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LINER SHIPPING ROUTE STUDY

FINAL REPORT

VOLUME XIII

DOMESTIC SHIPPING OPERATING COST MODEL

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FOREWORD

The Liner Shipping Route Study (LSRS) and the MARINA and SHIPPERCON STUDY (MARSH Study) were conducted, during 1993-1994, under the Philippine Sea Transport Consultancy (PSTC). The Final Report of the LSRS comprises 14 volumes and the Final Report of the MARSH Study comprises 5 volumes.

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Chapter 1

INTRODUCTION

The Domestic Shipping Costs & Rates Report (DOSCARR) is a report of the Liner Shipping Route Study (LSRS), being conducted during 1993-1994 for the Maritime Industry Authority (MARINA). DOSCARR is comprised of two volumes:

- Volume I is the Domestic Shipping Operating Cost Model (DOSOCOMO)
- Volume II is the Domestic Shipping Costs & Rates Analysis

DOSOCOMO presents two shipping cost calculation models which aim to serve as an essential tool for MARINA to continually appraise the financial and economic well-being of the shipping industry. In 1991, the Interisland Liner Shipping Rate Rationalization Study (SRRS) recommended a phased program of liner shipping with deregulation, and this program was largely adopted by MARINA, and has been partially implemented during 1992-1993. With the policy thrust towards a phased rate deregulation and route liberalization, these cost models hope to enable MARINA to assess how market-oriented shipping rates compare with actual and theoretical shipping costs so that it could be guided in respect to the implementation and timing of the various phases of deregulation/liberalization. After a database on shipping costs is set up over time as the model for estimating actual costs is used, the generated information will also provide MARINA with economic criteria for industry planning and policy formulation.

The methodologies used in shipping cost analyses differ from study to study and depend heavily on the availability and reliability of data as well as on the subjective preferences of the author. This report aims to present two cost models to address the problem of calculating shipping costs under the prevailing data constraints. The models were designed to incorporate some exogenous data which remain to be obtained by MARINA, e.g. vessel specifications and updated record of franchises, but provisions were made for the model to generate temporary or default values for these missing data.

Following this brief introduction are three chapters, namely:

- Chapter 2 : Data Sources for Cost Analysis
- Chapter 3 : A Model for Estimating Actual Shipping Costs
- Chapter 4 : A Model for Estimating Theoretical Shipping Costs

In Chapter 2, the LSRS confines the discussion to identifying the data sources available under the currently installed MARINA information system and to presenting the surveys that LSRS designed to supplement the existing information. Although some broad statements regarding the reliability and completeness of the data presently available at MARINA may be cited, a detailed assessment of the status and condition of data are dealt with in the other DOSCARR volume. This report therefore implies that MARINA's data collection efforts could improve so as to generate, at the very least, data that are reasonably available from the industry and are essential to any cost analysis.

The "actual cost" and "theoretical cost" models presented in Chapters 3 and 4 include a discussion of the specifications of and the general process adopted in each model prior to presenting the algorithms which will allow the cost analyst to understand the step-by-step calculation procedure and logic behind the respective models.

Although the models presented in this volume are expected to satisfy MARINA's basic requirements in so far as cost analyses are concerned, greater convenience could be fostered by developing a "mother of two models"which could integrate the analyses based on reported costs and that based on the theoretical costs. This integration will enable MARINA to generate, with the aid of a computer, an evaluation of the Annual Reports submitted by franchised operators which specifies a list of accounts that need to be reviewed/explained further in the light of any significant variance from the theoretical reference cost.

Chapter 2

DATA SOURCES FOR COST ANALYSIS

The LSRS was tasked to analyze interisland liner shipping costs covering the years 1991 and 1992. In carrying out this task, it was necessary to identify the possible sources of data and to assess their adequacy and reliability; and having done so, the LSRS was able to develop these shipping cost models that are adapted to MARINA's management information system.

This Chapter catalogs the sources of data that generate the required inputs to the cost models and discusses what supplemental sources could be developed to improve on the existing data base. As the other DOSCARR volume expounds on the extent of reliability and the present condition of data available with MARINA, this volume focuses its discussion on the availability and adequacy of the reports from which the required data inputs are obtained, particularly in terms of structure and design.

Annual Reports from Liner Operators

One of the major sources of data used by the model for estimating actual shipping costs is the Annual Report that MARINA-franchised shipping operators are required to submit by March of every year. This report is structured to contain data regarding each operator's company profile and fleet, vessel operating statistics, vessel traffic statistics, vessel and company income statement, balance sheet, as well as other financial reports and schedules.

MARINA has been relatively successful in its drive to make more ship operators submit their Annual Report over the past year. MARINA, with the assistance from LSRS, has encoded all properly-accomplished 1991 and 1992 reports into computer medium. However, it has been noted that several operators still fail to accomplish all sections of the report, thereby rendering them inadequate for unit cost analysis purposes.

Noting this increased availability but continued inadequacy of the Annual Reports, the LSRS developed the cost models with routines that generate estimates of missing data by deducing from the given information. Since the design and structure of the Annual Report itself was not adequate for such routines, the LSRS configured the cost model to draw data from the existing information systems within MARINA, i.e. the Vessel Inventory System and the Vessel Franchising Inventory.

Vessel Inventory System

The MARINA Vessel Inventory System (VIS) was designed to provide the detailed specifications of all Philippine-flag vessels engaged in domestic trade. In view of the lack of systematic flow of information from the Philippine Coast Guard, which was executing the ship registration functions, to MARINA, the VIS has not been continually updated. Furthermore, it has been observed that most vessel specifications were not known; this was understandable as the systems for vessel inspection and registration did not give much concern for such details.

Nevertheless, the VIS files could still prove to be of some use even at its present state as it provides at least the outline specifications of most of the older vessels that would become the subject of cost analysis. The analyst should, however, exercise caution when integrating vessel information from the VIS and the Annual Reports files since vessels are indexed according to their names and it has been a practice of some operators to reuse the name of an old vessel which they no longer operate on the route.

Vessel Franchising Inventory

The Vessel Franchising Inventory (VFI) system keeps track of all CPCs, Pas, Special Permits issued by MARINA to specific liner vessels or ferry boats that were authorized to serve a designated route. The VFI system also includes data on vessel capacity and vessel schedule on each franchised route, which are of use to the cost models. However, it was noted that some operators continue to hold a franchise despite having abandoned their route. The cost analyst using the model should therefore exercise caution when computing for route capacities and theoretical load factors.

Supplemental Surveys and Revised Annual Report Form

Realizing the immediate need to generate information for the LSRS to complete its task in analyzing shipping costs and noting the inadequacies in the Annual Reports, the VIS, and the VFI systems, the LSRS developed supplemental survey forms, namely: Vessel Inventory Questionnaire (in Annex A) in support of the VIS, Route Inventory Questionnaire (in Annex B) as a validation of the VFI, and a Maritime Personnel Compensation Survey (in Annex C) to supplement the old Annual Reports. To address these problems in the future, the LSRS also presents a revised Annual Report form as Annex D, which could then serve as the main source of data for shipping cost analyses.

MARINA Inspection Reports

These supplemental surveys as well as other data could be collected over time if MARINA will systematize data collection efforts during the periodic inspections that are undertaken by its operating offices.

Chapter 3

MODEL FOR ESTIMATING ACTUAL SHIPPING COSTS

This chapter presents a model for computing the full cost of liner shipping services on the basis of actual costs as reported by liner operators.

Specifications of the Model

This model was developed by LSRS to be mainly computer-based in view of the large requirement for data processing. Submitted with this report volume is a diskette containing a software entitled "VUCA.PRG". Programmed in FOXBASE+ language, this software generates a report patterned after the "Vessel Utilization and Cost Analysis" (VUCA) form as presented later in this chapter. This program will require a FOXBASE + software and an IBM or IBM-compatible PCAT 286 (or higher) computer with at least 640kb of memory, one disk drive, and a hard disk for the data source files and for storage of computed shippings costs.

Some aspects of the model were left to be done manually for practical reasons, but a great deal of work is still saved as the software was designed to integrate with the Annual Report files and the Route Inventory files generated by other subsystems in the DSO data base. For the analysis of one or just a few vessels with relatively simple route patterns or when no computer is available, it is still possible to perform the entire cost analysis manually by using the VUCA form and following each step as mentioned under this model's algorithms.

Aside from these environmental specifications, this model was designed to meet the following specifications:

- The model initially presumes that the Annual Reports of liner shipping companies are, in general, reflective of the actual costs of providing shipping services.

- The model provides a procedure for processing the Annual Reports into estimates of shipping cost per unit of capacity.

- The model provides the means to analyze how shipping costs vary with respect to vessel type, vessel size and age, routes plied, and fleet size of the operator.

- The model recognizes that franchised ship operators oftentimes serve more than one route.

- The model anticipates that some data from Annual Reports are not reliable and some information that are essential inputs to the model are not provided; thus, default values are assigned by the model.

- The model generates cost functions which can be easily compared with MARINA-prescribed rates, i.e. cost functions with a cost per unit and a cost per unit-mile of either capacity or traffic.

- The model provides algorithms in anticipation of the future deployment of specialized carriers into the domestic liner and ferry services.

- The model provides cost per unit calculations with respect to varying levels of vessel utilization, including estimates of required shipping rates under the prevailing costs and vessel utilization.

General Process of the Model

The Vessel Utilization and Cost Analysis (VUCA) form presented in this section defines the general structure on which the model is built. Each accomplished or generated VUCA form serves as a particular vessel's record on utilization and cost. This VUCA form is shown with numbers in each field; the algorithms in the following section refer to these numbers to provide the detailed procedure on how each field value is generated. However, the general process for generating a VUCA record is discussed below.

The model consists of eight components, namely:

a) definition of operator and scale of operation using fields 1 to 5
b) definition of vessel specifications using fields 6 to 41
c) information on vessel performance using fields 42 to 56
d) computation of capacity provided by the vessel using fields 57 to 74
e) allocation of costs to cargoes and to passengers using fields 75 to 109
f) calculation of costs per unit space using fields 110 to 159
g) information on passenger and cargo traffic using fields 160 to 178
h) cost analysis by route leg using fields 179 to 205.

In Component a), data regarding the fleet size of the operator are obtained from the Annual Reports as these will later serve as keys or indices for sorting computational results of various vessels for comparative purposes.

In Component b), vessel specifications are taken from both the Annual Reports (based on the existing format) and the LSRS Vessel Inventory survey. The model recognizes that some specifications may not be available from these two sources and, therefore, attempts to estimate the missing values on the basis of the gathered information.

In Component c), the model identifies the individual route code of the routes plied by the subject vessel using the LSRS Domestic Shipping Route Classification System. The model also gets data from the Annual Reports to compute for total miles run and to estimate total days at sea.

In Component d), the model computes for capacity provided by the vessel on a per route basis, as expressed in passenger-miles by class, ton-miles, TEU-miles, and other cargo unit-miles, depending on which cargo unit would be relevant to the technology of the vessel and would be the determinant for shipping rates.

In Component e), the vessel costs as obtained from the Annual Reports are allocated to cargoes and to passengers on the basis of the vessel's capacity profile and a pre-determined rate of change in deadweight with respect to a change in passenger capacity. Using the findings of SRRS, the following default values were adopted by the model: - 3 DWT per cabin passenger, -1.5 DWT per dormitory passenger, and -0.5 DWT per seated passenger. Prior to allocating costs to cargoes and passengers, this component groups the vessel expense accounts according to which pertain to voyage expenses, traffic-related expenses, and running expenses. It also computes for an annualized capital cost on the basis of the best estimate of fair market value of the vessel and ancillary assets, and a capital recovery factor. Finally, after recognizing all these expense groups, as allocated to cargoes and passengers, this component distributes revenue-related expenses, i.e. common carriers' tax and commissions, to cargoes and passengers in order to arrive at the total operating cost for cargo operations and for passenger operations.

In Component f), the individual expense accounts attributable to passenger operations are categorized according to which accounts are primarily incurred at sea and which are incurred in port. Those expenses which are incurred at sea are transformed into costs per passenger-mile while those incurred primarily in port are translated into costs per passenger. Since this component of the model aims to determine costs per unit and costs per unit-mile of capacity, the aforementioned calculation utilizes the "passenger-miles provided" (from component d) and total passenger capacity as the divisors of the expenses. The same process is likewise applied to the individual expense accounts attributable to cargo operations. At this juncture, the cost model would have generated an average passenger cost function and an average cargo cost function which both could be transformed into cost functions by passenger class (or by commodity group) depending on the respective cost index of each class relative to the average cost.

In Component g), traffic information is retrieved from the Annual Reports file. This traffic information by route is compared with the capacity calculations (in component d) to compute for load factors.

In Component h), the routes defined in component c) are broken down to origin-destination port pairs, and the cost functions in component f) are applied to compute for cost per passenger and cost per cargo unit transported between each port pair under a full load condition. Further cost-per-unit calculations are performed for each port pair under varying load factor conditions. In one set of calculations, the prevailing load factor on the route (as derived in component g) is used as a basis to estimate what cost-based shipping rates are required under the prevailing costs and vessel utilization.

VUCA Algorithms

This section discusses the procedures and algorithms involved in generating the value of each field variable in this VUCA form. For sake of brevity and easy reference, the VUCA form was

reproduced with each field variable being assigned a field code number. With these codes, any formula involving a particular field will only have to indicate the assigned code number in braces, e.g. {1}, to define its corresponding variable.

Since the LSRS was tasked to investigate shipping costs covering the years 1991 and 1992, the following algorithms, as well as the VUCA software, are described to draw data from various sources, i.e. Annual Report file, Vessel Inventory file, Route Classification file, Route Inventory file, etc., as these years and up to present are still utilizing the old Annual Report format. If and when MARINA adopts the LSRS-recommended Annual Report form, the vessel utilization and cost analysis can be performed with data sourced solely from well-accomplished Annual Reports.

	Field Description	Procedure
1	Control Sheet No.:	refers to the record number in the file generated under the Vessel Utilization and Cost Analysis.
2	Operator :	specifies the name of the company operating the vessel although that company may not necessarily be the owner of the vessel under analysis.
3	OpCode:	based on the code assigned to each operator under the masterfile of operators.
4	Fleet Size: No. of Vsls	based on the company profile section of the Annual Report file.
5	Fleet GRT:	based on the company profile section of the Annual Report file.
6	Vessel:	derived from the list of vessels operated by the vessel operator indicated in Field 2 and which have operating and financial data for analysis.

SSEL UTILIZATION AND COST ANALYSIS

Control Sheet No. :	1

rator :	2	OpCode:	3	Fleet Size: No. of Vsls	4	Fleet GRT:	5

ESSEL SPECIFICATIONS

sel:			6	Vsl Type:	7	GRT:	8	Year Built:	9
(m):	10	Breadth:	11	Depth:	12	LdDraft:	13	Speed:	14
Passenger Capacity				**Cargo Carrying Capacity**					
Class	15	In Cabins	18	DWT	21	TEU	22	PCU	23
Class	16	In Dorms	19	Bale	24	Grain	25		26
Class	17	Seated	20		27		28		29

Machinery				**Fuel/Lube Consumption**		**Crew Complement**	
	No.	BHP	RPM	Bunker /SFO (tpd):	36	Officers :	39
Eng.	30	31	32	Diesel (tpd):	37	Ratings :	40
Eng.	33	34	35	Lube (li. per day):	38	Apprentices:	41

SSEL PERFORMANCE DATA

tes Served

Route Description	Rt. Code	Rt. Length	No. of Voyages	Total Naut. Miles Run
42a	43a	44a	45a	46a
42b	43b	44b	45b	46b
42c	43c	44c	45c	46c
42d	43d	44d	45d	46d
42e	43e	44e	45e	46e
42 f	43 f	44 f	45 f	46 f
42g	43g	44g	45g	46g
42h	43h	44h	45h	46h
	Totals >>		47	48

f Days in Commission: Total -	49	Estimated Days At Sea -	50	In Port -	51
f Days Out of Commission: Total -	52	Under Repair Afloat -	53	On Drydock-	54
		Due to Bad Weather -	55	Laid-up -	56

PACITY COMPUTATIONS

	Passenger Capacity Provided (in Pax-Miles)				Cargo Capacity Provided (in Unit-Miles as appropriate)				
Code	1st Cl	2nd Cl	3rd Cl	___ Class	Ton-Miles	TEU-Miles	PCU-Miles	CBM-Miles	
3a	57a	58a	59a	60a	61a	62a	63a	64a	65a
3b	57b	58b	59b	60b	61b	62b	63b	64b	65b
3c	57c	58c	59c	60c	61c	62c	63c	64c	65c
3d	57d	58d	59d	60d	61d	62d	63d	64d	65d
3e	57e	58e	59e	60e	61e	62e	63e	64e	65e
3 f	57 f	58 f	59 f	60 f	61 f	62 f	63 f	64 f	65 f
3g	57g	58g	59g	60g	61g	62g	63g	64g	65g
3h	57h	58h	59h	60h	61h	62h	63h	64h	65h
s >>	66	67	68	69	70	71	72	73	74

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COST ALLOCATION COMPUTATION

entage Share in Daily Running Cost :	Cargo -	75	Passengers -	76

yage Expenses:	As Reported	Cargo Share	Pax Share
el	77	79	81
rt Charges	78	80	82

ning Expenses: (Excluding Interest and Depreciation)		---------- >	83
	On Vessel	On Ancillary Assets	Add: Cost of Capital
ested Capital:	84	86	
praisal Increment	85	87	88
		Total Running Cost	89

ning Cost:	Annual	Cargo Share	Pax Share
Sea	90	92	94
Port	91	93	95

ffic-Related Expenses:			
rgo-related Expenses	96	96	
ssenger-related Expenses	97		97
Total Operating Cost	98	99	100
ix	101	102	103
nissions	104	105	106
AL OPERATING COST	107	108	109

COST PER UNIT SPACE CALCULATIONS	Cargo Operations			Passenger Operations		
	Cost	Per Unit	Per Unit-Mile	Cost	Per Pax	Per Pax-Mile
ge Expenses:						
el	79		110	81		123
t Charges	80	111		82	124	
ing Cost:						
Sea	92		112	94		125
Port	93	113		95	126	
c-Related Expenses						
go-related Expenses	96	114				
senger-related Expenses				97	127	
Total Operating Cost	99	115	116	100	128	129
x	102	117	118	103	130	131
nissions	105	119	120	106	132	133
Ave. Cost Coefficients >>>		X	Y		X	Y
st Function : Cost /Unit= X + Y * Distance		121	122		134	135

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go Cost Functions by Commodity Class					Pax Cost Functions by Pax Accomodation				
	Cost Index	X	+	Dist. * Y		Cost Index	X	+	Dist. * Y
;s A	136	140		141	Cabin	148	152		153
;s B	137	142		143	Dormitory	149	154		155
;s C	138	144		145	Seat	150	156		157
	139	146		147		151	158		159

e: All abovementioned cost functions are attained only under full capacity utilization of the subject vessel.

TRAFFIC INFORMATION

t. Code	Passengers Served	Pax-Miles Served	Ave. Pax Ld Factor	Metric Tons Transported	MTon-Miles Served	Ave. Cargo Ld Factor	Cargo Unit : __ Units	166 Unit-Miles	Ave. Unit Ld Factor
43a	160a	161a	162a	163a	164a	165a	167a	168a	169a
43b	160b	161b	162b	163b	164b	165b	167b	168b	169b
43c	160c	161c	162c	163c	164c	165c	167c	168c	169c
43d	160d	161d	162d	163d	164d	165d	167d	168d	169d
43e	160e	161e	162e	163e	164e	165e	167e	168e	169e
13 f	160 f	161 f	162 f	163 f	164 f	165 f	167 f	168 f	169 f
43g	160g	161g	162g	163g	164g	165g	167g	168g	169g
43h	160h	161h	162h	163h	164h	165h	167h	168h	169h
ils >>	170	171	172	173	174	175	176	177	178

SSENGER COST ANALYSIS (BY ROUTE LEG)

oute Code	Port of Origin	Port of Destin.	Navigat. Distance	Est. Cost Per 3rd Class Passenger given a Load Factor of: 40%	50%	60%	80%	100%	Prevailing
43a	179a	180a	181a	182a	183a	184a	185a	186a	187a

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CARGO COST ANALYSIS (BY ROUTE LEG)

Route Code	Port of Origin	Port of Destin.	Navigat. Distance	Estimated Cost Per Ton given a Load Factor of:					
				40%	50%	60%	80%	100%	Prevailing
43a	179a	180a	181a	188a	189a	190a	191a	192a	193a

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ECTED CALCULATIONS

Container Operations:

Route Code	Port of Origin	Port of Destin.	Navigat. Distance	Est. Cost Per TEU FCL FAK given a Load Factor of:					
				40%	50%	60%	80%	100%	Prevailing
43a	179a	180a	181a	194a	195a	196a	197a	198a	199a

RORO Operations:

oute ode	Port of Origin	Port of Destin.	Navigat. Distance	Est. Cost Per Lane-Meter given a Load Factor of:					
				40%	50%	60%	80%	100%	Prevailing
43a	179a	180a	181a	200a	201a	202a	203a	204a	205a

rks: 206

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7 Vsl Type: derived from the LSRS survey form on Vessel Inventory; vessel types are coded as follows:

1 - Conventional Cargo
2 - Roll-on-Roll-off
3 - Container
4 - Passenger (21 knots and below)
5 - Combined Passenger-Conventional Cargo
6 - Combined Passenger-RoRo
7 - Combined Passenger-Container
8 - Fast Ferry (above 21 knots)
9 - Landing Craft
10 - Reefer
15 - Others
16 - Type not specified

8 GRT: derived from the operations data in the Annual Report file; if the Annual Report failed to supply this information, the LSRS survey form on Vessel Inventory could be used as an alternate source of data.

If GRT information is still not available from the Vessel Inventory files, i.e. {8} = 0, a value for GRT is estimated by the use of the following formula and field {206} is appended with a remark that the GRT was merely estimated:

$$\text{Estimated GRT} \approx \frac{\{10\} * \{11\} * \{12\} * \phi}{2.83}$$

where :

ϕ = block coefficient of the vessel under analysis;
if not available, block coefficient is assumed to be
= 0.98 for barges or box-like hull shapes
= 0.80 for pure cargo or pure container vessels
= 0.75 for combined passenger-cargo vessels
= 0.70 for monohulled pure passenger vessels
= 0.80 for any other vessel not covered by the above

9 Year Built:
10 LOA (m):
11 Breadth:
12 Depth:
13 LdDraft:
14 Speed:

fields {9} to {38} are vessel data derived from the LSRS survey form on Vessel Inventory.

15	1st Class Passengers	if the vessel type, i.e. field {7}, is equal to 4, 5, 6, 7 or 8 and no passenger capacity information was obtained, a dummy value of 0.09 (which will appear as zero after rounding) is assigned to fields {16} to {20} and a remark is added to field {206} that passenger capacity information was not available. If passenger capacity is provided but passenger class or type of accomodation is not reported, the passenger capacity is assigned to field {17}; furthermore, if the vessel is used for ferry operations as evident from the route lengths in fields {44a} to {44h}, this passenger capacity is likewise assigned to field {20}; otherwise, it is assigned to field {19}.
16	2nd Class Passengers	
17	3rd Class Passengers	
18	Passengers In Cabins	
19	Passengers In Dorms	
20	Seated Passengers	
21	DWT	Data sources may fail to provide a value for field {21} as it is not unusual for liner operators of relatively old passenger vessels or of vessels that underwent major conversion not to have information on deadweight. Since deadweight is an essential input to the model, it is estimated as described below and remarks field {206} is appended with the note that "DWT was estimated".

$$\{21\} = \max[\, EDWT_1 , EDWT_2 \,]$$

where :

$EDWT_1 =$ {8} × DWT:GRT ratio
and the DWT:GRT ratio is assumed to be as shown in the table below:

Vsl Type	Vessel	DWT:GRT Ratio
1	Conventional Cargo	1.5
2	Roll-on-roll-off	1.0
3	Containerized	1.7
4	Passenger	0.2
5	Passenger-Conventional	0.7
6	Passenger- RoRo	0.6
7	Passenger-Container	0.8
8	Fast Ferry	0.1
9	Landing Craft	1.6
10	Reefer	0.7
15	Others	1.0
16	Type not specified	1.0

$EDWT_2$ = Est. Displacement – Est. Light Ship Weight – PaxCap × .1

where:

Est. Displacement ≅ {10} * {11} * {13} * ϕ and

Est. Light Ship Weight ≅ [{30} * {31} * WPR * 1.5] +

[{10}*{11}*.122 + ({10}+{11})*{12}*.156 + {10}*{11}*Ndk*0.07]*1.25

with ϕ ≡ Block coefficient (as assumed in field {6})
Ndk ≡ Number of decks ≈ 2 as a default value for cargo vessels
≈ 3 as a default value for passenger vessels
WPR ≡ Weight of engine to Power Ratio ≈ 0.018 kg/hp as a default value.

