33736	238142
(g) Depreciation	9261	9261	9261	9261	9261	9261	9261	9261	9261	9261	92610
(h) Pro aft dep (f)-(g)	6809	8053	9599	10767	11882	14465	17105	19806	22571	24475	145532
(i) Income tax	2724	3221	3840	4307	4753	5786	6842	7922	9028	9790	58213
(j) Profit (h)-(i)	4085	4832	5759	6460	7129	8679	10263	11884	13543	14685	87319

APPENDIX 14 IRR CALCULATION FOR DOMESTIC COASTAL SHIPPING

APPENDIX 14 IRR CALCULATION FOR DOMESTIC COASTAL SHIPPING

IRR Calculation for domestic coastal shipping Cases 1, 2, 3, 7, 8, 9, 10 and 15 are worked out in the following ways.

The cost and benefit used for IRR calculation are given below.

Cost	Operating expenses Vessel expenses
Benefit (Cashflow)	Profit before interest and depreciation

Note: 1. The economic life of vessel is 10 years.

2. The residual value of vessel after 10 years will be 20%.

Table A.14-1 IRR Calculation

Case 1 Ship Price ₿ 34,557

IRR = 16.632872820

Unit: Bahts

Year	Cashflow	N.P. Value
1	6,603	5,661.4
2	6,554	4,818.0
3	6,871	4,330.7
4	6,820	3,685.5
5	6,750	3,127.5
6	7,073	2,809.8
7	7,406	2,522.5
8	7,753	2,264.1
9	8,113	2,031.4
10	8,489	1,822.4
Total	72,432	33,073.3
Residual Value	6,911	1,483.7
G. Total	79,343	34,557.0

Table A.14-2 IRR Calculation

Case 2 Ship Price ฿ 28,274

IRR = 11.804682016 Unit: Bahts

Year	Cashflow	N.P. Value
1	4,430	3,962.3
2	4,371	3,496.7
3	4,538	3,247.0
4	4,471	2,861.3
5	4,389	2,512.3
6	4,595	2,352.5
7	4,807	2,201.2
8	5,030	2,060.1
9	5,259	1,926.5
10	5,498	1,801.4
Total	47,388	26,421.2
Residual Value	5,655	1,852.8
G. Total	53,043	28,274.0

Table A.14-3 IRR Calculation

Case 3 Ship Price ฿ 21,991

IRR = 10.565811396 Unit: Bahts

Year	Cashflow	N.P. Value
1	3,211	2,904.2
2	3,134	2,563.6
3	3,387	2,505.8
4	3,307	2,212.8
5	3,216	1,946.3
6	3,361	1,839.7
7	3,514	1,739.6
8	3,675	1,645.5
9	3,839	1,554.6
10	4,008	1,468.0
Total	34,652	20,380.2
Residual Value	4,398	1,610.8
G. Total	39,050	21,991.0

Table A.14-4 IRR Calculation

Case 7 Ship Price ฿ 17,279

IRR = 38.248103857 Unit: Bahts

Year	Cashflow	N.P. Value
1	6,603	4,776.2
2	6,554	3,429.2
3	6,871	2,600.4
4	6,820	1,867.0
5	6,750	1,336.6
6	7,073	1,013.1
7	7,406	767.3
8	7,753	581.0
9	8,113	439.8
10	8,489	332.9
Total	72,432	17,143.5
Residual Value	3,456	135.5
G. Total	75,888	17,279.0

Table A.14-5 IRR Calculation

Case 8 Ship Price ฿ 14,137

IRR = 30.256038904 Unit: Bahts

Year	Cashflow	N.P. Value
1	4,430	3,401.0
2	4,371	2,576.2
3	4,538	2,053.4
4	4,471	1,553.0
5	5,389	1,170.5
6	4,595	940.8
7	4,807	755.6
8	5,030	607.0
9	5,259	487.2
10	5,498	391.0
Total	47,388	13,935.9
Residual Value	2,827	201.1
G. Total	50,215	14,137.0

Table A.14-6 IRR Calculation

Case 9 Ship Price ฿ 10,996

IRR = 28.146475554 Unit: Bahts

Year	Cashflow	N.P. Value
1	3,211	2,505.7
2	3,134	1,908.5
3	3,387	1,609.5
4	3,307	1,226.3
5	3,216	930.6
6	3,361	759.0
7	3,514	619.2
8	3,675	505.4
9	3,839	412.0
10	4,008	335.6
Total	34,652	10,811.9
Residual Value	2,199	184.1
G. Total	36,851	10,996.0