22	TEU	When the TEU capacity of a pure container vessel is not provided, this capacity is estimated as follows: {22} = {21} * .85 /20 in which case, field {206} should include a remark that the TEU capacity is merely an estimate.
23	PCU	In the case of RoRo vessels where PCU capacity is not specified and traffic is known to be predominantly comprised of rolling cargoes, the PCU capacity is estimated, on the basis of data from the Vessel Inventory form, as follows: {23} = [Integer({11}/3.8) * Integer ({10}/4)] in which case field {206} should include a remark that the PCU capacity is merely an estimate.
24	Bale	
25	Grain	
26	(Blank1)	fields {26} and {29} are provided in case the vessel operator has a passenger class other than 1st, 2nd, and 3rd class or has a specialized carrier which is more appropriately described in a unit of cargo capacity other than those specified in fields {21} to {25}.
27	(Blank2)	
28	(Blank3)	
29	(Blank4)	

30	Main Eng. No.	
31	Main Eng. BHP	note that some engines specify KW instead of BHP
32	Main Eng. RPM	
33	Aux. Eng. No.	
34	Aux. Eng. BHP	note that some engines specify KW instead of BHP
35	Aux. Eng. RPM	
36	Bunker/SFO (tpd):	
37	Diesel (tpd):	
38	Lube (li. per day):	
39	Officers :	Crew complement information is derived from the
40	Ratings :	operations data provided in the Annual Report file.
41	Apprentices:	
42a	Route 1 Description	Routes are described on the basis of the sequence
42b	Route 2 Description	of ports called as reported in the traffic section
42c	Route 3 Description	of the Annual Report file. In the absence of such
42d	Route 4 Description	details from the Annual Report file, the LSRS
42e	Route 5 Description	survey on Route Inventory could provide such
42f	Route 6 Description	information.
42g	Route 7 Description	
42h	Route 8 Description	
43a	Route 1 Code	Route codes are based on the codes indicated by
43b	Route 2 Code	the LSRS Route Classification System.
43c	Route 3 Code	
43d	Route 4 Code	
43e	Route 5 Code	
43f	Route 6 Code	
43g	Route 7 Code	
43h	Route 8 Code	
44a	Route 1 Length	Route length is derived by adding the distances
44b	Route 2 Length	between the origin and destination port of each
44c	Route 3 Length	route leg. This requires a complete table of direct
44d	Route 4 Length	distances between all ports called by liner vessels.
44e	Route 5 Length	Alternatively, the Vessel Performance survey could
44f	Route 6 Length	provide information on nautical miles per voyage
44g	Route 7 Length	if the routes reported in the Annual Report tally
44h	Route 8 Length	with those listed in the Route Inventory questionnaire.

45a	No. of Voy. - Route 1	No. of voyages is based on an analysis of the traffic section of the Annual Report File. In the absence of this information on the vessel, the LSRS survey on Vessel Performance could provide such information.
45b	No. of Voy. - Route 2	
45c	No. of Voy. - Route 3	
45d	No. of Voy. - Route 4	
45e	No. of Voy. - Route 5	
45f	No. of Voy. - Route 6	
45g	No. of Voy. - Route 7	
45h	No. of Voy. - Route 8	
46a	Naut. Miles Run - Route 1	computed by multiplying {44a} by {45a}
46b	Naut. Miles Run - Route 2	computed by multiplying {44b} by {45b}
46c	Naut. Miles Run - Route 3	computed by multiplying {44c} by {45c}
46d	Naut. Miles Run - Route 4	computed by multiplying {44d} by {45d}
46e	Naut. Miles Run - Route 5	computed by multiplying {44e} by {45e}
46f	Naut. Miles Run - Route 6	computed by multiplying {44f} by {45f}
46g	Naut. Miles Run - Route 7	computed by multiplying {44g} by {45g}
46h	Naut. Miles Run - Route 8	computed by multiplying {44h} by {45h}
47	Total No. of Voyages:	equal to the sum of fields {45a}, {45b}, {45c}, {45d}, {45e}, {45f}, {45g], and {45h].
48	Total Naut. Miles Run:	equal to the sum of fields {46a}, {46b}, {46c}, {46d}, {46e}, {46f}, {46g], and {46h].
49	No. of Days in Commission: Total	- obtained from the operations data of the Annual Report.
50	Estimated Days at Sea-	estimated by dividing the total nautical miles run (field {48}) by the speed of the vessel (field {14}).
51	In Port -	derived by deducting the days at sea (field {50}) from the total days in commission (field {49}).
52	No. of Days Out of Commission: Total -	fields {52} to {56} are obtained from the vessel operations data of the Annual Report file. Data for field {55} is normally not provided in the Annual Reports; however, this was interjected into the new Annual Report form for any eventual comparative analysis of costs over two or more years where daily running costs and unit costs may vary significantly due to non-commissionable days which are beyond the control of the operator and are extraneous to the operator's performance.
53	Under Repair Afloat-	
54	On Drydock-	
55	Due to Bad Weather -	
56	Laid-up -	

57a	1st Cl Passenger Capacity Provided (in Pax-Miles) - Route 1	fields {57a} to {57h} are computed by multiplying the respective "total nautical miles run" by route in {46a} to {46h} by {15}.
57b	1st Cl Passenger Capacity Provided (in Pax-Miles) - Route 2	
57c	1st Cl Passenger Capacity Provided (in Pax-Miles) - Route 3	
57d	1st Cl Passenger Capacity Provided (in Pax-Miles) - Route 4	
57e	1st Cl Passenger Capacity Provided (in Pax-Miles) - Route 5	
57f	1st Cl Passenger Capacity Provided (in Pax-Miles) - Route 6	
57g	1st Cl Passenger Capacity Provided (in Pax-Miles) - Route 7	
57h	1st Cl Passenger Capacity Provided (in Pax-Miles) - Route 8	
58a	2nd Cl Passenger Capacity Provided (in Pax-Miles)-Route 1	fields {58a} to {58h} are computed by multiplying the respective "total nautical miles run" by route in {46a} to {46h} by {16}.
58b	2nd Cl Passenger Capacity Provided (in Pax-Miles)-Route 2	
58c	2nd Cl Passenger Capacity Provided (in Pax-Miles)-Route 3	
58d	2nd Cl Passenger Capacity Provided (in Pax-Miles)-Route 4	
58e	2nd Cl Passenger Capacity Provided (in Pax-Miles)-Route 5	
58f	2nd Cl Passenger Capacity Provided (in Pax-Miles)-Route 6	
58g	2nd Cl Passenger Capacity Provided (in Pax-Miles)-Route 7	
58h	2nd Cl Passenger Capacity Provided (in Pax-Miles)-Route 8	
59a	3rd Cl Passenger Capacity Provided (in Pax-Miles)-Route 1	fields {59a} to {59h} are computed by multiplying the respective "total nautical miles run" by route in {46a} to {46h} by {17}.
59b	3rd Cl Passenger Capacity Provided (in Pax-Miles)-Route 2	
59c	3rd Cl Passenger Capacity Provided (in Pax-Miles)-Route 3	
59d	3rd Cl Passenger Capacity Provided (in Pax-Miles)-Route 4	
59e	3rd Cl Passenger Capacity Provided (in Pax-Miles)-Route 5	
59f	3rd Cl Passenger Capacity Provided (in Pax-Miles)-Route 6	
59g	3rd Cl Passenger Capacity Provided (in Pax-Miles)-Route 7	
59h	3rd Cl Passenger Capacity Provided (in Pax-Miles)-Route 8	
60a	___ Cl Pax Capacity Provided (in Pax-Miles)-Route 1	fields {60a} to {60h} are provided in case there is any intermediate class other than 1st, 2nd, or 3rd class; in such case, the values are computed by multiplying the respective "total nautical miles run" in {46a} to {46h} by the capacity of that class as may be specified in fields {26} to {29}.
60b	___ Cl Pax Capacity Provided (in Pax-Miles)-Route 2	
60c	___ Cl Pax Capacity Provided (in Pax-Miles)-Route 3	
60d	___ Cl Pax Capacity Provided (in Pax-Miles)-Route 4	
60e	___ Cl Pax Capacity Provided (in Pax-Miles)-Route 5	
60f	___ Cl Pax Capacity Provided (in Pax-Miles)-Route 6	
60g	___ Cl Pax Capacity Provided (in Pax-Miles)-Route 7	
60h	___ Cl Pax Capacity Provided (in Pax-Miles)-Route 8	

61a	Ton-Miles Capacity Provided - Route 1	fields {61a} to {61h} are computed by multiplying the respective "total nautical miles run" in {46a} to {46h} by 85% of DWT (field {21}).
61b	Ton-Miles Capacity Provided - Route 2	
61c	Ton-Miles Capacity Provided - Route 3	
61d	Ton-Miles Capacity Provided - Route 4	
61e	Ton-Miles Capacity Provided - Route 5	
61f	Ton-Miles Capacity Provided - Route 6	
61g	Ton-Miles Capacity Provided - Route 7	
61h	Ton-Miles Capacity Provided - Route 8	
62a	TEU-Miles Capacity Provided - Route 1	fields {62a} to {62h} are computed by multiplying the respective "total nautical miles run" in {46a} to {46h} by TEU capacity (field {22}).
62b	TEU-Miles Capacity Provided - Route 2	
62c	TEU-Miles Capacity Provided - Route 3	
62d	TEU-Miles Capacity Provided - Route 4	
62e	TEU-Miles Capacity Provided - Route 5	
62f	TEU-Miles Capacity Provided - Route 6	
62g	TEU-Miles Capacity Provided - Route 7	
62h	TEU-Miles Capacity Provided - Route 8	
63a	PCU-Miles Capacity Provided - Route 1	fields {63a} to {63h} are computed by multiplying the respective "total nautical miles run" in {46a} to {46h} by the PCU capacity (field {23}).
63b	PCU-Miles Capacity Provided - Route 2	
63c	PCU-Miles Capacity Provided - Route 3	
63d	PCU-Miles Capacity Provided - Route 4	
63e	PCU-Miles Capacity Provided - Route 5	
63f	PCU-Miles Capacity Provided - Route 6	
63g	PCU-Miles Capacity Provided - Route 7	
63h	PCU-Miles Capacity Provided - Route 8	
64a	CBM-Miles Capacity Provided - Route 1	fields {64a} to {64h} are computed by multiplying the respective "total nautical miles run" in {46a} to {46h} by either {24} or {25}, depending on which capacity the revenue is based.
64b	CBM-Miles Capacity Provided - Route 2	
64c	CBM-Miles Capacity Provided - Route 3	
64d	CBM-Miles Capacity Provided - Route 4	
64e	CBM-Miles Capacity Provided - Route 5	
64f	CBM-Miles Capacity Provided - Route 6	
64g	CBM-Miles Capacity Provided - Route 7	
64h	CBM-Miles Capacity Provided - Route 8	
65a	Unit-Miles Capacity Provided - Route 1	fields {65a} to {65h} are provided in case a specialized carrier is the subject of the analysis and fields {26}, {27}, {28}, or {29} are used; in such case,
65b	Unit-Miles Capacity Provided - Route 2	
65c	Unit-Miles Capacity Provided - Route 3	
65d	Unit-Miles Capacity Provided - Route 4	

65e 65f 65g 65h	Unit-Miles Capacity Provided - Route 5 Unit-Miles Capacity Provided - Route 6 Unit-Miles Capacity Provided - Route 7 Unit-Miles Capacity Provided - Route 8	fields {65a} to {65h} are computed by multiplying the respective "total nautical miles run" in {46a} to {46h} by either {26}, {27}, {28}, or {29}, depending on which capacity the revenue is based.
66	Total 1st Cl Pax Cap. Provided (in Pax-Miles)	equal to {15} × {48}
67	Total 2nd Cl Pax Cap. Provided (in Pax-Miles)	equal to {16} × {48}
68	Total 3rd Cl Pax Cap. Provided (in Pax-Miles)	equal to {17} × {48}
69	Total ___ Cl Pax Cap. Provided (in Pax-Miles)	equal to the sum of {60a}, {60b}, {60c}, and so on until {60h}.
70	Total Ton-Miles Cap. Provided	equal to {21} × .85 × {48}
71	Total TEU-Miles Cap. Provided	equal to {22} × {48}
72	Total PCU-Miles Cap. Provided	equal to {23} × {48}
73	Total CBM-Miles Cap. Provided	equal to the sum of {64a}, {64b}, {64c} and so on until {64h}.
74	Total Unit-Miles Cap. Provided	equal to the sum of {65a}, {65b}, {65c} and so on until {65h}.
75 76	Percent Share of Cargo in Daily Running Cost : Percent Share of Passengers in DRC:	If the vessel does not transport passengers, i.e. fields {15} to {20} are zero and field {7} is equal to either 1, 2, 3, 9, or 10, then field {75} = 100% and {76} = 0. The calculations make use of the findings of the SRRS Vol. 2 on Shipping Cost and Rate Analysis, particularly in respect to how deadweight of a vessel of given size or GRT changes in relation to an increase in passenger capacity, i.e. about -0.5 DWT per seated passenger, about -1.5 DWT per berthed dormitory passenger, and about -3 DWT per cabin passenger.

These are adopted as default values by this cost estimation model unless new values are specified by the user at the beginning of the cost estimation run.

The percentage shares of passengers and cargo in DRC are computed as follows:

a) estimate the applicable change in deadweight in relation to change in passenger capacity (and store in memory constant K_1 by sourcing information from the Vessel Inventory file and applying the formula:

$$K_1 = [\text{No. of Passenger Berths inside Cabins} * 3 + \text{No. of Passenger Berths in Dormitory Spaces} * 1.5 + \text{No. of Unberthed Passengers} * .5] / \text{Total Pax Cap.}$$

In the event that the Vessel Inventory file does not provide the required information on passenger capacity by type of accomodation, K_1 is estimated as follows:

<u>For liners or vessels with route length greater than 60 miles</u>

$$K_1 = [\{15\} * 3 + [\{16\} + \{17\}] * 1.5] / [\{15\} + \{16\} + \{17\}]$$

<u>For ferries or vessels with route length of 60 miles or less</u>

$$K_1 = .5$$

b) compute percentage share of passenger service in DRC,

$$\{76\} = \frac{PaxCap * K_1}{\{21\} + K_1 * PaxCap} * 100$$

where PaxCap = {15} + {16} + {17}
or = {18} + {19} + {20}, whichever is higher.

c) compute the percentage share of cargo service in DRC (field {75}) by simply deducting field {76} from 100 percent.

77 Fuel as Reported - derived from the vessel income statement in the Annual Report file. This field includes fuel and lubricants expenses of the subject vessel.

78 Port Charges as Reported - derived from the vessel income statement in the Annual Report file. This field includes pilotage, mooring and unmooring, vessel clearance, and port usage charges.

79 Cargo Share - Fuel is equal to {77} * {75}

80 Cargo Share - Port Charges is equal to {78} * {75}

81 Passenger Share - Fuel is equal to {77} * {76}

82 Passenger Share - Port Charges is equal to {78} * {76}

83 Running Expenses (Excluding Interest & Depreciation) is obtained from the Annual Report file; this consists of the all non-voyage related vessel expenses as well as a proportion of terminal, general administrative and overhead expenses which the vessel would bear relative to the fleet of the company. Such proportion is estimated (and stored in memory as a constant K_2) on the basis of the total operating cost of the vessel in relation to the total operating cost of the company. However, for purposes of this cost analysis, all depreciation and interest as well as amortization of pre-operating expenses or of capital expenditures shall be excluded from the estimate of running expense as this will be dealt with under field {88}.

84 Invested Capital: On Vessel is equal to the net book value of the subject vessel plus net value of capital improvements on the vessel, as indicated in the property & equipment schedule of the Annual Report file.

85 Appraisal Increment: On Vessel refers to the reappraised fair market value less accumulated depreciation since reappraisal. This is computed by deducting accumulated depreciation on appraisal from the appraisal increase, as obtained from the Annual Report file.

86 Invested Capital: On Ancillary Assets is computed by adding the net book value of terminal properties and equipment, the net book value of head office properties and equipment, the net value of capital improvements on terminals and head office, the net value of leasehold improvements, as provided in the Annual Report file. Assets not related to vessel operations, such as investments in securities, stocks, real property not relevant to operations, etc. are not to be considered as part of fields {86} and {87}.

87 Appraisal Increment: On Ancillary Assets is the appraisal increase of all ancillary assets mentioned in field {86}, net of depreciation on appraisal increment.

88 Cost of Capital refers to the annualized amount required to recover the invested capital; in lieu of depreciation plus interest (on own and on borrowed capital) over the remaining economic life of the vessel which will demonstrate a declining amount over time, this cost analysis will apply a capital recovery factor which presents a uniform annual stream of capital cost.

This method generates an amount comparable to what could be an equivalent lease rate for the assets. In the case of the vessel, this method will provide an indicative rate of what could be a long-term bareboat charter rate, exclusive of insurance and overseeing/managing expenses. That is to say that, at his point in the model, when full cost recovery is being identified, the "reasonable return" includes the return to risk on ownership of the vessel, but excludes the return to risk of placing the vessel into service. The subsequent addition of this latter return to risk will constitute the difference between the full cost per unit of traffic and the rate that would need to be imposed at a target load factor utilization rate to provide a sufficient return to vessel service risk.

The value of field {88} is computed as follows:

a) specify the reasonable rate of return, in percent per annum,

b) compute for the capital recovery factor (CRF) by using the formula

$$CRF = \frac{i * (1 + i)^n}{(1 + i)^n - 1}$$

where: i = rate of return (expressed as a decimal)
n = remaining economic life of the asset (in years)

c) compute for the capital recovery of the vessel by multiplying the sum of {84} and {85} by CRF

d) compute for the proportion of the capital recovery of other assets that can be associated with the subject vessel by the formula:
[{86}+{87}] * CRF * K_2 , where K_2 is the memory constant generated while computing for field {83}

e) computing for field {88} value by adding the results of the above steps c) and d).

89 Total Running Cost is determined from the sum of total running expenses plus the return on capital, i.e. {89} = {83} + {88}.

90 Annual Running Cost at Sea
91 Annual Running Cost in Port

is apportioned according to the total time spent by the vessel at sea and in port during its commissionable days. The following formula are applied:

Running Cost at Sea: {90} = {89}*{50}/{49}

Running Cost in Port: {91} = {89}*{51}/{49}

92 Cargo Share of Running cost at Sea is equal to {90} * {75}/100
93 Cargo Share of Running cost in Port is equal to {91} * {75}/100
94 Passenger Share of Running cost at Sea is equal to {90} * {76}/100
95 Passenger Share of Running cost in Port is equal to {91} * {76}/100

96 Annual Cargo-related Expenses refer to the stevedoring and wharf labor expenses as reported in the Annual Report file.

97 Annual Passenger-related Expenses include passenger meals, steward supplies, and other expenses directly incurred for passengers. The Annual Report files for 1992 and prior years fail to provide a detailed breakdown of these passenger-related expenses; thus, passenger meals expense for these years (reported under the prevailing Annual Report form) is estimated by deducting crew provisions and subsistence (estimated roughly at P40 per man per day or equal to

[{39 + {40} + {41}] * 40 * 365) from "food and subsistence" as reported in the Annual Report.

98 Annual Sub-Total Operating Cost is the sum of {77}+{78}+{90}+{91}+{96}+{97}

99 Sub-Total Cargo Share of Operating Cost is the sum of {79} + {80} + {92} + {93} + {96}.

100 Sub-Total Passenger Share of Operating Cost is the sum of {81} + {82} + {94} + {95} + {97}.

101 Annual Common Carriers' Tax is based on the subject vessel's common carriers' tax as reported in the Annual Report file. Based on rules of the Internal Revenue, common carriers' tax should be 3% of gross freight and passage revenue. If the reported common carriers' tax appears to be less than 3% of the said revenue, the computed percentage should be appended as a remark under field {206}.

102 Cargo Share of Common Carriers' Tax is based on the annual common carriers' tax and the proportion of the sub-total cargo operating cost to annual sub-total operating cost, i.e. {102} = {101} * {99} / {98}.

103 Passenger Share of Common Carrier's Tax is equal to {101} minus {102}.

104 Annual Commissions is based on the subject vessel's commission expense as reported in the Annual Report file.

105 Cargo Share of Commissions is based on the annual commissions and a proportion of the sub-total cargo operating cost to annual sub-total operating cost, i.e. {105} = {104} * {99} / {98}.

106 Passenger Share of Commissions is equal to {104} minus {105}.

107 Annual Total Operating Cost is equal to {98} + {101} + {104}.

108 Cargo Share of Total Operating Cost is equal to {99} + {102} + {105}.

109 Passenger Share of Total Operating Cost is equal to {100} + {103} + {106}.

Some vessels express cargo capacity in various cargo units, specially when the vessel is engaged in more than one type of cargo operation, e.g. mixed container and breakbulk operations. Under such cases, the share of each type of cargo operation to the total operating cost should be estimated on the basis of their respective proportion in the total cargo capacity. Thus, in computing for fields {110} to {122}, vessels with multiple cargo operations will have to consider this proportion before applying the values for fields {79}, {80}, {92}, {93}, and {96}. Additional algorithms for determining unit cost for vessels with various cargo units are presented in the Annex of this report volume.

110 Fuel Cost per Unit-Mile: Cargo Operations is equal to {79} divided by the relevant unit-miles capacity provided by the vessel, i.e.
For ton-miles, {110} = {79} / {70}
For TEU-miles, {110} = {79} / {71}
For PCU-miles, {110} = {79} / {72}
For CBM-miles, {110} = {79} / {73}

111 Port Charges per Unit of Cargo is equal to {80} divided by the relevant total cargo units of capacity provided by the vessel, i.e.
For ton units, {111} = {80} / [{21} * .85 * Total No. of Rt Legs]
For TEU units, {111} = {80} / [{22} * Total No. of Rt Legs]
For PCU units, {111} = {80} / [{23] * Total No. of Rt Legs]
For CBM units, {111} = {80} / [({24}, {25}, or {26}) * Total Rt. Legs]

where Total No. of Rt. Legs (TRL) is estimated as follows:

$$TRL = [\{45a\}*Rt\ Legs_{rt\,1} + \{45b\}*Rt\ Legs_{rt\,2} + \{45c\}*Rt\ Legs_{rt\,3} + \{45d\}*Rt\ Legs_{rt\,4} + \ldots + \{45h\}*Rt\ Legs_{rt\,5}]$$

112 Running Cost at Sea per Cargo Unit-Mile is equal to {92} divided by the relevant unit-miles capacity provided by the vessel, i.e.
For ton-miles, {112} = {92} / {70}
For TEU-miles, {112} = {92} / {71}
For PCU-miles, {112} = {92} / {72}
For CBM-miles, {112} = {92} / {73}

113 Running Cost in Port per Unit of Cargo is equal to {80} divided by the relevant total cargo units of capacity provided by the vessel, i.e.
For ton units, {113} = {93} / [{21} * .85 * Total No. of Rt Legs]
For TEU units, {113} = {93} / [{22} * Total No. of Rt Legs]
For PCU units, {113} = {93} / [{23] * Total No. of Rt Legs]
For CBM units, {113} = {93} / [({24}, {25}, or {26}) * Total Rt. Legs]

114 Cargo-related Expenses per Unit of Cargo is derived by dividing "actual cargo-related expenses" by the "actual traffic served" in an attempt to derive the then prevailing average cargo handling costs. The following formula is applied:
For ton units, {114} = {96} / {173}
For other relevant cargo units, {114} = {96} / {177}

115	Sub-Total Operating Cost per Unit of Cargo	is the sum of {111}+{113}+{114}
116	Sub-Total Operating Cost per Cargo Unit-Mile	is the sum of {110} + {112}
117	Common Carrier's Tax per Unit of Cargo	is equal to {115} * {102} / {99}
118	Common Carrier's Tax per Cargo Unit-Mile	is equal to {116} * {102} / {99}
119	Commissions per Unit of Cargo	is equal to {115} * {105} / {99}
120	Commissions per Cargo Unit-Mile	is equal to {116} * {105} / {99}

121 X Coeff. of Cargo Cost Function: All Classes is equal to the sum of {115}+{117}+{119}

122 Y Coeff. of Cargo Cost Function: All Classes is equal to the sum of {116}+{118}+{120}

123 Fuel Cost per Passenger-Mile is equal to {81} divided by the sum of {66} + {67} + {68} + {69}

124 Port Charges per Passenger is estimated by dividing the share of passenger operations in port charges by the total number of passengers that the vessel could have carried at full load. This is expressed in formula as follows:

{124} = {82}/[max({15}+{16}+{17}, {18}+{19}+{20})* TRL]

where TRL is as defined in field {111}.

125 Running Cost at Sea per Passenger-Mile is equal to {94} divided by the sum of {66} + {67} + {68} + {69}

126 Running Cost in Port per Passenger is equal to {95} divided by the total number of passengers that the vessel could have carried at full load, or {95} / [max({15}+{16}+{17}, {18}+{19}+{20}) * TRL]

127 Passenger-related Expenses per Passenger is derived by dividing "actual passenger-related expenses" by the "actual traffic served" in an attempt to derive the then prevailing average cost per passenger transported, i.e. {127} = {97} / {170}.

128 Sub-Total Operating Cost per Passenger is equal to {124} + {126} + {127}

129 Sub-Total Operating Cost per Passenger-Mile is equal to {123} + {125}

130 Common Carrier's Tax per Passenger is equal to {128} * {103} / {100}

131 Common Carrier's Tax per Passenger-Mile is equal to {129} * {103} / {100}

132 Commissions per Passenger is equal to {128} * {106} / {100}

133 Commissions per Passenger-Mile is equal to {129} * {106} / {100}

134 X Coefficient of Passenger Cost Function is equal to {128} + {130} + {132}

135 Y Coefficient of Passenger Cost Function is equal to {129} + {131} + {133}

136 Cost Index of Cargo Cost Function: Class A
137 Cost Index of Cargo Cost Function: Class B
138 Cost Index of Cargo Cost Function: Class C
139 Cost Index of Cargo Cost Function: _____

The cost indices of the cargo classes are to be specified by the analyst relative to the average cost function having an index of 100.

140 X Coefficient of Cargo Cost Function: Class A is equal to {121} * {136} / 100

141 Y Coefficient of Cargo Cost Function: Class A is equal to {122} * {136} / 100

142 X Coefficient of Cargo Cost Function: Class B is equal to {121} * {137} / 100

143 Y Coefficient of Cargo Cost Function: Class B is equal to {122} * {137} / 100

144 X Coefficient of Cargo Cost Function: Class C is equal to {121} * {138} / 100

145 Y Coefficient of Cargo Cost Function: Class C is equal to {122} * {138} / 100

146 X Coefficient of Cargo Cost Function: _____ is equal to {121} * {139} / 100

147 Y Coefficient of Cargo Cost Function: _____ is equal to {122} * {139} / 100

148 Cost Index of Passenger Cost Function for Cabin Passengers is estimated on the basis of the proportion of the reduction in DWT for every cabin passenger in relation to the weighted average reduction in DWT given the profile of passenger accomodations; in mathematical terms, {148} = 3 * 18} * 100 / [K_1 * ({15} + {16} + {17})]

149 Cost Index of Passenger Cost Function for Dormitory Passengers is equal to 1.5 * {19} * 100 / [K_1 * ({15} + {16} + {17})]

150 Cost Index of Passenger Cost Function for Passengers in Seats is equal to 0.5 * {20} * 100 / [K_1 * ({15} + {16} + {17})]

151 Cost Index of Passenger Cost Function for Passengers in another type of accomodation not elsewhere mentioned - is equal to the estimated reduction in DWT for every passenger in this accomodation space multiplied by the capacity in this accomodation and by 100 divided by the product of the weighted average reduction in DWT given the profile of passenger accomodations, K_1, and the total passenger capacity.

152 X Coeff. of Passenger Cost Function: Cabin Passengers is equal to {134}*{148} / 100

153 Y Coeff. of Passenger Cost Function: Cabin Passengers is equal to {135} * {148} / 100

154 X Coeff. of Passenger Cost Function: Dormitory Passengers is equal to {134}* {149} / 100

155 Y Coeff. of Passenger Cost Function: Dormitory Passengers is equal to {135}* {149} / 100

156 X Coeff. of Passenger Cost Function: Passengers in Seats is equal to {134} * {150} / 100

157 Y Coeff. of Passenger Cost Function: Passengers in Seats is equal to {135}*{150} / 100

158 X Coeff. of Passenger Cost Function: Passengers in another accomodation not elsewhere mentioned is equal to {134} * {151} / 100

159 Y Coeff. of Passenger Cost Function: Passengers in another accomodation not elsewhere mentioned is equal to {135} * {151} / 100

160a Passengers Served on Route 1
160b Passengers Served on Route 2
160c Passengers Served on Route 3
160d Passengers Served on Route 4
160e Passengers Served on Route 5
160f Passengers Served on Route 6
160g Passengers Served on Route 7
160h Passengers Served on Route 8

fields {160a} to {160h} are obtained from the traffic section of the Annual Report file.

161a Pax-Miles Served on Route 1
161b Pax-Miles Served on Route 2
161c Pax-Miles Served on Route 3
161d Pax-Miles Served on Route 4
161e Pax-Miles Served on Route 5
161f Pax-Miles Served on Route 6
161g Pax-Miles Served on Route 7
161h Pax-Miles Served on Route 8

fields {161a} to {161h} are computed by multiplying the number of passengers served between an origin and destination port pair of a given route by the navigated distance, inclusive of deviations through transit ports. This means that, in a case where passengers are bound for port C from port A via port B, pax-miles is equal to Pax * [Dist AB+BC].

162a Ave. Pax Load Factor on Route 1 is equal to {161a}/[{57a}+{58a}+{59a}+{60a}]
162b Ave. Pax Load Factor on Route 2 is equal to {161b}/[{57b}+{58b}+{59b}+{60b}]
162c Ave. Pax Load Factor on Route 3 is equal to {161c}/[{57c}+{58c}+{59c}+{60c}]
162d Ave. Pax Load Factor on Route 4 is equal to {161d}/[{57d}+{58d}+{59d}+{60d}]
162e Ave. Pax Load Factor on Route 5 is equal to {161e}/[{57e}+{58e}+{59e}+{60e}]
162f Ave. Pax Load Factor on Route 6 is equal to {161f}/[{57f}+{58f}+{59f}+{60f}]
162g Ave. Pax Load Factor on Route 7 is equal to {161g}/[{57g}+{58g}+{59g}+{60g}]
162h Ave. Pax Load Factor on Route 8 is equal to {161h}/[{57h}+{58h}+{59h}+{60h}]

163a M. Tons Transported on Route 1
163b M. Tons Transported on Route 2
163c M. Tons Transported on Route 3
163d M. Tons Transported on Route 4
163e M. Tons Transported on Route 5
163f M. Tons Transported on Route 6
163g M. Tons Transported on Route 7
163h M. Tons Transported on Route 8

fields {163a} to {163h} are obtained from the traffic section of the Annual Report file

164a	M. Ton-Miles Served on Route 1	fields {164a} to {164h} are computed by multiplying the tons moved between each origin-destination port pair by the navigated distance, inclusive of deviations via transit ports.
164b	M. Ton-Miles Served on Route 2	
164c	M. Ton-Miles Served on Route 3	
164d	M. Ton-Miles Served on Route 4	
164e	M. Ton-Miles Served on Route 5	
164f	M. Ton-Miles Served on Route 6	
164g	M. Ton-Miles Served on Route 7	
164h	M. Ton-Miles Served on Route 8	

165a	Ave. Cargo Load Factor on Route 1 is equal to {164a} / {61a}
165b	Ave. Cargo Load Factor on Route 2 is equal to {164b} / {61b}
165c	Ave. Cargo Load Factor on Route 3 is equal to {164c} / {61c}
165d	Ave. Cargo Load Factor on Route 4 is equal to {164d} / {61d}
165e	Ave. Cargo Load Factor on Route 5 is equal to {164e} / {61e}
165f	Ave. Cargo Load Factor on Route 6 is equal to {164f} / {61f}
165g	Ave. Cargo Load Factor on Route 7 is equal to {164g} / {61g}
165h	Ave. Cargo Load Factor on Route 8 is equal to {164h} / {61h}

166	Cargo Unit	field {166} defines the relevant cargo unit, e.g. TEU, PCU, CBM, etc., used in the calculation of fields {167}, {168} and {169}.

167a	Cargo Units Transported on Rt 1	fields {167a} to {167h} are obtained from the traffic section of the Annual Report file.
167b	Cargo Units Transported on Rt 2	
167c	Cargo Units Transported on Rt 3	
167d	Cargo Units Transported on Rt 4	
167e	Cargo Units Transported on Rt 5	
167f	Cargo Units Transported on Rt 6	
167g	Cargo Units Transported on Rt 7	
167h	Cargo Units Transported on Rt 8	

168a	Cargo Unit-Miles Transported on Rt 1	fields {168a} to {168h} are computed by multiplying the number of cargo units moved between an origin-destination port pair of a given route by the navigated distance between origin and destination, inclusive of deviation distance.
168b	Cargo Unit-Miles Transported on Rt 2	
168c	Cargo Unit-Miles Transported on Rt 3	
168d	Cargo Unit-Miles Transported on Rt 4	
168e	Cargo Unit-Miles Transported on Rt 5	
168f	Cargo Unit-Miles Transported on Rt 6	
168g	Cargo Unit-Miles Transported on Rt 7	
168h	Cargo Unit-Miles Transported on Rt 8	

169a	Ave. Unit Load Factor on Route 1	fields {169a} to {169h} are computed by dividing the cargo unit-miles in fields {168a} to {168h} by the respective cargo capacity pertaining to relevant cargo unit, i.e. {62a} to {62h} in the case of TEUs, {63a} to {63h} in the case of PCUs, etc.
169b	Ave. Unit Load Factor on Route 2	
169c	Ave. Unit Load Factor on Route 3	
169d	Ave. Unit Load Factor on Route 4	
169e	Ave. Unit Load Factor on Route 5	
169f	Ave. Unit Load Factor on Route 6	
169g	Ave. Unit Load Factor on Route 7	
169h	Ave. Unit Load Factor on Route 8	

170 Total Passengers Served is the sum of {160a} + {160b} + {160c} + ... {160h}

171 Total Passenger-Miles Served is the sum of {161a}+{161b}+{161c}+ ... {161h}

172 Weighted Ave. Passenger Load Factor is computed by dividing {171} by the sum of {66} + {67} + {68} + {69}.

173 Total M. Tons Transported is the sum of {163a} + {163b} + {163c} +... (163h}

174 Total M. Ton-Miles Served is the sum of {164a} + {164b} + {164c} + ... {164h}

175 Weighted Ave. Cargo Load Factor is computed by dividing {174} by {70}

176 Total Cargo Units Served is the sum of {167a} + {167b} + {167c} + ... {167h}

177 Total Cargo Unit-Miles Served is the sum of {168a}+{168b}+ {168c} + ...{168h}

178 Weighted Ave. Unit Load Factor is computed by dividing {177} by the relevant cargo unit-miles provided by the vessel, i.e.

{178} = {177} / {71} in the case of TEU calculations,
{178} = {177} / {72} in the case of PCU calculations, etc.

179a Port of Origin on Route 1
180a Port of Destination on Route 1

For each route, a list of port pairs where traffic is known to flow shall be prepared; this includes port pairs which are not only directly linked but also pairs with intermediate ports of call between them. As an example, take route L083 covering the ports Manila/Iloilo/Zambo-anga/Dadiangas-/Zamboanga/Iloilo/Manila; in this case, candidate port pairs to be indicated under fields {179} and {180} are:

a. Manila-Iloilo direct
b. Manila-Zamboanga via Iloilo
c. Manila-Dadiangas via Iloilo and Zamboanga
d. Iloilo-Zamboanga direct
e. Iloilo-Dadiangas via Zamboanga
f. Zamboanga-Dadiangas direct

Reverse directional flows which are directly linked (such as Iloilo-Manila) or are passing via the same transit ports (such as Dadiangas-Iloilo via Zamboanga) need not be repeated in the list. This simplification is appropriate because the same cost estimates will result from the computations for as long as the distance remains unchanged.

To simplify the task further, all port pairs with no apparent trade shall be removed from the list; in case of doubt regarding the presence of any trade flow, however, the port pair will still have to be included under fields {179} and {180}.

181a Navigated Distance between Origin and Destination refers to the estimated nautical distance navigated by the vessel under the route's sequence of port calls. This means that port pairs with intermediate ports of call will have to consider the deviation distance travelled via transit ports.

182a to 187a Notes : The passenger transport cost function discussed under fields {134} and {135} implicitly assumes a 100% load factor condition. Since the cost per passenger is inversely proportional to the passenger load factor, the passenger transport cost can be expressed as a function of both distance and load factor as follows:

Ave. Pax Transport Cost = [{135} * {181a} + {134}] * 100/PLF

In the case of passengers accomodated in dormitories, the cost function is:

Dorm Pax Transport Cost = [{155} * {181a} + {154}] * 100/PLF

and for unberthed (seated) passengers, the cost function is:

Seated Pax Transport Cost= [{157} * {181a} + {156}] * 100/PLF.

These two latter passenger transport cost functions indicate the actual cost in providing third class passenger space, i.e. dorm passenger transport cost in the case of liners, seated passenger transport cost in the case of ferries.

182a Est. Cost Per 3rd Class Passenger given a Load Factor of 40% is estimated:
a) for liners as equal to [{155} * {181a} +{154}] * 100/40
b) for ferries as equal to [{157} * {181a} + {156}] * 100/40

183a Est. Cost Per 3rd Class Passenger given a Load Factor of 50% is estimated:
a) for liners as equal to [{155} * {181a} +{154}] * 100/50
b) for ferries as equal to [{157} * {181a} + {156}] * 100/50

184a Est. Cost Per 3rd Class Passenger given a Load Factor of 60% is estimated:
a) for liners as equal to [{155} * {181a} +{154}] * 100/60
b) for ferries as equal to [{157} * {181a} + {156}] * 100/60

185a Est. Cost Per 3rd Class Passenger given a Load Factor of 80% is estimated:
a) for liners as equal to [{155} * {181a} +{154}] * 100/80
b) for ferries as equal to [{157} * {181a} + {156}] * 100/80

186a Est. Cost Per 3rd Class Passenger given a 100% Load Factor is identical to the original full cost functions, i.e. for liners as equal to [{155} * {181a} +{154}] and for ferries as equal to [{157} * {181a} + {156}].

187a Est. 3rd Class Passenger at the Prevailing Load Factor is estimated:
a) for liners as equal to [{155} * {181a} +{154}] * 100/ {162a}
b) for ferries as equal to [{157} * {181a} + {156}] * 100/{162a}

188a Estimated Cost Per Ton given a Load Factor of 40% is equal to
[{122} * {181a} + {121}] * 100/40

189a Estimated Cost Per Ton given a Load Factor of 50% is equal to
[{122} * {181a} + {121}] * 100/50

190a Estimated Cost Per Ton given a Load Factor of 60% is equal to
[{122} * {181a} + {121}] * 100/60

191a Estimated Cost Per Ton given a Load Factor of 80% is equal to
[{122} * {181a} + {121}] * 100/80

192a Estimated Cost Per Ton given a 100% Load Factor is identical to the original average cost function, i.e. [{122} * {181a} + {121}]

193a Estimated Cost Per Ton under the Prevailing Load Factor is equal to
[{122} * {181a} + {121}] * 100/ {165a}

194a Est. Cost Per TEU FCL FAK given a Load Factor of 40% is equal to
[{122} * {181a} + {121}] * 100/40

195a Est. Cost Per TEU FCL FAK given a Load Factor of 50% is equal to
[{122} * {181a} + {121}] * 100/50

196a Est. Cost Per TEU FCL FAK given a Load Factor of 60% is equal to
[{122} * {181a} + {121}] * 100/60

197a Est. Cost Per TEU FCL FAK given a Load Factor of 80% is equal to
[{122} * {181a} + {121}] * 100/80

198a Est. Cost Per TEU FCL FAK given a 100% Load Factor is identical to the original average cost function, i.e. [{122} * {181a} + {121}]

199a Est. Cost Per TEU FCL FAK under the Prevailing Load Factor is equal to
[{122} * {181a} + {121}] * 100/ {169a}

200a Est. Cost Per Lane-Meter given a Load Factor of 40% is equal to
[{122} * {181a} + {121}] * [100 /40] / 4

201a Est. Cost Per Lane-Meter given a Load Factor of 50% is equal to
[{122} * {181a} + {121}] * [100 /50] / 4

202a Est. Cost Per Lane-Meter given a Load Factor of 60% is equal to
[{122} * {181a} + {121}] * [100 /60] / 4

203a Est. Cost Per Lane-Meter given a Load Factor of 80% is equal to
[{122} * {181a} + {121}] * [100 /80] / 4

204a Est. Cost Per Lane-Meter given a 100% Load Factor is equal to
[{122} * {181a} + {121}] / 4

205a Est. Cost Per Lane-Meter under the Prevailing Load Factor is equal to
[{122} * {181a} + {121}] * [100/ {169a}] / 4

206 Remarks — field {206} is to contain remarks generated by algorithms of some fields which data were not obtainable and were merely estimated on the basis of other data. It provides space for notes whenever any data or calculation result appears beyond a zone of reasonableness and would call for further validation of information. It is to contain any other remark which the analyst wishes to record.

Chapter 4

A MODEL FOR ESTIMATING THEORETICAL COSTS

This chapter presents an alternative model for computing the full cost of providing liner shipping and ferry services. In contrast to the model presented in the previous chapter, this model generates theoretical cost estimates on the basis of technical parameters and price assumptions as specified by the cost analyst.

Specifications of the Model

Unlike in the preceding model for estimating actual costs where a computer program was appropriate for the repetitive processing of a great number of Annual Reports of shipping operators, this model for estimating theoretical costs was developed under a spreadsheet environment. As a spreadsheet template, it affords the cost analyst a fast and convenient tool for analyzing cost per unit of space for varying price assumptions and load factor conditions for any particular vessel and route combination.

This spreadsheet-based model presents a template in the accompanying diskette under the filename THEOCOST.XLS. The template is provided in Excel 4.0 format. The model requires the following system specifications: Windows 3.1 and Excel 4.0 (or later versions) application software and an IBM or IBM-compatible PCAT 286 (or higher) computer with at least 2mB of memory, one disk drive, and a hard disk or compact disk drive to contain the application software.

The model was designed according to the following specifications:

- The model requires as data inputs the outline specifications of an interisland vessel (regardless of whether or not it is presently trading), the characteristics and specifications of the route to be served (regardless of whether or not the route is presently served), and the vessel's sailing schedule.

- The model optionally requires as additional data inputs the monthly and/or annual traffic of whatever type and the user charges for each route link and type of traffic, when the analyst intends to assess the viability of a shipping service (whether existing or new) under a given set of assumptions.

- The model generates monthly and annual estimates of load factor by unit of traffic based on the traffic assumptions to enable the analyst to make adjustments on assumed sailing schedules and traffic volumes served.

- The model generates monthly and annual estimates for each cost item using default values for prices which are believed to be indicative of the prevailing prices of inputs. However, the model allows the user to change/update these default values whenever the analyst so desires.

- The model provides a template for conveniently generating monthly and annual projected income statements, cash flows, and balance sheet for the shipping service under study.

- The model provides estimates of daily runnings costs, daily operating costs, and estimates of cost per unit of space under varying load factor conditions.

Recommended Uses and Limitations

With the foregoing specifications and the process adopted in the development of this model, the LSRS recommends the following main uses for this model:

- The model could be used as a reference for checking the accuracy of reported costs. Owing to the generalized approach in deriving/adopting default values for this model, a variance of up to 20% between the computational results of the model and the reported costs may still render the reported costs to be within the "zone of reasonableness".

- The model could assist MARINA in assessing the probable effects on costs of changes in vessel call schedules and improved utilization rates, e.g. increase in number of voyages per annum as a result of reduction in port time or reduction in non-commisisonable days for the vessel, etc.

- The model could also assist MARINA in assessing the probable effects on full shipping costs (and on the relative viability of existing types of services) of changes in prices of fuel, salaries, and other essential inputs.

- The model could facilitate the preparation of complete financial analyses for possible new services which are not yet being operated.

The model contains simplified technical equations for estimating essential ship's particulars, e.g. GRT, DWT, etc., which may not always be available to the user of the model. It also provides tables of correspondence between essential ship's particulars and other technical parameters which directly relate to costs, such as the number and size of sea chest strainers in relation to GRT, or the propeller and tailshaft diameters in relation to BHP. Although these equations and tables involve ship design parameters, the model remains inappropriate and unsuitable for use in any ship design exercises or for determining optimum ship specifications for a route under study.

For the sake of simplicity and practicality, the model presents default values for field variables according to broad types and ranges in size of vessels and according to what is believed to be the current (1994) average value or price for that category. To attain relatively more accurate cost estimates, the model user is therefore advised to give preference to adopting customized, specific and up-to-date values that apply to the vessel and the route, whenever these are known, over the use of the default values provided in this model.

The general process of the model in generating cost estimates is applicable to most vessels regardless of where they trade. However, the cost analyst is forewarned that the default prices in this model are applicable to vessels presently engaged, or to be soon engaged, in the Philippine interisland trade; thus, it is deemed prudent that the default prices be updated periodically to suit the then prevailing local conditions. Likewise, the default values for consumption rates and other technical parameters are generally applicable to vessels within the size range of those currently deployed in domestic trade; the accuracy of cost estimates may therefore degenerate when this model is used for vessels exceeding 16,000 DWT.

General Process and Structure of the Model

The spreadsheet template of the model consists of the following modules:

a) Vessel Particulars
b) Operating Assumptions
c) Traffic Assumptions
d) Price Assumptions
e) Estimate of Annual Costs
f) Estimate of Cost per Unit of Space

In Module a), a column is provided for inputting all available vessel particulars that are of concern to the model. An adjacent column is incorporated to automatically estimate the value of any vessel particular that was not inputted on the basis of known particulars.