Table A.14-7 IRR Calculation

Case 10 Ship Price ฿ 17,279

IRR = 13.612467051

Unit: Bahts

Year	Cashflow	N.P. Value
1	3,069	2,701.3
2	2,932	2,271.5
3	3,160	2,154.8
4	3,015	1,809.6
5	2,853	1,507.2
6	2,978	1,384.7
7	3,105	1,270.8
8	3,236	1,165.7
9	3,372	1,069.2
10	3,510	979.6
Total	31,230	16,314.5
Residual Value	3,456	964.5
G. Total	34,686	17,279.0

Table A.14-8 IRR Calculation

Case 15 Ship Price (As fleet) ฿ 115,757

IRR = 21.204918623 Unit: Bahts

Year	Cashflow	N.P. Value
1	26,835	22,140.2
2	26,817	18,254.5
3	27,102	15,220.9
4	27,008	12,514.4
5	26,861	10,268.8
6	28,182	8,888.9
7	29,561	7,692.7
8	31,000	6,655.8
9	32,503	5,757.6
10	34,072	4,979.6
Total	289,941	112,373.5
Residual Value	23,151	3,383.5
G. Total	313,092	115,757.0

APPENDIX 15 EXPLANATION OF THE PROPOSED CARGO HANDLING SYSTEM

APPENDIX 15 EXPLANATION OF THE PROPOSED CARGO HANDLING SYSTEM

The general cargo handled at the public wharf is of many types and various weights, therefore it is difficult to increase efficiency due to the limits on the mechanization of such work.

However, high efficiency is considered to be indispensable and it leads to the following results.

1) Shortening the ship stay in the port and the turn-around time.

2) Improving the labour environment and the safety of cargo work.

3) Making it possible to use port facilities efficiently and to decrease the required number of berths.

4) Combining points 1 to 3 lead to reduced cargo handling cost

In this section we describe the optimum cargo handling system, which is a prerequisit for ship sailing and port development plans.

(1) Cargo handling system

The cargo flow in the port area is shown in the model described in Chapter 9 and the cargo handling is generally routed through basic facilities such as aprons, transit sheds and open storages. The following course of action is adopted in order to increase efficiency.

a) The general cargo handled at public wharves should be palletized as much as possible. Not only does the palletization make cargo easy to handle, but it helps prevent damage.

b) The re-handling between aprons and storage facilities (i.e. T/Shed & O/Storage) should be carried out by means of fork lifts. This is made easier when the cargo is palletized.

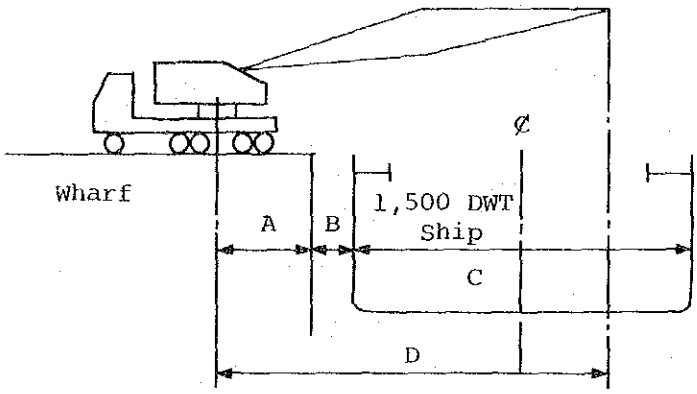
(2) Cargo handling machines

a) Cranes

As described in Chapter 9, the mobile crane is generally employed for cargo handling on public wharves dealing with the domestic trade. In this study, the truck crane rather than the mobile crane is selected for the following reasons.

- The Cargo handling efficiency of wharf cranes is not necessarily high, furthermore, it is expected that wharf cranes cause handling cost increases due to the extremely high cost of the equipment. In addition, there is no need to provide wharf cranes for their reach. Considering these factors, the wharf crane was eliminated.
- The mobility of the truck crane is far superior to that of others, and the charges for using these cranes will be competitive due to the low depreciation and operation costs.

Selection of the Cranes Lifting Capacity



reach

$$D = A + B + \frac{3}{4} C$$

Fig. A.15-1 Crane Lifting Capacity

Where, $D = 3\ m + 0.5\ m + \frac{3}{4} \times 11.5\ m = 12.125\ (m)$

Turning moment:

$$2t \times 12.125\ m = 24.25\ (t\text{-}m)$$

Required resisting moment:

$$24.25\ (t\text{-}m) \times \frac{100}{100 - 50} = 48.5\ (t\text{-}m)$$

Where, 50 stands for the percentage reduction in proportion to the reach.

Therefore, the optimum capacity is

20 t Crane [max, resisting moment = 20 t × 3 m = 60 (t-m)]

Net Crane Handling Efficiency

A crane's full cycle time is generally 1.3 2.3 min. If we assume 1.5 min. as the effective cycle time, the net handling efficiency is estimated as follows.