In Module b), the model user is required to specify the route and distances between route legs, the expected number of days of service interruption, and the proposed schedule of service. The model interacts with the user by indicating the maximum number of voyages possible over the given period, i.e. monthly and annually, after which the user could make necessary adjustments to the proposed schedule. The model then estimates the operating requirements, such as fuel, lubricating oil, crew complement, etc., based on default values but leaving the user the option to replace any cell value with what is known to be more accurate.

In Module c), the model user is required to indicate the types of traffic and their respective volumes that the vessel is expected to serve during each period, possibly on a monthly basis, after considering the seasonality of traffic and the expected market share. The model interacts with the user by displaying the ensuing load factors by type of traffic. The user is then allowed to change the vessel schedule in Module b) to increase capacity, if still possible, and/or modify the traffic targets when the load factors appear to be excessive.

In Module d), the spreadsheet groups together all price assumptions, including assumptions on user charges by type of traffic and by route link if the model is to be used in preparing complete financial analyses of any shipping service. Default prices, as discussed under the algorithms, are inputted into this part of the spreadsheet unless the user has data on more recent and applicable prices.

In Module e), the model presents the estimated annual revenues and costs, as well as monthly revenues and costs if the analyst has opted in the earlier Modules to specify any monthly operations and traffic data. If the analyst would like to prepare a complete financial analysis for a shipping service, the model also presents templates for a projected cash flow and projected balance sheet statement of up to 10 years. To generate all the financial projections, the user will need to specify a starting balance sheet and will have to examine if the default assumptions to the cash flow statement need any adjustment.

In Module f), the model presents, inter alia, the estimates of daily running cost, daily operating cost, and cost per unit of space under varying load factor conditions.

THEOCOST Algorithms

This section discusses the procedures and algorithms adopted in each of the aforementioned modules.

Vessel Particulars

The model requires that the cost analyst specify the following vessel particulars:

Field Description	Procedure
{1} Vessel Name :	This information is normally obtained without difficulty. However, the analyst should exercise care when obtaining a vessel name and corresponding specifications from various sources due to the common practice of liner operators in reusing the same name of another vessel under their fleet.
{2} Vessel Type :	Any of the following vessel types is specified as appropriate: 1 - Conventional Cargo 2 - Roll-on-Roll-off 3 - Container 4 - Passenger (21 knots and below) 5 - Combined Passenger-Conventional Cargo 6 - Combined Passenger-RoRo 7 - Combined Passenger-Container 8 - Fast Ferry (above 21 knots)

9 - Landing Craft
10 - Reefer
15 - Others
16 - Type not specified

Vessels of more than 499 gross tons and with passenger-carrying capacity of less than 50 dormitory or seated persons are not to be classified as passenger-carrying vessels in view of their negligible passenger space; this is also because some cargo vessels are fitted with an owner's cabin (or a few additional cabins) which were registered to carry passengers, although not on a commercial basis. By separating these vessels from those classified as passenger-cargo vessels, the computational effort is greatly reduced.

In the event that the hull of the vessel was not constructed of steel, this field data should indicate what material was used, e.g. wood, aluminium, ferrocement, glass reinforced plastic, etc.

{3} Year and Place Built: If both date of keel laying and date of launching are known, this field data should take the year of the latter date as this would be relatively more relevant in determining the service life of the vessel. If only one date is known, this is adopted as the date of building.

{4} Age: Time difference between the current date (or base date of cost analysis) and date of launching.

{5} Gross Registered Tonnage (GRT):
{6} Net Registered Tonnage (NRT):

GRT and NRT are derived from either the Annual Report file or the LSRS survey form on Vessel Inventory. Since GRT data is essential in computing for port charges, this is estimated by the cost model as follows:

$$\text{Estimated GRT} = \frac{L * B * D * \phi}{2.83}$$

where : L = length between perpendiculars (in meters)
B = breadth, moulded (in meters)
D = depth, moulded (in meters)
ϕ = block coefficient of the vessel under analysis; if not available, block coefficient is assumed to be
= 0.98 for barges or box-like hull shapes
= 0.80 for pure cargo or pure container vessels
= 0.75 for combined passenger-cargo vessels
= 0.70 for monohulled pure passenger vessels

{7} Length: This field data refers to the length between perpendiculars of the vessel but could be substituted by the overall length if no data on the former is available.

{8} Breadth : This field data refers to the moulded breadth of the vessel.

{9} Depth: This field data refers to the moulded depth of the vessel.

{10} Draft: This field data refers to the draft of the vessel when fully laden.

{11} Class: This refers to the classification society which the vessel entered into, e.g. PRS, BV, ABS, NK, DnV, Lloyds, GL, etc.

{12} DWT: This field data is derived from either the Annual Report file or the LSRS survey form on Vessel Inventory. In the event that DWT information is not available, a rough estimate could be derived for steel-hull vessels as follows:

$$\{12\} = \max[\, EDWT_1 , EDWT_2 \,]$$

where :

$$EDWT_1 = GRT \times DWT{:}GRT \text{ ratio}$$

and the DWT:GRT ratio is assumed to be as shown in Chapter 3 field {21}. For easy reference, the table is reproduced below:

Vsl Type	Vessel	DWT:GRT Ratio
1	Conventional Cargo	1.5
2	Roll-on-roll-off	1.0
3	Containerized	1.7
4	Passenger	0.2
5	Passenger-Conventional	0.7
6	Passenger- RoRo	0.6
7	Passenger-Container	0.8
8	Fast Ferry	0.1
9	Landing Craft	1.6
10	Reefer	0.7
15	Others	1.0
16	Type not specified	1.0

$EDWT_2$ = Est. Displacement – Est. Light Ship Weight – PaxCap × .1

where:

Est. Displacement ≅ LBP * B * Dft * ϕ and

Est. Light Ship Weight ≅ Nme * HP * WPR * 1.5 +

[LBP*B*.122 + (B+LBP)*D*.156 + LBP*B*Ndk*0.07]*1.25

with LBP ≡ Length between perpendiculars (in meters); or use Length overall as an approximation if LBP is not known.
B ≡ Breadth (in meters)
Dft ≡ Draft, fully laden (in meters)
ϕ ≡ Block coefficient (as assumed in field {6})
Nme ≡ Number of main engines
HP ≡ Horsepower of each main engine
D ≡ Depth (in meters)
Ndk ≡ Number of decks
WPR ≡ Weight of engine to Power Ratio (discussed in more detail later) ≈ 0.018 kg/hp as a default value.
PaxCap ≡ Total Passenger Capacity

In the above formula, the value of 0.122 represents the average number of tons per square meter of steel along the keel and bilge strakes considering that most interisland vessels apply 16mm and 12mm plates (with a density of about 127 and 95 kg/sqm, respectively) along these areas and reinforcing angulars and transverse frames which comprise about 10% of the weight of the bottom shell plates. The value of 0.156 also represents the common use of 10mm and 8mm plates (with a density of about 79 and 63 kg/sqm, respectively) on the remaining strakes on both port and starboard side and angulars comprising about 10% of the weight of the side shell plates.

The value of 0.07 represents the tons per square meter of 8 mm plates with angular reinforcements commonly used in deck platings.

The factor of 1.25 represents a 25% provision for the weight of pipes and deck fittings while the factor of 1.5 provides a 50% allowance over the weight of the main engine and reduction gear to cover for the weight of auxilliary engines and other machinery.

The coefficient of 0.1 before PaxCap represents an estimate of the weight directly added on the average by each passenger; this is to be distinguished from the "incremental decrease in deadweight per incremental passenger capacity" which includes not only the weight directly added by each passenger but also the weight of additional superstructure to provide the passenger accomodation space.

Regarding the weight to horsepower ratio (WPR), the LSRS tabulates hereunder a list of engines commonly found in interisland vessels. When the engine make (or better still, the engine model) is known, the WPR (or weight of the engine) could be obtained from the table as shown in the following page.

The cost analyst should bear in mind that the above algorithm yields mere approximations in the absence of essential data and by no means be construed as precise weights. The analyst should therefore examine other available information regarding the subject vessel to assess any peculiarities that may cause any substantial deviation from the above general formula, e.g. large generating capacity on a luxury passenger vessel which may indicate that the 50% allowance over the weight of the main engine is insufficient, or special cargo access equipment which may require more than 25% allowance over the hull and deck weight, etc.

POWER VS. WEIGHT OF DIESEL ENGINES COMMONLY FOUND IN INTERISLAND VESSELS

MAKE	MODEL	PS	RPM	NO. OF CYL.	COMMON USE	WEIGHT	Weight/PS Ratio
Daihatsu	6DSDM-22	700	900	6	Main Eng	10800	15.43
Daihatsu	6DSM-22	1000	900	6	Main Eng	11500	11.50
Daihatsu	8PSHTcM-26H	1000	720	8	Main Eng	16000	16.00
Daihatsu	6DSM-26A	1400	750	6	Main Eng	16100	11.50
Daihatsu	6DSM-28	1800	720	6	Main Eng	21000	11.67
Daihatsu	8DSM-32	3000	600	8	Main Eng	37000	12.33
Daihatsu	M2TG	150	1800	6	Aux Eng	2300	15.33
Daihatsu	M3SG	360	1800	6	Aux Eng	4800	13.33
Daihatsu	6PSHTb-26H	750	720	6	Aux Eng	9100	12.13
Daihatsu	6PSHTc-26H	900	720	6	Aux Eng	9100	10.11
Daihatsu	8PSHTc-26H	1200	720	8	Aux Eng	12100	10.08
Daihatsu	6VSHTb-26H	1500	720	12	Aux Eng	15260	10.17
Daihatsu	6DV-32	4500	600	12	Aux Eng	41000	9.11
Akasaka	DM26	1050	400	6	Main Eng	15000	14.29
Akasaka	DM30	1500	375	6	Main Eng	22800	15.20
Akasaka	DM36	1800	330	6	Main Eng	31500	17.50
Akasaka	DM40	2600	310	6	Main Eng	45000	17.31
Akasaka	DM41	3000	300	6	Main Eng	48000	16.00
Akasaka	DM47M	4000	260	6	Main Eng	70600	17.65
Akasaka	6U24	850	720	6	Main Eng	15000	17.65
Akasaka	6U26	1300	720	6	Main Eng	16100	12.38
Akasaka	6U28	1800	680	6	Main Eng	21300	11.83
Akasaka	6U50	5000	340	6	Main Eng	75000	15.00
Akasaka	6U24G	1050	900	6	Aux Eng	18000	17.14
Akasaka	8U24G	1400	900	8	Aux Eng	20850	14.89
Hanshin	6L26BSH	750	400	6	Main Eng	11700	15.60
Hanshin	6LUD22	800	400	6	Main Eng	12300	15.38
Hanshin	6LU26	1050	400	6	Main Eng	15500	14.76
Hanshin	6LUN28	1600	395	6	Main Eng	16600	10.38
Hanshin	6LU38	2200	310	6	Main Eng	34000	15.45
Hanshin	6LUS40	3000	300	6	Main Eng	40000	13.33
Hanshin	6LUS46	4000	265	6	Main Eng	62000	15.50
Hanshin	6EL44	4000	220	6	Main Eng	70000	17.50
Makita	GNLH6275	1200	390	6	Main Eng	17800	14.83
Makita	GNLH630	1500	375	6	Main Eng	22300	14.87
Makita	GNLH633	1800	350	6	Main Eng	32000	17.78
Makita	GSLH647	3800	250	6	Main Eng	76600	20.16
Makita	GSLH654	4800	225	6	Main Eng	110400	23.00
Niigata	6MG16X	400	1300	6	Main Eng	4300	10.75
Niigata	6MG18CX	650	950	6	Main Eng	6200	9.54
Niigata	6MG25BX	1000	720	6	Main Eng	12500	12.50
Niigata	6MG28BX	1800	720	6	Main Eng	19700	10.94
Niigata	6MG40CX	3300	450	6	Main Eng	57000	17.27
Niigata	8MG40CX	4400	450	8	Main Eng	67000	15.23
Niigata	6M28AET	1300	390	6	Main Eng	16500	12.69
Niigata	6M31AET	1600	360	6	Main Eng	22500	14.06

Note: Low Speed: RPM <450 ; Medium Speed: 450 <= RPM < 900 ; High Speed: RPM >=900

{13} Passenger Capacity: This field data defines the total passenger capacity of the subject vessel as authorized in the vessel's Certificate of Inspection or as reported in the survey form on Vessel Inventory.

{14} Unit Capacity: This field data relates to the relevant unit capacity of the subject vessel. For container vessels, the relevant unit is expressed in twenty-foot equivalent units (TEUs). For roro vessels, the capacity is expressed either in passenger car units (PCUs) or in lane-meters. For reefer vessels, the capacity is measured in cubic meters of reefer space. For cattle carriers, the unit capacity is in terms of "heads". It is important that the relevant unit capacity of the carrier be defined for the cost analysis. In the event that the Annual Report or the LSRS survey form on Vessel Inventory fail to provide this information, the algorithms presented below should provide a reasonably good estimate of the capacity of the dominant types of vessels now comprising the domestic interisland fleet.

For Container Vessels

$$TEU = \frac{DWT * .85}{20}$$

For Roro Vessels

PCU = Integer (Breadth/3.8) * Integer (LOA/4)

or

Lane-Meters = LOA * Integer (Breadth/3.8)

{15} Crew Complement: This field contains the total number of officers, ratings, apprentices, and other shipboard personnel. This is derived from the number of personnel as broken down by rank/position in the section on "Operating Assumptions".

{16} No. of Decks: This field indicates the number of main decks of the vessel as reported in the LSRS survey form on Vessel Inventory. In case no information is available in this respect, a default value is assigned as follows: 3 for pure cargo vessels of any size and passenger vessels below 500 GRT; 4 for passenger-carrying vessels of 500 to 2,000 GRT; and 5 for passenger-carrying vessels of above 2,000 GRT.

{17} Main Engine Make: This field contains the name of the main engine manufacturer and the engine model, if this is also available. These information could help in the estimation of weights in field {12} and eventually in the estimation of acquisition and maintenance costs.

{18} No. of Main Engines:
{19} Maximum Horse-power Rating of Main Engine:
{20} Total HP of Aux Engines:
{21} Service Speed:

Fields {18} to {23} contain data from the LSRS survey on Vessel Inventory. Another alternative source of data is the Register of Ships as published by Lloyds or by other publishers.

$\{22\}_f$ Fuel Consumption of Main Engines (Li/Hr) :

This is a group of fields to contain the consumption rate for the relevant type "f" of fuel for the vessel's mains. In case no information is available for field $\{22\}_f$, the cost model will estimate fuel consumption depending on the type of engine as follows:

For Low Speed Diesel Engines

Fuel Cons. Rate = No. of Main Engines*Main Eng HP*0.12

For Medium Speed Diesel Engines

Fuel Cons. Rate= No. of Main Engines*Main Eng HP* 0.13

For High Speed Diesel Engines

Fuel Cons. Rate= No. of Main Engines*Main Eng HP* 0.14

If the type of engine is not known, the default value for the fuel consumption rate of vessels other than fast ferries will be based on that for a medium speed diesel engine, as this is most predominantly used in interisland vessels; however, the formula for high speed diesel engines will be applied to fast ferries.

If the type of fuel is not known, the analyst could assume the fuel type as indicated in the table below:

Type of Engine	Fuel Type: 1 Bunker	2 SFO/Blended	3 ADO/Diesel
Low Speed	BHP ≥ 5,000	BHP < 5,000	
Medium Speed		BHP ≥ 1,800	BHP < 1,800
High Speed			Any BHP

{23} Fuel Consumption of Auxilliary Engines (Liters/Day) :

If no data are available for field {23} and the number and horsepower of auxilliary engines are known, fuel consumption rate is estimated in the same manner as in field {22} except that the cost analyst will have to consider the number of auxilliary engines in operation while at sea and in port as well as the average number of hours spent at sea and in port. In the absence of any information regarding auxilliary engines, the following default values could be adopted:

For Ferry Operations:

- Conventional ferry service - 500 liters/day
- Luxury ferry service - 700 liters/day

For Liner Operations:

- Pure cargo service - 1,000 liters/day
- Combined passenger-cargo service - 1,400 liters/day
- Luxury passenger service- 2,000 liters/day

{24} Current Market Value:

This field contains the current market value of the vessel in operational state. This could be based on a recent valuation appraisal of the vessel, including any notation by the appraisers as to how much is required to put the vessel in good and operating condition. It could also be based on the negotiated selling price of the vessel if the subject vessel is available for sale and the cost model is used for simulating the performance of the vessel on the prospective route; however, the prevailing foreign exchange rate, the import duties and taxes, insurance, conduction, and other expenses to be incurred prior to putting the vessel in operation have to be taken into account.

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Operating Assumptions

After having specified the vessel particulars, the model requires that the cost analyst lay down the operating assumptions as follows:

{25} Liner Route: This field contains the sequence of port calls that define a round voyage of the subject vessel. In evaluating existing services, it will be noted from the Annual Reports that some vessels were made to serve various routes within a given year. For cost analysis purposes, this model specifies that routes be analyzed one at a time.

It is easy to identify the various routes that were served by the vessel when there was a rerouting or a clear change in pattern of port calls at some point in time during the year. However, there is some difficulty in identifying distinct routes when the regular pattern of port calls involves multiple calls at one or more ports within a "single round voyage"; such complex routes are characterized by having different transit ports between a given origin-destination (O-D) link within the route and by noting trade flows between ports which would introspectively have belonged to different distinct routes. Unless there is factual evidence of such trade flows or unless the identified potential trade is not presently served by any liner, it is suggested that the complex route be analyzed in terms of its component routes of simpler structure.

{26} Provision for Drydocking: This field specifies the number of days to be provided each year for drydocking the vessel, inclusive of time involved in sailing to and from the shipyard. This could vary anywhere from 6 days to 24 days depending on size, age, and technology of the vessel as well as on the productivity of the shipyard that will most likely perform the drydocking and repairs, not to mention the ability of the ship managers to plan materials and parts required ahead of time and to schedule and closely supervise all activities. Notwithstanding, this model assigns a default value of 16 days per year for drydocking.

{27} Provision for Afloat Repairs: This field assumes the equivalent number of days to be incurred while performing afloat repairs which could not be performed during normal vessel operations or repairs which are undertaken after a deck, machinery, or equipment breakdown that renders the vessel inoperational. Ship operators adopting a preventive maintenance plan could provide for as little as 2 days

per year for afloat repairs in order to allow for delays in docking (waiting for a slipway or dock to be vacated), for rectifying problems observed during sea trials, and for machinery surveys while afloat. On the other hand, ship operators with insufficient spares and antiquated vessels could experience long downtime and thus have to provide 30 or even more days per year for afloat repairs. Considering the present state of the interisland fleet, this model assigns a default value of 10 days per year for afloat repairs.

{28} Provision for Bad Weather : The PAGASA claims that an average of 19 tropical cyclones or typhoons (with winds exceeding 30 knots) enter the Philippine area of responsibility each year; in 1993, however, there were 32 cyclones which affected the country. While not all interisland vessel operations are affected by every cyclone reported by PAGASA, vessel operations are oftentimes suspended due to rough wave conditions triggered by low pressure areas or tropical depressions. For purposes of this model, a default value of 19 days is provided for downtime of cargo vessels due to bad weather. In the case of passenger-carrying vessels, the provision for downtime due to bad weather and heavy swells is based on the number of days as provided in the table below:

DEFAULT VALUES FOR DOWNTIME OF PASSENGER VESSELS DUE TO BAD SEA CONDITIONS (in days)

GRT > / Route	Less than 250 GRT	250 to < 500 GRT	500 to <1,000 GRT	Above 1,000 GRT
With Port Calls North of Cebu or above 10.5° Latitude (within cyclone path)				
Protected / Bay and River	19	19	16	14
Partially Protected Waters	30	25	20	15
Unprotected/ Open Sea	90	60	30	20
With Port Calls Confined to South of Cebu or 10.5° Latitude and Below				
Protected / Bay and River	10	10	8	5
Partially Protected Waters	19	15	10	8
Unprotected/ Open Sea	60	30	15	10

{29} Commissionable Days: . This field variable is computed by deducting the sum of {26}, {27}, and {28} from the number of days per year.

{30} No. of Days per Round Trip: (for liner operations)

No. of Round Trips per Day: (for ferry operations)

If the cost analysis involves an existing liner or ferry service, the analyst will have to examine the Traffic Section of the Annual Report or the franchise document of the subject vessel to determine the sailing schedule and frequency to be assumed for field {30}. If the cost analysis involves either a prospective vessel or/for a prospective route, the analyst will have to assume a sailing schedule which is most appropriate for the vessel and the route, both from the technical and commercial standpoint.

{31} Total No. of Round Trips per Year :

For liner operations, this field variable is computed by dividing the number of commissionable days by the number of days per round trip. For ferry operations, the procedure is to multiply the number of commissionable days by the number of round trips per day. This procedure simulates the outcome if the vessel were to service the subject route throughout the year, although in actuality, it may be deployed on several routes. This is done for the purpose of associating the costs relevant to the route so that the corresponding cost per unit of space and required rate for the subject route could be isolated from those for other routes.

{32} Fuel Requirements:
$\{32\}_1$ Bunker :
$\{32\}_2$ SFO :
$\{32\}_3$ Diesel :

Field variables $\{32\}_1$ to $\{32\}_3$ are derived by computing for the total consumption of the main and auxilliary engines, considering the type of fuel used, their consumption rates as provided in fields $\{22\}_f$ and {23}, and the duration of their operation. The following formula are used to compute for the total liters needed per year by the main and auxilliary engines:

$$\text{M.Eng. Fuel req'd}_{\text{fuel type}} = \{22\}_f * 24 * \text{Days/Rd Trip} * \{31\}$$

$$\text{AuxEng Fuel req'd}_{\text{fuel type}} = \{23\} * [\ \{29\} + \{28\}\ ]$$

{33} System Oil Requirement: This field variable is computed on the basis of 0.9% of the total fuel consumed by all engines onboard the vessel.

{34} Hydraulic Oil Reqmt: This field variable is computed on the basis of 0.05% of the total fuel consumed by all engines onboard the vessel.

$\{35\}_P$ Food & Water Provisions:

This group of field variables consists of food requirements $\{35\}_F$ and water provisions $\{35\}_W$ needed by the vessel, its crew, and its passengers, if any.

Field $\{35\}_F$ contains an estimate of the number of meals to be provided onboard the vessel during the entire year. For this purpose, the cost analyst will have to assess the sailing schedule of the vessel and identify on which route legs meals would be served, if ever. All passenger traffic with O-D links where the vessel is to be sailing at sea during normal meal hours, i.e. 0600-0800H for breakfast, 1100-1300H for lunch, and 1800-2000H for dinner, are candidates for being provided meals, except in the following cases:

a) when the sailing time is less than four hours, and

b) when the authorized passenger fares explicitly cites that meals are excluded.

The total number of meals to be provided is derived from the sum of the product of passenger traffic and meals served per passenger on the relevant O-D route links and the food provisions for the crew complement with 5% allowance for ship's official visitors. This is more clearly illustrated in formula presentation as follows:

$$\{35\}_F = \sum_{Link=1}^{L} [\{37\}_{Pax}^{Link} \times (\text{No. of Meals})^{Link}] + [\{36\} \times 1.05 \times 3 \times 365] \text{ per Pax.}$$

Field $\{35\}_W$ is estimated on the assumption that, during each day of the year (but excluding days during drydocking), each shipboard personnel would on the average consume 150 liters of water daily and 1 cubic meter would be used daily for maintenance and cooling purposes. In addition to this water consumption, the model assumes a certain water consumption on account of the number of passengers served.

For All Cargo Vessels

$$FW = (365 - \{26\}) * [\{15\} * 0.15 + 1]$$

For Ferryboats

$$FW = (365 - \{26\}) * [\{15\} * 0.15 + 1] + Pax * 0.002$$

where: Pax ≡ Estimated No. of Passengers Served

0.002 implies the assumption that 10% of passengers served each consume an average of 20 liters of fresh water.

For Passenger-Carrying Liner Vessels

$$FW = (365 - \{26\})^* [\ \{15\}^*0.15 + 1\ ] + \frac{PMC^*LF_{PAX}}{Speed} * 3.125$$

where: PMC ≡ Passenger-miles Capacity provided during 1 yr.

LF_{PAX} ≡ Annual Ave. Passenger Load Factor on the subject route = field {40}

3.125 implies the assumption that liner passengers, on the average, consume 75 liters per day at sea

Speed ≡ field {21} ; used to estimate the average time spent at sea per passenger trip

{36} Personnel Requirement: As part of the operating requirements, the analyst is required to specify the number of persons needed to man the vessel and to perform the terminal functions, keeping in view the subject route and assumed schedule. This cost model enumerates the various positions usually created to meet the ship and terminal operating requirements; for sake of convenience and spreadsheet efficiency, the assumed salary scales for each position were indicated opposite the number of persons to be specified by the analyst. The cost analyst may also superimpose any pay scale over the default values as provided in the tables below.

The analyst will have to ensure that the minimum manning requirement for the subject vessel under Philippine merchant marine rules is met. For ready reference, this paper summarizes the minimum requirements as follows:

For Passenger and Cargo Vessels Plying Protected Waters/ Bays/ Rivers

Vessel Size ⇒ / Position	≤ 35 GT	> 35 GT to 100 GT	> 100 GT to 250 GT	> 250 GT to 500 GT	> 500 GT
Captain/ Master	PCG Cert.	HBRP	3/M; MinP	2/M; MajP	C/M Lic.
Senior Watch Keeping Officer					2/M Lic.
Watch Keeping Officer		PCG Cert.	3/M; MinP	3/M; MinP	3/M Lic.

Main Engine HP ⇒ Position	< 25 BHP	25 BHP to < 100 BHP	100 BHP to 500 BHP	> 500 BHP
Chief Engineer		MDiesel Mech.	4/E Lic.	3/E Lic.
Assistant Engineer		PCG Cert.	MDiesel Mech.	4/E Lic.
Engine Man	PCG Cert.			
Operator	PCG Cert.			

For Passenger Vessels Engaged in Interisland Trade

Vessel Size ⇒ Position	500 GT or less	Over 500 GT to 1,000 GT	Over 1,000 GT
Master/ Captain	C/M Lic.	Master Mariner	Master Mariner
Senior Watch Keeping Officer	2/M Lic.	2/M Lic.	C/M Lic.
2nd Watch Keeping Officer	3/M Lic.	3/M Lic.	2/M Lic.
3rd Watch Keeping Officer		3/M Lic.	3/M Lic.
Radio Officer	2nd Class	2nd Class	2nd Class

Main Engine HP ⇒ Position	Less than 500 BHP	500 BHP to 2,500 BHP	Over 2,500 BHP
Chief Engineer	3/E Lic.	2/E Lic.	C/E Lic.
1st Asst. Engineer	4/E Lic.	3/E Lic.	2/E Lic.
2nd Asst. Engineer	MDiesel Mechanic	4/E Lic.	3/E Lic.
3rd Asst. Engineer			4/E Lic. or MElectr.

For Cargo Vessels Engaged in Interisland Trade

Vessel Size ⇒ Position	500 GT or less	Over 500 GT to 1,000 GT	Over 1,000 GT
Master/ Captain	2/M Lic.; MajP	C/M Lic.	Master Mariner
Senior Watch Keeping Officer	3/M Lic.; MinP	2/M Lic.	C/M Lic.
2nd Watch Keeping Officer	3/M Lic.; MinP	3/M Lic.	2/M Lic.
3rd Watch Keeping Officer		3/M Lic.	3/M Lic.
Radio Officer	2nd Class	2nd Class	2nd Class

Main Engine HP ⇒ Position	Less than 500 BHP	500 BHP to 2,500 BHP	Over 2,500 BHP
Chief Engineer	3/E Lic.	2/E Lic.	C/E Lic.
1st Asst. Engineer	4/E Lic.	3/E Lic.	2/E Lic.
2nd Asst. Engineer	MDiesel Mechanic	4/E Lic.	3/E Lic.
3rd Asst. Engineer			4/E Lic. or MElectr.

Notes: C/M - Chief Mate; 2/M - 2nd Mate; 3/M - 3rd Mate; MajP - Major Patron; MinP - Minor Patron; HBRP - Harbors, Bay and River Patron; C/E - Chief Engineer; 2/E - 2nd Engineer; 3/E - 3rd Engineer; 4/E - 4th Engineer; MDiesel - Marine Diesel; MElectr. - Master Electrician

The default values adopted by the model meet the minimum manning requirements and assume average salary scales now prevailing in the domestic labor market.

FERRY OPERATIONS	500 GRT and below			FERRY OPERATIONS	Above 500 GRT		
	No.	AVE. SALARY			No.	AVE. SALARY	
DECK DEPARTMENT:		Basic	Allow	DECK DEPARTMENT:		Basic	Allow
Master (Major Patron)	1	8,500	1,500	Master (ChMate Lic.)	1	10,000	1,500
Chief Mate	1	7,000	1,000	Chief Mate	1	8,500	1,000
2nd Mate		5,000	1,000	2nd Mate	1	7,000	1,000
				3rd Mate		5,000	1,000
Radio Officer/Purser	1	3,500	1,000	Radio Officer/Purser	1	5,000	1,000
Purser		3,000	500	Purser		3,500	500
Boatswain / QM	1	3,000	500	Boatswain	1	3,500	500
Able Seaman / QM	1	2,500	500	Able Seaman / QM	2	2,500	500
Ordinary Seaman	1	1,500	500	Ordinary Seaman	2	2,000	500
Deck Apprentice			500	Deck Apprentice	1		500
TTAL DECK PERSNL	6	26,000	5,000	TTAL DECK PERSNL	10	43,000	7,500
ENGINE DEPT.:				ENGINE DEPT.:			
Chief Engineer	1	8,500	1,500	Chief Engineer	1	10,000	1,500
2nd Engineer	1	7,000	1,000	2nd Engineer	1	8,500	1,000
3rd Engineer		5,000	1,000	3rd Engineer	1	7,000	1,000
				4th Engineer/Electr.	1	5,000	1,000
Electrician	1	3,500	1,000	Electrician		4,000	1,000
Oiler #1		3,000	500	Oiler #1/ Welder	1	3,500	500
Oiler	2	2,500	500	Oiler	2	2,500	500
Wiper		1,500	500	Wiper		2,000	500
Engine Cadet			500	Engine Cadet	1		500
TOTAL ENG. PERSNL	5	24,000	4,500	TOTAL ENG. PERSNL	8	39,000	7,500
STEWARD DEPARTMENT:				STEWARD DEPARTMENT:			
Chief Cook	1	3,000	500	Chief Cook	1	3,000	500
Asst. Cook				Asst. Cook			
Messman / Steward	1	1,500	500	Messman	1	2,000	500
Steward		1,500	500	Steward	1	2,000	500
TOTAL STEW. PERSNL	2	4,500	1,000	TOTAL STEW. PERSNL	3	7,000	1,500

CARGO LINER OPNS	500 GRT and below			CARGO LINERS OPNS	Above 500 GRT		
	No.	AVE. SALARY			No.	AVE. SALARY	
DECK DEPARTMENT:		Basic	Allow	DECK DEPARTMENT:		Basic	Allow
Master (2/M Lic.)	1	8,500	1,500	Master (ChMate Lic.)	1	10,000	1,500
Chief Mate	1	7,000	1,000	Chief Mate	1	8,500	1,000
2nd Mate	1	5,500	1,000	2nd Mate	1	7,000	1,000
Radio Officer	1	4,000	1,000	3rd Mate	1	6,000	1,000
Boatswain	1	3,500	500	Radio Officer	1	4,500	1,000
Able Seaman/ QM	2	3,300	500	Boatswain	1	3,800	500
Ordinary Seaman	2	3,000	500	Able Seaman / QM	3	3,500	500
Forklift Optr/ Winchman	1	3,000	500	Ordinary Seaman	2	3,300	500
				Forklift Optr/Winchman	1	3,300	500
Deck Apprentice	1		500	Deck Apprentice	1		500
TOTAL DECK PERSNL	11	44,100	8,000	TOTAL DECK PERSNL	13	60,200	9,500
ENGINE DEPT.:				ENGINE DEPT.:			
Chief Engineer	1	8,500	1,500	Chief Engineer	1	10,000	1,500
2nd Engineer	1	7,000	1,000	2nd Engineer	1	8,500	1,000
				3rd Engineer	1	7,000	1,000
Marine Diesel Mechanic	1	4,000	500	4th Engineer/Mastr Electr.	1	6,000	1,000
Electrician	1	4,000	500	Electrician		4,000	500
Oiler #1/Welder/Pipefitter	1	3,500	500	Oiler #1/ Welder/Pipefitter	1	3,800	500
Oiler	2	3,300	500	Oiler	3	3,500	500
Wiper		3,000	500	Wiper	2	3,300	500
Engine Cadet	1		500	Engine Cadet	1		500
TOTAL ENG. PERSNL	8	33,600	5,500	TOTAL ENG. PERSNL	11	52,400	8,000

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continuation

CARGO LINER OPNS:	500 GRT AND BELOW			CARGO LINER OPNS:	ABOVE 500 GRT		
	No.	AVE. SALARY			No.	AVE. SALARY	
STEWARD DEPARTMENT:				STEWARD DEPARTMENT:			
Cook	1	3,500	500	Cook	1	3,800	500
Asst. Cook		3,300	500	Asst. Cook		3,300	500
Messman	1	3,000	500	Messman	1	3,000	500
Helper		3,000	500	Helper	1	3,000	500
TOTAL STEW. PERSNL	2	8,500	1,500	TOTAL STEW. PERSNL	3	9,800	1,500

In the succeeding manning scales for passenger liner vessels, the default values implicitly assume a 500-passenger vessel in the case of the "over 500 GRT to 1,000 GRT" size range and a 1,800-passenger vessel in the other case of "over 1,000 GRT".

PASSENGER LINER OPNS:	Over 500 GRT to 1,000 GRT			PASSENGER LINER OPNS:	Over 1,000 GRT		
	No.	AVE. SALARY			No.	AVE. SALARY	
DECK DEPARTMENT:		Basic	Allow	DECK DEPARTMENT:		Basic	Allow
Master (Master Lic.)	1	12,000	1,500	Master (Master Lic.)	1	15,000	1,500
Chief Mate (2/M Lic.)	1	8,500	1,000	Chief Mate	1	11,000	1,000
2nd Mate	1	7,500	1,000	2nd Mate	1	7,500	1,000
3rd Mate	1	6,000	1,000	3rd Mate	1	6,000	1,000
Radio Officer	1	6,000	1,000	Radio Officer	1	6,000	1,000
Asst. Radio Operator		5,000	500	Asst. Radio Operator	1	5,000	500
Physician		7,000	1,000	Physician	1	7,000	1,000
Nurse	1	3,500	500	Nurse	1	3,500	500
Purser/ Asst. Radio Op.	1	5,000	500	Purser	1	5,000	500
Asst. Purser		4,000	500	Asst. Purser	1	4,000	500
Boatswain	1	4,000	500	Boatswain	1	4,000	500
Able Seaman/ QM	3	3,500	500	Able Seaman/ QM	3	3,500	500
Ordinary Seaman	3	3,300	500	Ordinary Seaman	4	3,300	500
Forklift Optr/ Winchman	1	3,300	500	Forklift Optr/ Winchman	1	3,300	500
Checker	1	3,300	500	Checker	2	3,300	500
Deck Apprentice	1		500	Deck Apprentice	2		500
TOTAL DECK PERSNL	17	79,500	11,500	TOTAL DECK PERSNL	23	107,600	15,000
ENGINE DEPT.:				ENGINE DEPT.:			
Chief Engineer	1	12,000	1,500	Chief Engineer	1	14,000	1,500
2nd Engineer	1	8,500	1,000	2nd Engineer	1	11,000	1,000
3rd Engineer	1	7,500	1,000	3rd Engineer	1	7,500	1,000
4th Engineer/Mastr Electr.	1	6,000	1,000	4th Engineer	1	6,000	1,000
Electrician		4,000	500	Electrician	1	4,000	500
Asst. Electrician		3,500	500	Asst. Electrician		3,500	500
Reeferman		4,000	500	Reeferman	1	4,000	500
Welder/Pipefitter	1	3,800	500	Welder/Pipefitter	1	3,800	500
Oiler #1/ Machinist	1	4,000	500	Oiler #1/ Machinist	1	4,000	500
Oiler	3	3,500	500	Oiler	3	3,500	500
Wiper	2	3,300	500	Wiper	3	3,300	500
Engine Cadet	1		500	Engine Cadet	2		500
TOTAL ENG. PERSNL	12	58,900	8,500	TOTAL ENG. PERSNL	16	74,700	10,500

continued . .

continuation

PASSENGER LINER OPNS.	Over 500 GRT to 1,000 GRT			PASSENGER LINER OPNS.	Over 1,000 GRT		
STEWARD DEPARTMENT:				STEWARD DEPARTMENT:			
Chief Steward	1	4,500	1,000	Chief Steward	1	4,500	1,000
Asst. Chief Steward		4,000	1,000	Asst. Chief Steward	1	4,000	1,000
Storekeeper		3,500	500	Storekeeper	1	3,500	500
Asst. Storekeeper		3,300	500	Asst. Storekeeper	2	3,300	500
Chief Cook	1	4,300	1,000	Chief Cook / Chef	1	4,300	1,000
1st. Asst. Cook	1	3,800	500	1st. Asst. Cook	1	3,800	500
2nd Asst. Cook	1	3,800	500	2nd Asst. Cook	1	3,800	500
3rd Asst. Cook		3,800	500	3rd Asst. Cook		3,800	500
Cook Helper	3	3,300	500	Cook Helper	3	3,300	500
Messman	1	3,300	500	Messman	1	3,300	500
Stewards	3	3,300	500	Stewards	18	3,300	500
Linenman	3	3,300	500	Linenman	3	3,300	500
TOTAL STEW. PERSNL	14	49,400	8,000	TOTAL STEW. PERSNL	33	113,000	18,000

Traffic Assumptions

$\{37\}^{L}_{t}$ Route Link Traffic: This group of fields represents the volume of annual traffic of type "t" that moved along each origin-destination (O-D) link "L" of the route defined in field {25}. The number of such fields will depend on the number of ports comprising the route and the number of cargo types or passenger classes to be served by the vessel. In mathematical terms,

No. of O-D Links to be evaluated $\equiv L = n \times (n - 1)$

where: $n \equiv$ number of ports of call on the route defined in field {25},

and the No. of Fields under this group $= L \times t$

where: $t \equiv$ No. of Passenger Traffic Categories + No. of Cargo Traffic Categories

and Passenger Traffic Categories are the passenger classes offered while Cargo Traffic Categories are the subdivisions of cargo by tariff group, e.g. Class A, B, C in the case of conventional cargo services, or Vehicle Size or Length Categories in the case of roro services, or TEU-FCL, TEU-LCL, TEU-Empties, FEU-FCL, FEU- LCL, FEU-Empties, etc. in the case of container services.

To illustrate the group of fields in the case of a conventional cargo service on the route involving calls at ports 1 to 2 to 3 to 2 and back to 1, the traffic fields shall be as follows:

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$\{37\}^{1\text{ to }2}_{A}$	$\{37\}^{2\text{ to }3}_{A}$	$\{37\}^{1\text{ to }3}_{A}$
$\{37\}^{1\text{ to }2}_{B}$	$\{37\}^{2\text{ to }3}_{B}$	$\{37\}^{1\text{ to }3}_{B}$
$\{37\}^{1\text{ to }2}_{C}$	$\{37\}^{2\text{ to }3}_{C}$	$\{37\}^{1\text{ to }3}_{C}$
$\{37\}^{1\text{ to }2}_{C\text{ Basic}}$	$\{37\}^{2\text{ to }3}_{C\text{ Basic}}$	$\{37\}^{1\text{ to }3}_{C\text{ Basic}}$

and vice versa or reverse direction of each of the above; since there are thee ports of call and four traffic categories, there will be 6, i.e. (3)×(3-2), O-D port pairs and a total of 24, i.e. 6 × 4, traffic data fields to contain the annual traffic assumptions.

Being mere assumptions for the model, highly subjective values could be assigned to these traffic data fields; however, it is essential that the analyst does not assume any combination of values in excess of the annual total capacity provided by the vessel for the given type of traffic. In assuming traffic values, it is suggested that an assessment of traffic potentials for each O-D port pair be made and a "guesstimate" of the market share of the subject vessel be adopted in the light of any competition, whether intra-modal or inter-modal, on the respective O-D links.

$\{38\}^{L}$ Route Link Distance: This group of fields is to contain the sailing (and not the direct) vector distance between port pairs on the route. Being a vector rather than a scalar quantity, particular attention is given to the port call sequence of each O-D link. Using the same hypothetical route as discussed under field {37}, this would mean that the route link distance from port 1 to port 3 is derived by adding the sailing distance between ports 1 and 2 to the sailing distance between ports 2 and 3.

In the case of complex routes, the computation of route link distance for O-D links served more than once during each voyage will require a short algorithm as discussed by way of an example below. Take the case of another hypothetical route with a port call sequence: $1 \Rightarrow 2 \Rightarrow 3 \Rightarrow 1 \Rightarrow 3 \Rightarrow 4 \Rightarrow 1$. At first glance, it would appear that there could be two distinct routes within this route, both having port 1 as their base port. For purposes of discussion, assume that there is (or at least a good potential)

traffic flowing from port 4 to port 2 despite a transit call at port 1 and thereby rendering the earlier defined route to be complex. Be that as it may, it will be noted that the vector distance from port 1 to port 3 could either be a direct linkage or via port 2 while the reverse flow, i.e. from port 3 to port 1, could also be direct or via port 4. It may also be noted that vector links 1 to 3 and 3 to 1 will be served twice during every round voyage. In such case, the route link distance is to be computed in a manner depending on:

a) whether the route, per se, is presently served or is merely at the prospective stage; and,

b) whether or not there is any other vessel that could compete with the subject vessel either on the same route or on other liner routes that overlap with the subject route.

For a Route Presently Served

A presently served route poses the benefit of experience and knowledge in respect to how elastic the traffic volume is with respect to a shift from a direct service to one that involves transit ports. Using the aforementioned complex route $1 \Rightarrow 2 \Rightarrow 3 \Rightarrow 1 \Rightarrow 3 \Rightarrow 4 \Rightarrow 1$, traffic reports could provide the relative volume of traffic transported directly from port 1 to port 3, i.e. $\{37\}^{1\to3}$ and, on the other hand, the volume of traffic shipped from port 1 to port 3 after calling at port 2, i.e. $\{37\}^{1\to2\to3}$. The route link distance could then be computed on the basis of the weighted average distance for all route links from port 1 to port 3, as illustrated below:

$$\{38\}^{1\,\text{to}\,3} = \frac{\{38\}^{1\to3} \times \{37\}^{1\to3} + \{38\}^{1\to2\to3} \times \{37\}^{1\to2\to3}}{\{37\}^{1\to3} + \{37\}^{1\to2\to3}}$$

For a Prospective Route (Not Presently Served) with No Competing Routes or Liner Vessels

Under this case, the relative volume of traffic through the direct service from port 1 to port 3 vis-a-vis the traffic through the indirect service from port 1 to port 3 via transit port 2 is not known but a "guesstimate" of the potential traffic flow from port 1 to port 3 would have been made earlier as $\{37\}^{1\text{ to }3}$. An assumption would have to be laid on how this traffic from port 1 to port 3 will move in order to derive the weighted average distance travelled by each type of traffic. In this regard, the model generally assumes that traffic will give preference to a direct service and subsequently to alternative route links prioritized according to their ascending order of time or distance to reach the

final destination; this order of preference will later be referred to as the traffic allocation priority ranking (TAPR).

Thus, the algorithm entails an iterative assessment of potential traffic vis-a-vis capacity for each order of TAPR, until the entire traffic would have been allocated or until total capacity would have been exhausted. In mathematical form, the algorithm for the complex route $1 \Rightarrow 2 \Rightarrow 3 \Rightarrow 1 \Rightarrow 3 \Rightarrow 4 \Rightarrow 1$, particularly for the route link distance from port 1 to port 3, is as follows:

By definition, total traffic from port 1 to port 3 :

in units $= \{37\}^{1\,\text{to}\,3} = \{37\}^{1\to3} + \{37\}^{1\to2\to3}$

in unit-miles $= \{37\}^{1\,\text{to}\,3} \times \{38\}^{1\,\text{to}\,3} = \{37\}^{1\to3} \times \{38\}^{1\to3} + \{37\}^{1\to2\to3} \times \{38\}^{1\to2\to3}$

Solving for traffic that could not be accomodated by the direct service from port 1 to port 3, i.e. TAPR = 1 or with no transit ports,

$$\{37\}^{1\to2\to3} = \frac{\{37\}^{1\,\text{to}\,3} - \{31\} \times \{38\}^{1\to3} \times \text{Relevant Vsl Cap.}}{\{38\}^{1\to2\to3}}$$

where the relevant vessel capacity could be equivalent to any one of the fields {12}, {13}, or {14}.

If $\{37\}^{1\to2\to3}$ is equal to or less than zero, the result implies that the direct service could possibly cope with potential traffic from port 1 to port 3. Thus, the route link distance $\{38\}^{1\,\text{to}\,3}$ is equal to the direct distance $\{38\}^{1\to3}$.

If $\{37\}^{1\to2\to3}$ is greater than zero, the estimated traffic volume of the two alternative links between ports 1 and 2 are applied as weights in computing for the route link distance as follows:

$$\{38\}^{1\,\text{to}\,3} = \frac{\{31\} \times \{38\}^{1\to3} \times \text{Rel. Vsl Cap.} + \{37\}^{1\to2\to3} \times \{38\}^{1\to2\to3}}{\{37\}^{1\,\text{to}\,3}}$$

For a Prospective Route (Not Presently Served) With Competing Routes or Liner Vessels

The algorithm for computing the route link distance under a competitive environment is similar to the case when there is no competition, except that the analyst will have to assess what market share the subject vessel could garner on each O-D link. In this exercise, the analyst could:

a) group O-D links according to their respective TAPR levels, i.e. TAPR=1 for direct service, TAPR=2 for one transit call or cost and delay unit, TAPR=3 for two transit calls or cost and delay units, and so on;

b) start analyzing direct links (TAPR=1) and, for each link, allocate the estimated potential link traffic to the available capacity of all vessels providing the same TAPR level on that link; both capacity and traffic, at this juncture, are expressed in terms of unit-miles;

c) analyze links under the next group of TAPR and continue allocating the remaining traffic that could not be accomodated by earlier TAPR levels;

d) repeat the above activity c) until either all traffic in unit-miles have been allocated or all available capacity have been exhausted;

e) compute for the weighted average route link distance after having estimated the traffic for each TAPR level in which allocated traffic is greater than zero.

$\{39\}_T$ Total Traffic: This group of fields represents the annual total volume of composite type "T" traffic that moved along the route defined in field {25}. The number of such fields will depend on the number of composite types of traffic, e.g. passengers, cargo tons, PCUs, TEUs, etc., to be served by the vessel. Total route traffic is computed in unit-miles, e.g. ton-miles, passenger-miles, TEU-miles, etc., as follows:

$$\{39\}_T = \{37\}_T^{link\ 1} \times \{38\}^{link\ 1} + \{37\}_T^{link\ 2} \times \{38\}^{link\ 2} + \{37\}_T^{link\ 3} \times \{38\}^{link\ 3} + \ldots + \{37\}_T^{link\ L} \times \{38\}^{link\ L}$$

where

$$\{37\}_T^{link\ L} = \{37\}_1^{link\ L} + \{37\}_2^{link\ L} + \{37\}_3^{link\ L} + \ldots + \{37\}_t^{link\ L}$$

which is the sum of all specific types under the composite type of traffic, e.g. total tons of cargo combining all classes A, B, and C.