40 cycles/hr × 2 t = 80 t/hr

Where, 2 t shows the typical weight of cargo per cycle.

b) Fork-Lift

As described above, the fork-lift is adopted in order to make effective use of the storage facilities and achieve quick re-handling.

Selection of the Fork-Lift Capacity

Typical combinations of cranes and fork-lifts are as follows.

20 t Crane and 2 t Fork-Lifts
35 t Crane and 3.5 t Fork-Lifts

Therefore, the capacity of fork-lifts should be 2.0 t.

Net Fork Lift Handling Efficiency

The designated distance from aprons to storage facilities is generally around 150 m.

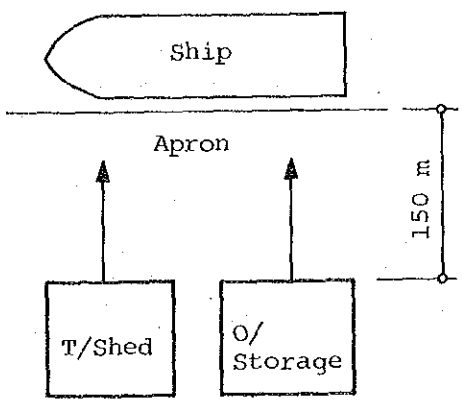


Fig. A.15-2 Movement of Fork-Lifts

The travel time per round-trip is computed as follows.

300 m ÷ 83 m/min. = 4 min.

where, the average fork-lift speed is assumed to be

5 km/hr = 83 m/min.

Therefore, it is possible for a fork-lift to make 15 roundtrips per hour, and the efficiency is 2.0 t × 15 = 30 t/hr.

(3) General cargo palletization

The types of packaging described in 9.2 (2) are classified in detail in order to select those suitable for palletization.

Table A.15-1 Packaging Types and Weights

Commodity	Type	Weight (kg/pc)	(Ave.)
General Cargo	Box (Small)*	5 ∿ 20	(10)
	Carton*	2 ∿ 500	(20)
	Case (Wooden)	20 ∿ 20,000	(500)
	Crate/Skeleton Case	10 ∿ 30,000	(1,500)
	Drum*	20 ∿ 300	(70)
	Skid	200 ∿ 5,000	(500)
Fertilizer	Bag*	10 ∿ 200	(50)
Construction Materials	Bundle	20 ∿ 3,000	(300)
	Coil	100 ∿ 4,000	(2,000)
	Unpacked	Var.	
Rice & Maize	Bag*	10 ∿ 200	(50)
	Bale*	90 ∿ 2,000	(200)
Vegetable & Fruits	Box (Small)*	5 ∿ 20	(10)
Fish Products	Do*	Do	

The cargo marked with an (*) can be palletized taking into consideration its packaging and weight, say less than 1 t/pc.

Therefore, it is estimated that half of the general cargo, fertilizer, rice & maize, fish products and vegetables & fruits are suitable for palletization.

Furthermore, in considering future cargo volumes it is assumed that palletized cargo and loose cargo will each account for 50 percent.

(4) Cargo handling efficiency

In this section, the target for cargo handling efficiency shall be set up on the basis of the above described system and equipment.

In general, the efficiencies of workers, fork-lifts and cranes are in a one-two-six ratio.

Accordingly, the net handling efficiencies are:

Worker : 15 t/hr
Fork-Lift: 30 t/hr
Crane : 80 t/hr

Furthermore, the efficiency is affected by the type of cargo, and palletized and loose cargo are in a ratio of two to one.

From the above-mentioned efficiencies, the net capacity is determined by the efficiency of the crane, as follows:

Palletized Cargo: 80 t/hr
Loose Cargo : 40 t/hr

Meanwhile, the actual cargo work includes all kinds of lost time, waiting due to various reasons, rigging, rests and so on.

Table A.15-2 Net Working Time and Lost Time

Kind of Work	Net Working Time	Lost Time
Loading	60 ∿ 70%	40 ∿ 30%
Discharging	50 ∿ 60%	50 ∿ 40%
Re-handling	60 ∿ 70%	40 ∿ 30%
Average	60%	40%

And therefore, the actual efficiency can be computed as follows.

Palletized Cargo: 80 t/hr × 0.6 = 50 t/hr
Loose Cargo : 40 t/hr × 0.6 = 20 t/hr
Average : (50 t/hr + 20 t/hr) ÷ 2 = 35 t/hr

The typical composition of a gang for cargo handling is decided in proportion to the various efficiencies, as following.

20 t Truck Crane	1	(with operator)
2 t Fork-Lift	3	(with operator)
Worker	6	

In the case of stevedoring (i.e. cargo handling on the ship), the gang will generally be 12 ∿ 15 men as it includes hold-men and deck-men, etc.