{40} Ave. Passenger Load Factor : This field serves as an indicator as to how the passenger capacity of the vessel is utilized on the average when deployed on the route with the assumed traffic volumes. The average passenger load factor is estimated as follows:

$$\{40\} = \frac{\{39\}_{PAX} \times 100\%}{\{13\} \times \{31\} \times \text{Route Length}}$$

where Route Length is the sum of all direct distances traversed, starting from the base port 1 to the subsequent ports until port n (granting there are "n" number of ports called) and back to the base port, i.e.

$$\text{Route Length} = \{37\}^{1\,\text{to}\,2} + \{37\}^{2\,\text{to}\,3} + \ldots + \{37\}^{n\,\text{to}\,1}$$

{41} Ave. Cargo Load Factor : This field gives the analyst an indicatior as to how the cargo capacity of the vessel is utilized on the average when deployed on the route with the assumed traffic volumes. The average cargo load factor is estimated as follows:

If Relevant Cargo Unit is in Tons

$$\{41\} = \frac{\{39\}_{Tons} \times 100\%}{\{12\} \times .85 \times \{31\} \times \text{Route Length}}$$

If Relevant Cargo Unit is in TEUs, PCUs, etc. not elsewhere stated

$$\{41\} = \frac{\{39\}_{T} \times 100\%}{\{14\} \times \{31\} \times \text{Route Length}}$$

The analyst should note that whenever {40} and/or {41} exceed 100%, it is implied that overloading prevails under the assumed traffic conditions and/or voyage schedule; thus, adjustments will have to be made by either reducing traffic projections or increasing capacity.

. When potential traffic is known to be highly seasonal and a high annual average load factor is observed, it is an indication that a fair amount of waiting time will be experienced by ship users in general. The template model therefore provides the analyst the option to perform calculations on a monthly basis by following the same procedure as just described. In doing so, the analyst may see that annual average load factors way below 100% could already imply overloading situations and he could then be guided as to what adjustments in (served) traffic assumptions and vessel schedules have to be made.

Price Assumptions

This section of the model enables the cost analyst to specify the prices of logistics in support of the vessel's operation and to optionally set provisional user rates for financial analysis purposes. The model provides a set of default values in case the analyst opts not to specify his assumptions. While the LSRS has attempted to identify as many factors affecting costs as possible, it does not purport in any way that the default values will yield the best cost estimates for all types and designs of vessels and to all routes and operating environments.

$\{42\}^{L}_{t}$ User Rates: This group of fields holds the provisional user rates or user charges for the transport of passengers and/or goods of type "t" between each O-D link "L" of the route defined in field {25}. Fields under this group should contain values only when the analyst intends to conduct a financial analysis of an existing or proposed service.

Granting that financial projections are to be generated, the model adopts default values depending on the type of liner service offered but leaves the analyst the opportunity to make the necessary changes. For this purpose, it is assumed that the type of vessel specified in field {2} indicates the type of service offered.

Presented below are the formula used in deriving the default user charges. It may be noted that all formula presented below adopt the direct sailing distance from "O" to port "D" instead of the sailing distance from port "O" to transit ports to port "D", i.e. $\{37\}^{O \text{ to } D}$ instead of $\{37\}^{O \rightarrow D}$; this is because the model implicitly assumes that passengers shall not be charged for incremental sailing distances ensuing from deviations to transit ports. However, $\{37\}^{O \rightarrow D}$ may be used by the analyst in lieu of $\{37\}^{O \text{ to } D}$ when the O-D link is presently not served and could be considered a developmental run.

For Passenger Liner Services

For vessels with field {2} equal to 4, 5, 6, or 7, the default passage rate between port "O" to port "D", in Pesos per passenger, is calculated on the basis of :

$$\{42\}^{O\to D}_{1st\,Cl} = X_1 + Y_1 \times \{37\}^{O\,to\,D} \quad \text{: For 1st Class Passage}$$

$$\{42\}^{O\to D}_{2nd\,Cl} = X_2 + Y_2 \times \{37\}^{O\,to\,D} \quad \text{: For 2nd Class Passage}$$

$$\{42\}^{O\to D}_{3rd\,Cl} = X_3 + Y_3 \times \{37\}^{O\,to\,D} \quad \text{: For 3rd Class Passage}$$

For fast ferries with field {2} equal to 8, the default passage rate between port "O" to port "D", in Pesos per passenger, is calculated on the basis of :

$$\{42\}^{O\to D}_{Fast} = X_F + Y_F \times \{37\}^{O\,to\,D} \quad \text{: For Fast Craft Passage}$$

with coefficients that are 20% higher than that for the normal first class tariff.

The values of the X and Y coefficients vary with respect to which range of distance $\{37\}^{O\,to\,D}$ would fall under, as provided in the table below:

O to D Distance>	Below 100 miles		101 - 300 miles		Above 300 miles	
Passenger Class	X	Y	X	Y	X	Y
1st Class	54.30	1.07	103.50	0.94	151.80	0.87
2nd Class	45.25	0.89	90.00	0.82	138.00	0.79
3rd Class	36.19	0.71	75.00	0.68	115.00	0.66
Fast Class	65.15	1.29	124.20	1.13	NA	NA

For Conventional Cargo Liner Services

For vessels with field {2} equal to 1, 5, 9, 10, 15, or 16, the default freight rate between port "O" to port "D", in Pesos per revenue ton, is calculated on the basis of :

$$\{42\}^{O\to D}_{Cl.\,A} = X_A + Y_A \times \{37\}^{O\,to\,D} \quad \text{: For Class A Cargoes}$$

$$\{42\}^{O\to D}_{Cl.\,B} = X_B + Y_B \times \{37\}^{O\,to\,D} \quad \text{: For Class B Cargoes}$$

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$$\{42\}^{O \to D}_{Cl.C} = X_C + Y_C \times \{37\}^{O\,to\,D}$$: For Class C Cargoes

where X and Y coefficients are as provided in the table below:

O to D Distance>	Below 100 miles		101 - 300 miles		Above 300 miles	
Cargo Class ↓	X	Y	X	Y	X	Y
Class A	108.15	.8176	89.08	.7629	70.01	.7085
Class B	85.56	.6539	71.26	.6101	56.03	.5658
Class C	70.31	.5323	57.92	.4968	45.52	.4609

For Container Services

For vessels with field {2} equal to 3 or 7, the default freight rate between port "O" to port "D", in Pesos per box, is calculated on the basis of the following assumptions:

a) that each fully loaded TEU would have 14 metric tons of cargo on the average;
b) that FCL shipments consist mainly of class A commodities; and,
c) that each empty TEU and FEU would be charged the equivalent of 10 tons and 15 tons, respectively, based on class B rate.

The tariff structure for container services under this model is assumed to be as shown below and the user charges for each rate group should be computed as follows:

$$\{42\}^{O \to D}_{TF} = X_{TF} + Y_{TF} \times \{37\}^{O\,to\,D}$$: For TEU-FCLs

$$\{42\}^{O \to D}_{TL} = X_{TL} + Y_{TL} \times \{37\}^{O\,to\,D}$$: For TEU-LCLs where X & Y are based on the table for conventional cargoes

$$\{42\}^{O \to D}_{TE} = X_{TE} + Y_{TE} \times \{37\}^{O\,to\,D}$$: For TEU-Empties

$$\{42\}^{O \to D}_{FF} = X_{FF} + Y_{FF} \times \{37\}^{O\,to\,D}$$: For FEU-FCLs

$$\{42\}^{O \to D}_{FL} = X_{FL} + Y_{FL} \times \{37\}^{O\,to\,D}$$: For FEU-LCLs where X & Y are based on the table for conventional cargoes

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$$\{42\}_{FE}^{O\to D} = X_{FE} + Y_{FE} \times \{37\}^{O\,to\,D} \quad \text{: For FEU-Empties}$$

O to D Distance>	Below 100 miles		101 - 300 miles		Above 300 miles	
ContainerClass	X	Y	X	Y	X	Y
TEU-FCL (FAK)	1,514	11.47	1,247	10.68	980	9.92
TEU-LCL	See Note	See Note	See Note	See Note	See Note	See Note
TEU-Empty	856	6.54	713	6.10	560	5.66
FEU-FCL (FAK)	3,028	22.94	2,494	21.36	1,960	19.84
FEU-LCL	See Note	See Note	See Note	See Note	See Note	See Note
FEU-Empty	1,283	9.80	1,069	9.15	840	8.49

Note : All X coefficients for FCL and Empty Boxes are in Pesos per box ; all Y coefficents for FCL and Empty Boxes are in Pesos per box -mile; all LCL shipments are to adopt the rates for conventional cargoes.

For Roll-On-Roll-Off Services

For vessels with field {2} equal to 2 or 6, the default freight rate between port "O" to port "D", in Pesos per unit of type "t" vehicle, is calculated for each route link as follows:

$$\{42\}_{t}^{O\to D} = [\,137.40 + 1.012 \times \{37\}^{O\,to\,D}\,] \times L_t$$

Presented below is a suggested system of classifying the composite types of vehicles with their corresponding average lengths. If roll-on-roll-off rates are to remain regulated, this system of classification could serve as basis for a class tariff structure for roro services in addition to a general rate formula such as the one just shown above.

t	Composite Type	Ave. Length (in m.)
1	Cars/Sedans	4.000
2	Light Vans & Comm'l Veh.	4.320
3	Mini-Buses	7.599
4	Passenger Buses	11.085
5	Light Trucks 4 Wheeler	4.740
6	Six Wheeler Trucks	5.990
7	6 Whlr Long/ 10 Whlr Short	8.700
8	Ten Wheeler Trucks	11.660
9	Heavy Equipment	16.000
10	Tricycles/Motorcycles	equiv. to 1.5 lane-meters

Source: DEMICO (Ship Management) INC.

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{43} Common Carrier's Tax: The value for this field is equivalent to 3% of gross revenue. Since gross revenue is a dependent variable in this cost and rate analysis, common carrier's tax is estimated after having computed for revenue based on the assumed traffic in field {37} and user charges in field {42}; alternatively, this field could be estimated after having accounted for all other costs and the ensuing "required revenue".

{44}$_f$ Fuel Prices: This group of fields contains the assumed prices for different types of fuel commonly used by interisland vessels. The model adopts the prevailing prices as default values:

Fuel Type	f	Price/Li
Bunker	1	4.06
SFO	2	6.57
ADO	3	6.97

{45}$_f$ Lube Oil Prices: This group of fields contains the assumed price per liter of system oil and hydraulic oil. The model adopts the prevailing prices as default values:

Lube Type	f	Price/Li
System Oil	1	37.43
Hydraulic Oil	2	32.59

{46} PPA Charges: The PPA charges interisland vessels a usage fee of P0.188 per GRT per day or a fraction thereof. Thus, vessels having multiple port calls (MPCs) within any given day of the voyage have to pay a correspondingly higher amount per GRT per day.

{47} Port Clearing per Port Call: This field represents the average cost of securing a departure clearance from the clearing authorities at each port of call. This includes transportation, representations, overtime pay, and so-called "SOPs" for the avoidance of delays in securing vessel clearance. Although the amount spent varies widely from port to port and with respect to the political influence the vessel operator may have, the model assumes a default value of P125 per port call.

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{48} Mooring & Unmooring

This field contains the average mooring and unmooring charges on the vessel for every port call. Also commonly known as "making fast and letting go line", this port charge varies widely from port to port not only in respect to rates but also in tariff structure. Shown below is a short list of ports and their respective mooring and unmooring charges on vessels in domestic trade. However, there is San Jose, Mindoro where charges vary relative to the type of vessel, i.e. motor boat- P11.80, batel- P39.30, and coastwise vessel- P78.60. Another port with a different tariff structure is Masbate where mooring charges vary in respect to the size of the vessel, i.e. vessels of less than 100 GRT- P30.55, vessels of 100 to 999 GRT - P76.35, and vessels of 1,000 GRT and above - P114.55. Some ports even have no PPA-approved tariff for handling of lines and charges are based on negotiations between the port operator and the carrier.

For sake of simplicity, the model has adopted a default value of P70.00 per port call.

MOORING AND UNMOORING CHARGES BY PORT	
PORT	Pesos per Vessel Call
Lebak, Sultan Kudarat	25.00
Kalamansig	31.25
Polloc	47.70
Surigao	48.40
Brooke's Point	45.30
Puerto Princesa	45.30
Iligan	61.00
Cagayan de Oro	61.50
San Jose, Mindoro	11.80 to 78.60
Iloilo	89.80
Banago	95.95
Masao, Butuan	96.20
Nasipit	98.30
General Santos	111.30
Masbate	30.55 to 114.55

Source of Basic Data: PPA

{49}$_B$ Employees'Benefits:

This group of fields contain the benefits assumed to be given to the officers and crew. The common benefits extended to personnel are presented below together with the default values assigned by the model.

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B	MONTHLY EMPLOYEES' BENEFITS	
1	SSS Contribution in Pesos/head	202.70
2	Medicare Contribution in Pesos/head	37.50
3	Provision for Extra Medicals in Pesos/head	100.00
4	Uniform Expenses in Pesos/head	300.00
5	13th Month Pay-Amortized as % of Salaries	8.3%
6	Bonuses as % of monthly pay	0.0%
7	Other Benefits as % of monthly pay	0.0%

{50} Passenger Meals: This field contains an estimate of the average expenses per meal served onboard the vessel. This amount would depend highly on the type and quality of passenger service the operator would like to provide to the public. As a default value, this model assumes an average expense of P20 per passenger meal.

{51} Crew Subsistence: Crew subsistence varies widely from company to company as this amount is at times set low but is compensated by the crew being given a relatively higher pay. Unless the analyst assumes otherwise, the model assigns a default value of P35 per crew per day.

{52} Fresh Water: This field contains the average price per ton of fresh water. The price of fresh water varies from port to port; the analyst could therefore analyze the operating schedule of the vessel and adopt the price of fresh water in the port/s most likely to be the source of fresh water. Otherwise, the model assigns a default value of P25 per metric ton of fresh water.

{53} Stores: This field contains an estimate of annual expenses on deck, medical, steward, and electrical stores and supplies. The analyst will have to assess each subsidiary types of stores vis-a-vis the operating requirements of the subject vessel. The model presents default values as follows.

FOR CARGO VESSELS >> Type of Stores	Less than 100 GRT	100 to 499 GRT	500 to 999 GRT	1,000 to 2,500 GRT	Above 2,500 GRT
a) Ropes, Chains & Cables	51,000	85,000	120,000	180,000	300,000
b) Paints & Thinners	18,700	90,200	140,800	240,900	456,500
c) Cleaning Supplies	800	4,000	6,000	13,000	22,600
d) Steward Supplies	={15}*320	={15}*320	={15}*320	={15}*320	={15}*320
e) Electrical Stores	3,575	7,150	9,900	13,200	22,000
f) Other Stores	0	0	0	0	0

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FOR PASSENGER VSLS >> Type of Stores	Less than 100 GRT	100 to 499 GRT	500 to 999 GRT	1,000 to 2,500 GRT	Above 2,500 GRT
a) Ropes, Chains & Cables	51,000	85,000	120,000	180,000	300,000
b) Paints & Thinners	19,800	99,000	170,500	299,200	555,500
c) Cleaning Supplies	2,800	14,000	31,600	68,400	119,200
d) Steward Supplies	= {15}*4*80 + Integer({39}$_{Pax}$/100) *5*80				
e) Electrical Stores	7,150	13,200	19,800	42,900	74,800
f) Other Stores	={39}$_P$×OS	={39}$_P$×OS	={39}$_P$×OS	={39}$_P$×OS	={39}$_P$×OS

These default values are not price indications in themselves and would appear to be foreign to this section. To be consistent with the model's objective in providing a formula to estimate costs based on consumption and prices, the default value for each type of store is derived/adjusted/updated on the basis of an estimated *equivalent* quantity of one item under each type and the current price of that item.

The following sections will discuss the basic assumptions for deriving the default values and the reader is reminded that the quantities indicated therein should not be interpreted literally. The concept in adopting one store item as reference is principally to simplify the procedure for estimating the cost of the group of items on the premise that relative prices of items within the group are not expected to change significantly. Besides, there is no practical benefit in detailing all expected consumption and price of store items under each group considering the marginal contribution to total operating costs and because of the ensuing difficulty in using a model which requires more technical and operating information just to obtain a supposedly more accurate estimate.

Ropes, Chains & Cables. Due to its relatively high contribution in the total cost for the group and due to its wide application and faster turnover in vessels of various sizes, this model opted to use "ropes"as the reference item under the group.

PASSENGER & CARGO VESSELS	COMMON ROPE SPECIFICATION	EQUIVAL. QTY	ESTIMATED PRICE
Less than 100 GRT	Nylon 6" circumference, 6 strand	3 rolls	17,000
100 to 499 GRT	Nylon 6" circumference, 6 strand	5 rolls	17,000
500 to 999 GRT	Nylon 8" circumference, 8 strand	4 rolls	30,000
1,000 to 2,500 GRT	Nylon 8" circumference, 8 strand	6 rolls	30,000
Above 2,500 GRT	Nylon 8" circumference, 8 strand	10 rolls	30,000

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Paints & Thinners. Various types and systems of paints and thinners are available for hull preservation and deck coatings, e.g. coal tar epoxy, chlorinated rubber, or epoxy anticorrosive paints, boottopping, regular or self-polishing antifouling coats, bituminous, nonskid paint, etc. Prices vary widely between systems but coat life tends to vary directly with price; for example, alkyd-based paints priced at about P220 per gallon could last for 4 months but an epoxy-based paint costing P750 per gallon could provide deck protection for at least a year. In view of the wide usage of conventional paints in interisland vessels, even as merely a topcoat, this model adopts alkyd-based paints as the reference item for this group of stores. The table below indicates the equivalent quantity of alkyd paint needed to cover for thinners, for bituminous paint for the chain lockers, for the anticorrosive and antifouling coats below waterline, etc.; since anticorrosive and antifouling paints are 3 to 6 times more expensive than alkyd paint, the "equivalent quantity" may appear to be excessive at first glance.

	ASSUMED SPECIFICATIONS					
CARGO VESSELS	LOA	B	SurfArea Keel to DLL	SurfArea Above Waterline	EQUIVAL. QTY OF AlkydPaint	ESTIMATED PRICE PER GALLON
Less than 100 GRT	12	4	96	96	85	220
100 to 499 GRT	30	8	456	480	410	220
500 to 999 GRT	45	8	720	720	640	220
1,000 to 2,500 GRT	65	12	1,508	1,560	1,095	220
Above 2,500 GRT	85	16	2,924	2,720	2,075	220

	ASSUMED SPECIFICATIONS					
PASSENGER VESSELS	LOA	B	SurfArea Keel to DLL	SurfArea Above Waterline	EQUIVAL. QTY OF AlkydPaint	ESTIMATED PRICE PER GALLON
Less than 100 GRT	12	4	106	96	90	220
100 to 499 GRT	30	8	480	480	450	220
500 to 999 GRT	45	8	756	1,080	775	220
1,000 to 2,500 GRT	65	12	1,560	2,340	1,360	220
Above 2,500 GRT	85	16	2,992	4,080	2,525	220

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Cleaning Supplies. This group of stores consists of cleaning tools and consummables, such as mops, mop heads, soda ash, detergents, degreasers, sludge breakers, floor wax, carpet shampoo, and the like. This model adopts "detergents" as the reference item under this group in view of its wide application for cleaning. Assuming that the vessel is fairly well maintained and decks and paint coats are washed down with detergent solution and finally with fresh water on a regular basis, the model estimates cleaning supplies as follows:

	ASSUMED SPECIFICATIONS					
CARGO VESSELS	LOA	B	No. of Decks	SurfArea to be Cleaned	EQUIVAL. QTY OF Detergents	ESTIMATED PRICE PER KILOGRAM
Less than 100 GRT	12	4	2	96	20	40
100 to 499 GRT	30	8	2	480	100	40
500 to 999 GRT	45	8	2	720	150	40
1,000 to 2,500 GRT	65	12	2	1,560	325	40
Above 2,500 GRT	85	16	2	2,720	565	40

	ASSUMED SPECIFICATIONS					
PASSENGER VESSELS	LOA	B	No. of Decks	SurfArea to be Cleaned	EQUIVAL. QTY OF Detergents	ESTIMATED PRICE PER KILOGRAM
Less than 100 GRT	12	4	2	96	70	40
100 to 499 GRT	30	8	2	480	350	40
500 to 999 GRT	45	8	3	1,080	790	40
1,000 to 2,500 GRT	65	12	3	2,340	1,710	40
Above 2,500 GRT	85	16	3	4,080	2,980	40

Steward Supplies. This group of stores includes cutlery, plates, cups and saucers, glasses, napkins, tablecloths, bedsheets, pillow covers, soap, towels, and other items which are made available to passengers and crew (aside from food and beverages) to make the vessel a more habitable and comfortable place during travel. The model adopts "a set of cutlery and plates" as the reference item for this group considering that this set has the fastest turnover rate. The cost incurred for steward supplies is estimated on the basis of :

a) equivalent to four sets of cutlery and plates per crew per year; and,

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b) equivalent to five sets of cutlery and plates per one hun- dred passengers served.

A set of stainless steel cutlery and melamine plates is currently priced at P80. This implies that the cost function is as follows:

$$\text{Steward Supplies} = \{15\}*4*80 + \text{Integer}(\{39\}_{Pax}/100)*5*80$$

Electrical Stores. This group of stores consists of various types of bulbs, fuses, circuit breakers, solenoid valves, switches, multitester and other basic electrical tools, soldering iron, soldering flux, wires and electrical cables, terminal connectors, condensers, flourescent ballast, contact cleaner, pilot lamp, and other electrical or electronic parts. This model adopts a "40-watt flourescent bulb" as a reference item for this group and the equivalent number of bulbs to cover the cost of electrical stores and supplies is estimated on the basis of the number of 40-watt lighting fixtures onboard the vessel (assumed to be 1 fixture for every 3 sq.m. of deck space) or the KVA rating of the generator, whichever is higher.

	ASSUMED SPECIFICATIONS					
CARGO VESSELS	LOA	B	No. of Decks	Genset Rating in KVA	EQUIVAL. QTY OF 40W Bulbs	ESTIMATED PRICE PER 40W Bulb
Less than 100 GRT	12	4	2	65	65	55
100 to 499 GRT	30	8	2	130	130	55
500 to 999 GRT	45	8	2	180	180	55
1,000 to 2,500 GRT	65	12	2	240	240	55
Above 2,500 GRT	85	16	2	400	400	55

	ASSUMED SPECIFICATIONS					
PASSENGER VESSELS	LOA	B	No. of Decks	Genset Rating in KVA	EQUIVAL. QTY OF 40W Bulbs	ESTIMATED PRICE PER 40W Bulb
Less than 100 GRT	12	4	2	130	130	55
100 to 499 GRT	30	8	2	240	240	55
500 to 999 GRT	45	8	3	360	360	55
1,000 to 2,500 GRT	65	12	3	500	780	55
Above 2,500 GRT	85	16	3	1,000	1,360	55

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Other Stores. This group of store items includes those not normally covered by the aforementioned groups. This could involve special complimentary items given to passengers and shippers like slippers, robe, souvenir items, emergency sewing kit, shampoo and bubble bath kit, or any other store item not included under the previous types. The cost analyst will have to assume an average cost of "other stores" for each passenger or shipper, i.e. OS; this model, however, assigns a default value of zero cost per passenger or shipper to OS.

{54}$_{Eng}$ Spare Parts: This group of fields estimates the cost of parts for the main engines, the auxilliary engines, and for other machinery and equipment. This model considers that the cost of parts will depend on the number of running hours of the main engines and auxilliary engines; in the case of other equipment which are heterogeneous, the model adopts an assumption of parts cost as a percentage of the original value of the vessel. The following default values are applied unless specified otherwise by the analyst:

SPARE PARTS FOR	Est. Cost
Main Engines (in Pesos/HP per 1,000 run-hours)	40.00
Auxilliary Engines (in Pesos/HP per 1,000 run-hrs)	40.00
Other Machinery (in percentage of value of the vsl)	0.01%

{55} Repairs & Maintenance: This field represents the percentage of the original value of the vessel which approximates the annual cost of afloat repairs and maintenance. This is to include cost of all contracted repairs other than those normally undertaken during annual drydocking, e.g. replace bushings of fairlead rollers, replace brake lining of windlass, replace stern tube bearings, etc., and also include major works such as hull replating, complete main engine overhauls, replacement of major ship components like ramp, crane, etc. While these repairs and maintenance work could involve huge outlays, their occurrence would not be annual and could therefore be amortized over quadrennials or even up to over the remaining life of the ship. This field is also to include the provision for extra pay given to officers and crew in cases when the company has a planned maintenance (PM) bonus or incentive pay for each completed PM activity. Unless the analyst assumes otherwise, the model applies a default value of 0.13% to this field.

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{56}$_Z$ Annualized Drydocking: This group of fields covers all the major accounts encountered during drydocking. Each account is discussed below in respect to how much could be involved during every drydocking occasion. After separately computing for the annualized cost of each account, the total of all individual accounts is inputted into the THEOCOST spreadsheet. The default values were based mainly on the 1993 shipyard tariff of Cebu Shipyard and Engineering Works (CSEW), which is still in effect to date (March 1994).

The major drydocking accounts are as follows:

{56}$_{GS}$ General Services

Under the major account called "general services" are docking/undocking, lay charges, tugboat hire, and other support services offered by a shipyard to the vessel, e.g. waste disposal, direct telephone connection, shuttle service, etc.

Docking and Undocking. Docking and undocking cost is dependent on the GRT of the vessel, the size of the docking facility that is made available, the number of bilge blocks used (if any), and the performance of works on Sundays and Holidays. CSEW indicates a docking and undocking schedule as follows:

GRT SIZE RANGE	DOCKING/UNDOCKING CHARGE
Up to 300 GRT	P 5,450
Over 300 to 600 GRT	P 5,450 + P4.10/GRT over 300 GT
Over 600 to 1,000 GRT	P 6,610 + P5.20/GRT over 600 GT
Over 1,000 to 1,500 GRT	P 8,700 + P5.70/GRT over 1,000GT
Over 1,500 to 2,500 GRT	P11,480 + P7.80/GRT over 1,500GT
Over 2,500 to 3,500 GRT	P19,260 + P8.10/GRT over 2,500GT
Over 3,500 to 4,500 GRT	P27,380 + P8.60/GRT over 3,500GT
Over 4,500 to 5,500 GRT	P38,980 + P9.30/GRT over 4,500GT

Source: CSEW, Cebu

Lay Charges. Lay charge is usually a percentage of the docking and undocking charge. The model adopts a daily lay charge of 20% of docking and undocking charge per day. The number of days on drydock is based on field {26} but after deducting two days from this to account for preparations and docking and undocking time.

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Tugboat Services. Shipyards normally compel vessels to avail of tug assistance when maneuvering into or out of their docking facility. Tugboat hire will therefore have to be considered for two occasions, i.e. docking and undocking, and each occasion may involve two tugs with each used for about 2 to 3 hours, depending on the relative sizes of the tugs and the vessel, meteorological conditions, and the point of origin of the tugs. In respect to the hourly hire rates and application of the tugboats, the following table is indicative of the prevailing domestic rates and usage:

TUGBOAT SERVICES	TUGHIRE PER HOUR	TYPICALLY USED BY VESSELS OF
From 200 to 250 HP	P 1,750	Below 250 GRT
Above 250 to 400 HP	P 2,000	250 to < 500 GRT
Above 400 to 600 HP	P 2,500	500 to < 750 GRT
Above 600 to 800 HP	P 3,000	750 to < 1,000 GRT
Above 800 to 1,000 HP	P 3,500	1,000 to <1,500 GRT
Above 1,000 to 1,300 HP	P 4,000	1,500 GRT and above

Other Support Services. Owing to the wide range of support services and the likelihood that most of these services offered by the shipyard may never be availed of, it becomes rather difficult to provide a detailed cost estimate for other support services. This model simplifies the estimate by adopting a default value of P1.00 per gross ton per day of vessel's stay at the shipyard, but in no case less than P1,000 per day. This amount will in most cases be adequate to cover the cost of shore power, water, and the collection of refuse.

{56}$_{II}$ Hull Preservation

This major account under annual drydocking consists of two main components, i.e. hull cleaning and preparation, and hull painting. These two processes are billed by shipyards either by the area or as approximated by the length of the vessel.

Hull Cleaning and Preparation. This process could involve either hydroblasting, scraping, powerbrushing, chipping, or sandblasting for purposes of removing marine growth, scales, and/or corrosion from the hull, and finally involve hosing down the cleaned surface with fresh water. Since the choice of specific process depends on the extent of hull fouling, the availability of equipment, and the operating budget of the vessel operator, this model assumes a combination of "hyrdojetting, light scraping of marine growth plus 20% of the area for hard scraping, and complete hosing down

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with fresh water" as a basis for adopting default price asssumptions. The CSEW tariff indicates the following package charge for this combination of activities for hull cleaning and preparation.

VESSEL LengthOA (in meters)	Jetting, Light Scraping, Hose Down w/ FWater	Hard Scraping (assume 20% area)
Up to 30	P 7,545.00	P 1,440.00
Over 30 to 50	14,565.00	2,160.00
Over 50 to 70	20,485.00	3,600.00
Over 70 to 90	31,955.00	5,280.00
Over 90 to 110	42,620.00	7,200.00
Over 110 to 130	47,950.00	8,640.00
Over 130	53,930.00	10,920.00

Hull Painting. There are three major hull sections which are normally covered by shipyard tariffs, namely: bottom, boottop, and topside. Although some yards have a general tariff for hull painting, which is about P12 per sq.m. using owner-supplied conventional paint or up to P16 per sq.m. for non-conventional paints such as epoxy, chlorinated rubber, SPC, CTE, etc., some yards like CSEW have a specific tariff for vessels of a given length. This model adopts this specific tariff, as shown below, as the default value:

VESSEL LengthOA (in meters)	BOTTOM & BOOTTOP Applying First Coat	TOPSIDE Applying First Coat
Up to 30	P 3,310.00	P 2,715.00
Over 30 to 50	6,435.00	2,935.00
Over 50 to 70	9,160.00	3,375.00
Over 70 to 90	13,735.00	4,250.00
Over 90 to 110	18,325.00	5,670.00
Over 110 to 130	20,610.00	6,360.00
Over 130	24,510.00	7,710.00

	Applying Each Additional Coat		
VESSEL LengthOA (in meters)	BOTTOM Keel to LLL	BOOTTOP	TOPSIDE
Up to 30	P 2,935.00	P 370.00	P 2,060.00
Over 30 to 50	5,185.00	1,250.00	2,275.00
Over 50 to 70	7,225.00	1,940.00	2,560.00
Over 70 to 90	10,800.00	2,935.00	3,220.00
Over 90 to 110	14,690.00	3,630.00	4,295.00
Over 110 to 130	16,360.00	4,245.00	4,820.00
Over 130	19,370.00	5,140.00	5,725.00

Source of Basic Data: CSEW

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{56}$_A$ Anchors, Chains & Lockers

This major account under annual drydocking includes unshipping of vessel's anchors and chains for cleaning, inspection, stud repair, painting, and re-stowing. It also includes normal works on chain lockers such as washing down, cleaning, and painting. The model adopts the default values as presented in the table below:

	ANCHOR, CHAIN, AND LOCKER JOBS			
GRT SIZE RANGE	Job 1	Job 2	Job 3	Job 4
Up to 300 GRT	P 4,700.00	P 1,685.00	P 1,450.00	P 2,600.00
Over 300 to 600 GRT	6,275.00	2,560.00	1,650.00	2,600.00
Over 600 to 1,000 GRT	7,820.00	4,110.00	1,985.00	5,200.00
Over 1,000 to 1,500 GRT	9,800.00	6,165.00	2,090.00	5,200.00
Over 1,500 to 2,500 GRT	11,740.00	7,700.00	2,380.00	7,800.00
Over 2,500 to 3,500 GRT	14,665.00	8,620.00	2,635.00	7,800.00
Over 3,500 to 4,500 GRT	19,060.00	9,910.00	2,900.00	10,400.00
Over 4,500 to 5,500 GRT	24,770.00	11,390.00	3,190.00	10,400.00

Note to Anchor, Chain and Locker Jobs:

Job 1: Unship anchor and chain; range for inspection, tumble clean, spray paint and restowing in chain locker (port and starboard).

Job 2: Washing down, cleaning and painting of chain lockers (port and starboard).

Job 3: Disconnect and remove bitter ends (port and starboard).

Job 4: Repair chain studs; assume replacement of 5 studs and welding of 10 studs per shackle at P140 and P60 per stud, respectively.

{56}$_R$ Rudder, Propeller & Shaft Works

This account includes a wide range of possible jobs for the rudders, the propellers, and the shafts owing to the different designs and types of rudders and propeller systems.

Rudder Works. The common jobs performed on the rudders during drydock are as follows:

Job 1 - Check clearance of rudder bearings;

Job 2 - Remove rudder blade for survey and reinstall;

Job 3 - Remove rudder stock for survey and reinstall;

Job 4a - Haul rudder stock to shop and check for straightness;

Job 5 - Renew stuffing box gland packing with owner's packing;

Job 4b- For pintle type of rudder, remove rudder pintle pin for survey, haul to shop, check in lathe for straightness, and reinstall.

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The price assumptions for these jobs are provided in the table below:

GRT SIZE RANGE	RUDDER WORKS					
	JOB 1	JOB 2	JOB 3	JOB 4a	JOB 4	JOB 4b
Up to 300 GRT	P 770	P 4,910	P 2,290	P 2,565	P 770	P 2,440
Over 300 to 600 GRT	1,010	6,380	2,995	3,260	1,010	3,150
Over 600 to 1,000 GRT	1,090	7,010	3,240	3,585	1,115	3,465
Over 1,000 to 1,500 GRT	1,545	9,890	4,600	5,025	1,545	4,890
Over 1,500 to 2,500 GRT	1,805	11,560	5,405	5,870	1,815	5,745
Over 2,500 to 3,500 GRT	2,070	13,155	6,110	6,620	2,070	6,480
Over 3,500 to 4,500 GRT	2,395	15,135	7,050	7,560	2,385	7,460
Over 4,500 to 5,500 GRT	2,640	17,400	8,000	8,600	2,730	8,530

Propeller Works. The common jobs involving the propellers during drydock are as follows:

Job 1a - Clean and polish in place propeller blades; then grease;
Job 1b - Clean and polish in shop propeller blades; then grease;
Job 2 - Remove brass cap propeller nut, propeller for inspection and reinstallation;
Job 3b - Haul propeller to shop; check pitch and perform static balance;
Job 4 - Straighten propeller blades and fair up pitch; and,
Job 5 - Repair of pitholes and cracks on blades.

The service charge for each propeller job is assumed as follows:

PROPELLER DIAMETER	PROPELLER WORKS (Based on 3-Blade Propeller)					
	JOB 1a	JOB 1b	JOB 2	JOB 3b	JOB 4	JOB 5
Up to 500 mm	P1,145	P 915	P 1,485	P 670	500	500
501 - 1,000 mm	1,330	1,050	1,770	1,545	1,000	1,000
1,001 - 1,500 mm	1,875	1,480	2,555	2,345	1,500	1,500
1,501 - 2,000 mm	2,310	1,780	4,355	3,115	2,000	2,000
2,001 - 2,500 mm	2,735	2,105	8,430	3,900	2,500	2,500
2,501 - 3,000 mm	3,140	2,430	12,230	5,400	3,000	3,000
3,001 - 3,500 mm	3,300	2,555	14,685	6,475	3,500	3,500
3,501 - 4,000 mm	3,465	2,645	16,700	7,360	4,000	4,000
4,001 - 4,500 mm	3,590	2,795	17,535	7,725	4,500	4,500
4,501 - 5,000 mm	3,665	2,830	21,205	9,380	5,000	5,000
5,001 - 5,500 mm	3,850	2,955	23,380	10,315	5,500	5,500
5,501 - 6,000 mm	4,070	3,145	25,505	11,210	6,000	6,000
Additional: For 4-Blades	15%	15%	P 500	P 200	15%	15%
Additional: For 5-Blades	25%	25%	P 900	P 350	25%	25%

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When determining which charges are to apply as default values, the analyst should retrieve information from the Vessel Inventory file where the number and diameter of the propellers are indicated. Furthermore, it should be noted that job1a is mutually exclusive from jobs 1b and 3b and it would therefore be incorrect to add the charges for all the common jobs just mentioned.

For the calculation procedure, the analyst is advised to add the charges for jobs 1a, 2, 4, 5 and amortization of jobs 1b and 3b over the tailshaft survey interval and later multiply this sum by the number of propellers (or the number of main engines if no information on propellers is available), except when it is known that the propellers are in need of extensive repair (which should normally not be often) or that the vessel is due for its propeller shaft survey.

If there is no information available regarding the diameter of the propeller/s, the analyst could assume the following correspondence between the horsepower per main engine or per side thruster of the vessel and the propeller diameter of that engine. The default values provided below were based primarily on data from Hanshin Diesel and Kamome Propeller Co. as shown in Annex E.

Maximum BHP Output of Given Engine	Assumed No. of Blades	ESTIMATED RANGE OF PROPELLER DIAMETER
Less than 84 BHP	3	Up to 500 mm
85 ≤ BHP ≤ 270	3	501 - 1,000 mm
271 ≤ BHP ≤ 560	3	1,001 - 1,500 mm
561 ≤ BHP ≤ 1,100	3	1,501 - 2,000 mm
1,101 ≤ BHP ≤ 1,600	3	2,001 - 2,500 mm
1,601 ≤ BHP ≤ 3,000	3 for ≤ 2,200HP; else, 4	2,501 - 3,000 mm
3,001 ≤ BHP ≤ 4,500	4	3,001 - 3,500 mm
4,501 ≤ BHP ≤ 6,000	4	3,501 - 4,000 mm
6,001 ≤ BHP ≤ 9,000	4	4,001 - 4,500 mm
9,001 ≤ BHP ≤ 13,000	4	4,501 - 5,000 mm
13,001 ≤ BHP ≤ 16,000	5	5,001 - 5,500 mm
16,001 < BHP ≤ 20,000	5	5,501 - 6,000 mm

If there is also no information regarding the horsepower rating of engines or motors with propellers, it is broadly assumed that there are two propellers with each main propeller being within the range of 3% of the total length of the vessel.

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Tailshaft Works. The job orders for the tailshaft that are given to the shipyard during drydocking are:

Job 1 - Check clearance of outboard bearing of tailshaft;
Job 2 - Draw out (or draw in) tailshaft for inspection and reinstall;
Job 3 - Haul tailshaft to shop, check straightness, clean, polish and haul back to vessel;
Job 4 - Dye-check tailshaft taper and keyway with owners' supplied dye penetrant kit;
Job 5 - Renew stuffing box gland packing of tailshaft using owners' packing;
Job 6 - Remove and lay aside intermediate shaft and reinstall after completion of work.

	TAILSHAFT WORKS					
TAILSHAFT DIAMETER	JOB 1	JOB 2	JOB 3	JOB 4	JOB 5	JOB 6
Up to 100 mm	P 865	P4,295	P3,485	P1,145	P1,305	P3,220
101 - 150 mm	1,035	8,075	4,625	1,505	1,440	6,055
151 - 200 mm	1,395	13,360	6,210	2,000	1,590	10,020
201 - 250 mm	1,705	21,350	9,070	2,520	1,980	16,010
251 - 300 mm	1,980	29,355	12,570	2,995	2,375	22,015
301 - 350 mm	2,265	37,340	16,810	3,505	2,775	28,005
351 - 400 mm	2,420	44,020	21,535	3,985	3,140	33,015
401 - 450 mm	2,555	49,520	24,175	4,495	3,560	37,140
451 - 500 mm	2,615	55,390	29,755	4,995	3,985	41,540
501 - 600 mm	2,740	66,030	35,725	6,010	4,820	49,520

Note: Job 2 will involve a surcharge of 45% in cases when the tailshaft has to be drawn in.

Jobs 2, 3, and 4 are normally carried out when the vessel is undergoing its propeller shaft survey, which is undertaken every four years, except in the case of light crafts or fast ferries which are required to conduct this survey every two years. The analyst should therefore amortize jobs 2, 3, and 4 over the periodic interval of the shaft survey and add this quotient to the cost of jobs 1, 5 and 6, and the total amount should be multiplied by the number of tailshafts.

If the diameter of the tailshaft/s is not known, the default values are based on the following table of correspondence between maximum horsepower output and tailshaft diameter.

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Primemover HP Output	EST. TAILSHAFT DIAMETER
Less than 200 BHP	Up to 100 mm
201 ≤ BHP ≤ 600	101 - 150 mm
601 ≤ BHP ≤ 1,000	151 - 200 mm
1,001 ≤ BHP ≤ 1,600	201 - 250 mm
1,601 ≤ BHP ≤ 3,000	251 - 300 mm
3,001 ≤ BHP ≤ 5,000	301 - 350 mm
5,001 ≤ BHP ≤ 8,000	351 - 400 mm
8,001 ≤ BHP ≤ 12,000	401 - 450 mm
12,001 ≤ BHP ≤ 17,000	451 - 500 mm
17,001 ≤ BHP ≤ 23,000	501 - 600 mm

{56}$_{SV}$ Sea Valves, Sea Chests & Strainers

This account includes the charges for the servicing of intake and discharge valves as well as the removal and cleaning of strainers and sea chests. The price assumptions presented below are based on the CSEW tariff.

Sea Valves. The number and sizes of intake and discharge valves could vary from vessel to vessel depending on its design. For purposes of this model and considering the magnitude of cost involved to undertake this drydocking activity, it is not practicable to set up a table which details all sizes of valves that are typically found in vessels. For the benefit of ship operators who know the detailed configuration of valves in their vessels and would like to perform an analysis of costs with the use of this model, the following price assumptions are as shown below:

	For Opening up each valve for inspection, cleaning, grinding, painting and repacking	
Valve Diameter	Globe Valve	Gate Valve
Up to 25 mm	P 295.00	P 420.00
26 - 50 mm	465.00	580.00
51 - 75 mm	640.00	865.00
76 - 100 mm	755.00	1,045.00
101 - 125 mm	930.00	1,280.00
126 - 150 mm	1,155.00	1,505.00
151 - 200 mm	1,450.00	1,875.00
201 - 250 mm	1,925.00	2,595.00
251 - 300 mm	2,370.00	3,195.00
301 - 350 mm	2,840.00	3,810.00
351 - 400 mm	3,395.00	4,560.00

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For purposes of MARINA, which is not expected to have in its data base the detailed inventory of valves for every ship, the general approach of adopting a single valve size and expressing the cost in terms of equivalents based on that valve size should suffice. In this regard, the model assumes the correspondence between ship size and equivalent number of suction and discharge valves, including scuppers as given below.

		Assumed Equivalent No. of Valves for Purposes of Cost Estimates	
Vessel GRT Range	**Valve Diameter**	**Globe Valve**	**Gate Valve**
Up to 50 GRT	Up to 25 mm	6	5
Over 50 to 100 GRT	26 - 50 mm	6	5
Over 100 to 300 GRT	51 - 75 mm	6	5
Over 300 to 600 GRT	76 - 100 mm	7	5
Over 600 to 1,000 GRT	101 - 125 mm	7	5
Over 1,000 to 1,500 GRT	126 - 150 mm	8	6
Over 1,500 to 2,500 GRT	151 - 200 mm	8	6
Over 2,500 to 3,500 GRT	201 - 250 mm	9	7
Over 3,500 to 4,500 GRT	251 - 300 mm	10	8
Over 4,500 to 5,500 GRT	301 - 350 mm	10	8
Over 5,500 GRT	351 - 400 mm	11	9

Sea Chests and Strainers. Like in the case of sea valves, the number and sizes of strainers (or gratings) and seachests vary from vessel to vessel. However, for the analyst with detailed information on the vessel, the price assumptions for removal and cleaning of strainers and the cleaning and painting of sea chests are as given below:

Size of Strainer or Sea Chest	**Remove strainers & sea chests, clean, paint w/ AC & AF, and refit**
Up to 0.10 sq.m.	P 590.00
0.11 - 0.25 sq.m.	835.00
0.26 - 0.50 sq.m.	990.00
0.51 - 0.75 sq.m.	1,320.00
0.76 - up	1,935.00

In the absence of information regarding the strainers and sea chests of the vessel under study, the following default values are adopted by the model.

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	ASSUMED STRAINERS AND SEA CHESTS	
Vessel GRT	Equivalent Number	Area (sqm) per Unit
Up to 300 GRT	4	Up to 0.10 sq.m.
Over 300 to 600 GRT	5	0.11 - 0.25 sq.m.
Over 600 to 1,000 GRT	6	0.26 - 0.50 sq.m.
Over 1,000 to 1,500 GRT	7	0.26 - 0.50 sq.m.
Over 1,500 to 2,500 GRT	8	0.26 - 0.50 sq.m.
Over 2,500 to 3,500 GRT	8	0.26 - 0.50 sq.m.
Over 3,500 to 4,500 GRT	9	0.26 - 0.50 sq.m.
Over 4,500 to 5,500 GRT	9	0.51 - 0.75 sq.m.
Over 5,500 GRT	9	0.76 - up

{56}$_T$ Tank Works

This account covers all shipyard jobs relating to fresh water, fuel, lube oil, ballast, or any enclosure that contains any fluid or gas. The most common job orders involving tanks are as follows:

Job 1 - Remove drain plug of tank;
Job 2 - Remove manhole opening for the inspection of the tank and renewal of gasket and reinstalling;
Job 3 - Cleaning of FW Tank; application of one coat cement wash; wash down with fresh water;
Job 4 - Cleaning of ballast tank; wipe down with rags for survey;
Job 5 - Cleaning of diesel oil tank with wiping rags;
Job 6 - Cleaning of bunker or lube oil tank with wiping rags;
Job 7 - Hydrotesting of tanks with either sea water or fresh water;
Job 8 - Gas detection and gas free certification of tanks prior to survey;
Job 9 - Pumping or transfer of fuel or oil; and,
Job 10 - Steaming of tanks.

These jobs need not be undertaken during every drydock nor do they have to be done all at the same time. However, tanks are required to be cleaned and tested during every special survey; thus, all the abovementioned jobs will have to be carried out at least every 4 or 5 years. Since some tanks need to be inspected during intermediate surveys which are carried out in between special surveys, some of these jobs may be done at shorter intervals.

The model assumes the following charges for these tank-related jobs:

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TANK JOB	ASSUMED CHARGES
1	P285 per drain plug
2	P730 per manhole
3	P105 per ton capacity of fresh water tank; minimum charge- based on 30 tons.
4	P95 per ton capacity of ballast tank; minimum charge- based on 30 tons.
5	P170 per ton capacity of diesel oil tank; minimum charge- based on 30 tons.
6	P200 per ton capacity of bunker or lube oil tank; minimum charge to be based on 30 tons.
7	P65 per ton capacity if fresh water; P55 per ton capacity if sea water.
8	P5,000 per attendance of surveyor with gas detector.
9	P50 per ton; minimum charge to be based on 20 tons.
10	P1,470 per hour; minimum charge, inclusive of connection and disconnection, is P6,610.00.

Unless the analyst has detailed information on the vessel, the following default values are used by the model:

Tank Job No. >> / Vessel GRT	1	2	3	4	5	6a LOT	6b C-Oil	7	8	9	10
Up to 300 GRT	6	4	10	30	15	1	NA	56	1	10	NA
Over 300 to 600 GRT	8	4	20	50	25	3	NA	97	1	15	NA
Over 600 to 1,000 GRT	10	4	30	80	40	6	NA	156	1	20	NA
Over 1,000 to 1,500 GRT	12	6	45	120	60	10	30	265	1	45	4
Over 1,500 to 2,500 GRT	14	6	60	200	100	15	100	475	1	100	8
Over 2,500 to 3,500 GRT	18	8	80	300	150	25	150	705	2	150	12
Over 3,500 to 4,500 GRT	22	8	100	400	200	35	200	935	2	200	16
Over 4,500 to 5,500 GRT	28	8	120	500	250	45	250	1165	2	250	20
Over 5,500 GRT	36	12	150	600	300	60	300	1410	2	300	24

Note : Units of Values under each Job No. are as follows: 1 - number of drain plugs / 2 - number of manholes / 3 - fresh water tank capacity in tons/ 4 - ballast tank capacity in tons/ 5 - diesel oil tank capacity in tons/ 6a - lube oil tank capacity/ 6b - bunker oil tank capacity; not applicable to vessels not using blended fuel or bunker oil / 7 - based on total tank capacity; base calculation on use of fresh water for hydrotesting/ 8 - number of occasions/ 9 - total tons pumped out/ 10 - in hours of use.

$\{56\}_P$ Pipe Works
$\{56\}_M$ Machinery Works
$\{56\}_E$ Electrical Works
$\{56\}_{CG}$ Cargo Gear Works
$\{56\}_{SW}$ Steel Works

The annualized cost of all pipe works, machinery works, electrical works, cargo gear works, and steel works ordinarily required in the course of normal wear and tear and with exception of repairs

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needed after a marine casualty are considered under "spare parts" under field {54} and "repairs and maintenance"under field {55}. On the other hand, casualty related repairs are covered by insurance policies except for deductibles which have to be borne by the insured party. In order not to distort normal cost levels, the model treats extraordinary repairs within the deductible amount as part of insurance costs. In any case, the model still provides the analyst the option to specify values for piping, machinery, electrical, cargo gear, and steel works.

$\{56\}_O$ Other Shipyard Accounts

Aside from the aforementioned drydocking accounts, there are numerous other services which may be, but not necessarily, provided at extra cost by the shipyard. These activities include, inter alia, cranage, ultrasonic gauging of hull plates, magna flux testing of the tailshaft, fire watch services during hot works, gaining access to the area intended to be worked on, preparation of plans and drawings, erection of scaffoldings and stagings, wharfage, provision of telephone facilities, etc. This model assumes a rate of P10 per gross tonnage to cover the cost of all remaining shipyard services.

$\{56\}_L$ Lifeboat/Liferaft Servicing

Companies accredited by the PCG undertake the servicing of lifeboats and liferafts. This account includes the cost of inspection and testing of the lifeboats and/or liferafts, as well as the renewal of provisions such as water and food rations, parachute signals, hand flares, and medicines. The model provides a default value of P400 per passenger capacity for this account.

$\{56\}_{TX}$ Value Added Tax on Drydocking

This account provides for the 10% value added tax on the sum of all annualized costs estimated under the aforementioned major drydocking accounts.

{57}TX Local Government Taxes & Fees: This group of fields contains the assumptions for local government taxes and fees collected in the cities or municipalities, as well as the MARINA supervision fee. The model adopts the following default values :

Nature of Tax/License	TX	Default Value
Municipal Tax on Business	1	0.5% of gross receipt of previous year
Municipal Fees	2	P5,000 per municipality (or port) of call
MARINA Supervision Fee	3	0.5% of paid-in capital
Real Property Tax on Land :		
- within Metro Manila	4	1.5% of fair market value
- outside Metro Manila	5	1.0% of fair market value
Real Property Tax on Bldgs.:		
- within Metro Manila	6	2.4% of fair market value
- outside Metro Manila	7	1.6% of fair market value

These default values were based mainly on the Local Government Code of 1991 which went into force in 1 January 1992 and Administrative Order No. 261 which was done on 16 January 1992.

Municipal Tax. Sec. 143 of the Local Government Code presents a schedule of annual business tax for gross receipts of less than P2 million and cites a maximum rate of 0.5% of gross revenue if the company grossed more than P2 million during the previous year. In Sec.144 of the Local Government Code, it is stipulated that the municipalities within the Metropolitan Manila Area may levy taxes at rates of 50% above those provided in Sec. 143. The model adopted 0.5% as the default value.

Municipal Fees. The city or municipality where the company is doing business may also charge reasonable fees not dependent on gross revenue, such as inspection fees, garbage collection fees, etc. The model assigns a default value of P5,000 per year for every municipality where the ports of call are situated.

Real Property Taxes. The default values on real property taxes include the basic tax as provided in Sec. 233 of the Local Government Code and the Special Education Fund as cited in Sec. 235 of the same code and in Administrative Order No. 261.

{58} Hull & Machinery Insurance Rate: This field contains the effective rate of the hull and machinery insurance premium. This effective rate is derived by multiplying the nominal premium rate by 1.125 to take into account the documentary stamps of 7.5% and premium tax of 5%.

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The insurance premium rates of vessels vary in respect to the coverage of the policy, the loss history of the vessel and other vessels within the operator's fleet, the vessel's classification, age, technical condition and valuation. This model adopts a default nominal premium of 7% of the appraised value of the subject vessel.

{59} Insurance Deductible: This field contains the hull insurance deductible, or amount which the insured party will have to bear after every claimable incident, as expressed in percentage of the cover value. This model assigns a default value of 10% as insurance deductible.

{60} Protection & Indemnity: This field contains the contributions to be paid to the mutual indemnity club to be participated by the vessel in order to protect the company against passenger and cargo claims, claims arising from damage to ports, and other third party claims. The model assigns a default value of P159.48 (or about US$5.70) per GRT per annum for this field.

{61} Passenger Accident Insurance: This field contains the insurance rate for the compulsory accident insurance cover of P50,000 per passenger that MARINA requires from passenger liner operators. The model assigns a default value of P60 per passenger per year for this field.

{62}$_{VF}$ Vessel Forms: This group of fields contains the cost of vessel forms such as tickets, bills of lading, manifests, receipts, and other commercial forms. The model adopts the following default unit costs:

Vessel Forms & Tickets *	VF	Default Value
Ave. Cost of Passenger Ticket & Forms (in Pesos per Passenger)	1	0.350
Ave. Cost of Bill of Lading & Forms (in Pesos per Metric Ton)	2	0.400

{63} Ave. Cargo Handling Rate : This field involves an estimate of the average cost in handling each unit of cargo traffic through the ports on the route. This cost of handling includes stevedoring, rigging of ship's gear, dunnaging material, security, stuffing and stripping (in the case of containers), lashing, shifting, and any other cargo-related costs. Since costs are expected to vary from port to port and for each commodity, the analyst may opt to set up a separate spreadsheet

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with the detailed cargo traffic by type and by route link and the corresponding cargo handling costs from which a weighted average cost per unit of cargo can be derived. In lieu of such tedious process, the model presents default values of P20 per metric ton.

Estimate of Annual Costs

This section of the model is presented in the form of a projected profit and loss statement which is subdivided into vessel operations, terminal operations, general administration, and later summarized in the form of a consolidated income statement. The table provided below presents the algorithms opposite each field variable. All shaded algorithms are automatically executed by the model on the basis of data contained in previously defined field variables. Thus, the model user only needs to define the annual costs of the remaining (unshaded) fields. For the convenience of the analyst in understanding the logic behind the algorithms, a list of field variables used by this model is provided as Annex F.

Vessel Operations

CODE	FIELD NAME	ALGORITHM
	VESSEL REVENUE:	
{64}	Passage	= sum of {42} for link L; pax. class t x {37} for link L; pax class t - for all links and all pax classes
{65}	Freight	= sum of {42} for link L; cargo type t x {37} for link L; cargo type t - for all links and all cargo types
{66}	Less: Common Carrier's Tax	= [{64} + {65}] x {43}
{67}	NET REVENUE	= {64} + {65} – {66}
	VOYAGE EXPENSES:	
{68}	Fuel & Lubes	= {32} for fuel type 1 x {44} for fuel type 1 + {32} for fuel type 2 x {44} for fuel type 2 + {32} for fuel type 3 x {44} for fuel type 3 + $\{33\} \times \{45\}_1 + \{34\} \times \{45\}_2$
{69}	PPA Charges	for liners: = {5} x [{30} - Route Length/{21}] x {31} x {46} for ferries: = {5} x [No. of Ports Called x {30}+1)] x {29} x {46} where Route Length and No. of Ports Called per Round Trip are derived from {25} and {37}
{70}	Clearing Expenses	= No. of Ports Called per Round Trip x {31} x {47}
{71}	Mooring& Unmooring	= No. of Ports Called per Round Trip x {31} x {48}
{72}	TOTAL VOY EXPENSES	= {68} + {69} +{70} +{71}

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CODE	FIELD NAME	ALGORITHM
	TRAFFIC-RELATED EXPENSES:	
{73}	Passenger Meals & Other Exp	= $\{35\}_F$ x {50} – {15} x 1.05 x 365 x {51}
{74}	Cargo Handling & Other Exp.	= {12} x .85 x {31} x 2 x {63}
{75}	TOTAL TRAFFIC-REL. EXP.	= {73} + {74}
	VESSEL RUNNING EXPENSES:	
{76}	Salaries & Wages	= monthly pay from tables used for field {36} x 12
{77}	Empl. Benefits	= [$\{49\}_1$ + $\{49\}_2$ + $\{49\}_3$ + $\{49\}_4$] x {15} + {76} x $\{49\}_5$ + [$\{49\}_6$ + $\{49\}_7$] x {76}/12
{78}	Subsistence	= {15} x 1.05 x 365 x {51}
{79}	Fresh Water	= $\{35\}_W$ x {52}
{80}	Stores & Spare Parts	= $\{54\}_{ME}$ x [{18} x {19} x {31} x Route Length / {21}] / 1000 + {53} + $\{54\}_{AE}$ x {20} x [365 – {26}] x 24/1000 + $\{54\}_{OM}$ x {24} x max[1, 20/ (20 – {4})]
{81}	Repairs & Maint.	= {55} x {24} x max[1, 20/ (20 – {4})]
{82}	Accrued Drydocking	= $\{56\}_Z$
{83}	Taxes & Licenses	= $\{57\}_{TX}$
{84}	Hull & Machy Insurance	= {58} x {24} + {59}
{85}	Other Insurance & P&I	= {60} x {5} + {61} x {13}
{86}	Vsl Depreciation	= [{24} – Est. Light Ship Weight] / Remaining Economic Life of the Vessel
{87}	Amortiz. of Capex-Vsl	Each capital expenditure item for the vessel is to be amortized over its useful life (as a default, over five years)
{88}	Misc Vessel Expenses	The model user is to specify an amount to serve as contingency. As a default, = 10,000
{89}	TOTAL RUNNING EXP	Sum of {76} to {88}
{90}	VSL CONTRIB TO OVRHD	= {67} – {72} – {75} – {89}

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Terminal Operations

CODE	FIELD NAME	ALGORITHM
	TERMINAL EXPENSES:	
{91}	Salaries & Wages	In the same manner that vessel manning scales were set up under field {36}, the spreadsheet model provides a breakdown of positions that may have to be filled to support the extent of terminal (or shore-based support) operations needed by the vessel on the route. The model user is expected to specify the salary scales deemed adequate for the various positions in the area. As a default value, an amount of P30,000 per month is assumed for salaries in each terminal or port of call.
{92}	Employees' Benefits	This field value is computed using the same procedure as in field {77}. The same benefits as provided in field {49} could be applied to the number of terminal personnel (in lieu of {15}) and their salaries in field {91} (in lieu of {77}).
{93}	Subsistence	This field is provided in the event that terminal personnel are provided a budget for subsistence.
{94}	Forms & Tickets	= {31} x [{13}x{40} x $\{62\}_1$ + {12}x{41} x $\{62\}_2$]
{95}	Office Rental	The model user is to estimate the office space required by the terminal personnel and apply a rental rate believed to be prevalent in each locality. As a default value, the model assigns a rate of P3,000 per month per port of call.
		The model user is to estimate values for Fields {96} to {102} depending on the envisioned scale of operation, extent of control and reporting that is required by the head office, and management policies. Nevertheless, the model presents the following default values:
{96}	Light & Water	= P1,200 per month per terminal
{97}	Gasoline & Oil	= P1,500 per month per terminal
{98}	Postage & Telephone	= P750 per month per terminal
{99}	Transport & Travel	= P4,000 per month per port manager or the cost of travel from the area of operation to head office
{100}	Repairs & Maint.	= 2% of terminal property and equipment or at least P500 per month per terminal
{101}	Represent./Donations	= P3,000 per month per terminal
{102}	Advert./Notices	= P3,000 per month per terminal
{103}	Depreciation & Amortization	This field obtains its value from the schedule of depreciation of existing property and equipment and the amortization of expected capital expenditure items over their respective useful life.
{104}	Miscellaneous	The model user is to assign an amount deemed to be a reasonable contingency for other terminal expenses.
{105}	TOTAL TERMINAL EXP	= sum of fields {91} to {104}

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{106}	TOTAL CONTRIBUTION	
	TO OVERHEAD	= {90} – {105}

General Administration

CODE	FIELD NAME	ALGORITHM
	GEN ADMINISTRATIVE EXPENSES:	
		The general administration expenses to be borne by the subject vessel will greatly depend on the size of the operator's fleet. A single-vessel company will find it highly uneconomical to maintain all departments, e.g. technical department, claims department, traffic department, etc., that are commonly found in professionally runned shipping corporations. To allow vessels of similar specifications to have comparable costs, this model assumes that shipping companies with one or even up to three vessels will reduce their administration costs by engaging the services of a ship management firm. With this prefatory statement, the model assigns the following default values:
{107}	Salaries & Allowance	Under a ship management contract, the shipping company will only have to bear the cost of hiring one internal/resident auditor. This may involve a monthly expense of anywhere between P6,000 to P13,000.
{108}	Employees' Benefits	= $[\{49\}_1 + \{49\}_2 + \{49\}_3 + \{49\}_4] + \{107\} \times \{49\}_5 + [\{49\}_6 + \{49\}_7] \times \{107\}/12$
{109}	Ship Management Fee	= P50,000 plus 10% VAT ; for this consideration, the ship management company will perform all departmental functions.
{110}	Legal & Audit Fee	This includes monthly retainer fees, final audit fee, and attendance to special cases. A default value of P72,000 per annum is assigned by the model.
{111}	Board Honoraria & Mtg Expenses	This field contains an estimate of the honoraria given to board members of the company during regular meetings as well as other expenses attendant to the meetings. The model assigns a default value of P2,000 per month to cover refreshments during meetings and leaves the honoraria for the model user to specify.
{112}	Supplies & Xerox	= P2,000 per month per vessel
{113}	Postage & Telephone	= P1,500 per month per vessel
{114}	Transport & Travel	= P4,000 per month or the cost of travel of the marine superintendent from head office to the area of operation plus P20,000 per year (or travel expense for five person-visits, i.e. inventory controller, and for directors/management.
{115}	Repairs & Maintenance	= 2% of head office property and equipment, if any, as the ship management company bears this cost.

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CODE	FIELD NAME	ALGORITHM
{116}	Representations/Donations	= P5,000 per month per vessel
{117}	Advertisements/Notices	= P24,000 per annum per vessel
{118}	Taxes & Licenses	= P5,000 per annum ; other taxes were already taken under the same account title under vessel operations
{119}	Insurance	= cost of securing fidelity bonds and MSPR policy for all personnel handling cash plus the insurance premium for fire, lightning, earthquake, typhoon, etc. to cover properties and equipment, if any.
{120}	Depreciation & Amortization	This field obtains its value from the schedule of depreciation of existing head office property and equipment and the amortization of expected capital expenditure items over their respective useful life. Under a ship management contract, the value of this field could be nil.
{121}	Miscellaneous	The model user is to assign an amount deemed to be a reasonable contingency for other head office expenses
{122}	TOTAL ADMIN. EXP	Sum of fields {107} to {121}

Consolidated Income Statement

CODE	FIELD NAME	ALGORITHM
{67}	VESSEL REVENUE, NET	= {64} + {65} – {66}
{72}	VOYAGE EXPENSES	= {68} + {69} + {70} + {71}
{75}	TRAFFIC-RELATED EXP.	= {73} + {74}
{89}	RUNNING EXPENSES	= SUM ({76} to {88})
{105}	TERMINAL EXPENSES	= SUM ({91} to {104})
{106}	CONTRIBUTION TO OVERHEAD	= {90} – {105}
{122}	ADMINISTRATIVE & OVERHEAD	= SUM ({107} to {121})
{123}	OPERATING INCOME	= {106} – {122}
{124}	LESS: Bank Interest	The model provides a segment of the spreadsheet for generating a schedule of interest charges on loans with repayment period of up to 5 years. The model user will have to locate this segment and specify the amount of the loan and the interest rate to be applied.
{125}	Other Interest	The model provides another segment in the spreadsheet for short term borrowings to tide the company over through periods of negative cash flows. The model use will have to locate this segment and specify the amount, the interest, and the month of availment and repayment.

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CODE	FIELD NAME	ALGORITHM
{126}	OTHER INCOME, NET	This field contains income from all other sources after deducting expenses, inter alia: income from food and beverage sales less cost of sales, income from radio or cellular phone facilities less communication cost, interest income on time or savings deposits less with-holding tax and bank charges, terminal rentals, etc.
{127}	NET INC. BEFORE TAX	= {123} – {124} – {125} + {126}
{128}	PROVIS. FOR INC. TAX	= max[35% of {127}, 0]
{129}	NET INCOME (LOSS)	= {127} – {128}

Cost Analysis

Having computed for all theoretical costs, the final phase of the model involves the calculation of unit costs under varying load factors. For this purpose, an Excel 4.0 format of the VUCA form (discussed in Chapter 3) was developed to automatically pick up most of the relevant field data from the THEOCOST spreadsheet and generate the required cost calculations. The algorithms used in deriving unit costs are as described in Chapter 2.

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ANNEXES

ANNEX A

RECOMMENDED VESSEL INVENTORY QUESTIONAIRE

MARITIME INDUSTRY AUTHORITY

DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS
REPUBLIC OF THE PHILIPPINES
5TH FLOOR, PPL BUILDING, UN AVENUE, ERMITA, MANILA, PHILIPPINES

VESSEL INVENTORY QUESTIONNAIRE

Ship Operator/Manager: Name and Address

Contact Person :

Telephone Nos:

Fax Number:

Control No.

Ship Name on File :

Ship Name (as built):

Year of Build :

Registered Owner :

☐ Bareboat Chartered ; ☐ Under Lease-Purchase ; ☐ .....

OPERATIONAL STATUS:

☐ Currently trading at (Specify route or geographic limits): .....

☐ Sold for further trading to: ..... Date Sold: .....

☐ Sold for demolition ; ☐ Inoperational / Laid up due to: ☐ Machinery Problems; ☐ Hull Condition; ☐ .....

☐ Lost due to: ☐ Typhoon; ☐ Collision; ☐ Grounding; ☐ Fire; ☐ Sinking; ☐ Piracy ; ☐ .....

GENERAL INFORMATION:

Current Vessel Name (Full Style): ..... Vessel Ex-Name: .....

Call Sign: ..... Port of Registry ..... Flag: ..... Official Number: .....

Current Classification Society: ..... Last Renewal/Special Survey: .....

Current Ship Type: ☐ Container; ☐ Conventional Cargo; ☐ Ro/Ro; ☐ Passenger; ☐ Others (pls specify): .....

Conversions and Alterations: (If converted, indicate previous ship type; if altered, give details on extent of alteration)

MEASUREMENTS: (Specify Units if not in meters and tons)

Length between Perpendiculars: ..... Length Overall: ..... Breadth Moulded: ..... Breadth Extreme: ..... Depth Moulded: .....

Tonnages: Gross - ..... Net - ..... Deadweight - ..... If dual tonnage: GRT2- ..... NRT2- ..... DWT2- .....

Draught fully laden: ..... Displacement: ..... Bale: ..... Grain: ..... Tonnage Mark (T. Mk.)? ☐ Yes ☐ No

TYPES OF CARGO AND CAPACITY:

☐ Containers - Standard ..... TEUs plus Reefer ..... TEUs ; ☐ Reefer - ..... cu. m. ; ☐ Vehicles - ..... 8-ton trucks plus ..... cars

☐ Livestock - ..... Heads of ..... ☐ Others (Pls specify) .....

ACCOMODATION:

No. of Passenger Cabins: ..... No. of Passenger Berths: Inside Cabins- ..... In Dormitory Spaces- .....

No. of Unberthed Passengers (Seated on Deck): ..... Total No. of Officers and Crew: .....

No. of Toilets for Passengers: ..... No. of Bathrooms: ..... No. of Crew Cabins: .....

COMMUNICATIONS AND NAVIGATIONAL EQUIPMENT:

☐ Echo Sounder	☐ Radar	☐ Satellite Navigator	☐ MF Radio	☐ UHF Radio
☐ Giro Compass	☐ Collision Avoidance Radar	☐ Loran 'C'	☐ HF Radio	☐ Cellular Telephone
☐ Direction Finder	☐ Decca Navigator	☐ Omega	☐ VHF Radio	☐ Satellite Communication

☐ Other Aids (Pls indicate below):

MACHINERY DETAILS

ITEM	IF MORE THAN ONE ENGINE OR IF MORE THAN ONE SIZE MOTOR/GEARBOX, INDICATE SEPARATELY			
	EXAMPLE ONLY	1	2	3
MAIN ENGINES				
Engine No. & Position in Engine Room	No. 1 Stbd Inboard			
Engine: Design	MG Series			
Model	6MG40CX			
Maker	Niigata			
Place of Manufacture	Japan			
Number of Cylinders per Engine	6			
Bore x Stroke	400mm x 520mm			
kW/BHP & RPM Max: Service	3,000hp x 400rpm			
Continuous	3,300hp x 450rpm			
Design	3,450hp x 480rpm			
MAIN GEARING				
For Engine No. & Position in Engine Room	No. 2 Portside			
RPM & Number: Inputs	400 X 1			
Outputs	180 X 1			
Gearbox: Model	MGR 1800Z			
Maker	Niigata			
Place of Manufacture	Japan			
GENERATORS FOR ELECTRICAL SERVICES				
Prime Mover No. & Position	Portside & Stbd			
Prime Mover : Model	6L16HS/ 360HP			
Make	Niigata			
Output per Generator	2 x 250KVA			
Voltage/ Cycles / AC or DC	550VAC / 60Hz			
CARGO HANDLING AND CARGO ACCESS				
Type of Cargo Access Equipment	Fore Ramp			
Manufacturer of Cargo Handling/Access Equipment	Niigata Shipbldg			
No. x Capacity of Cranes or Derricks	NA			
No. x Length x Width of Ramp	1 x 10m x 6m			
No. x Width x Height of Side Doors	NA			

No. of Holds / Hatches : No. of Decks (excluding Collapsible Decks): No. of Collapsible Decks:

PROPULSION SYSTEM

Type of Main Propellers: ☐ Fixed Pitch; ☐ Controllable Pitch; ☐ Ducted; ☐ Directional; ☐ Fixed Nozzle; ☐ Steerable Nozzle; ☐ .....

Number of Main Propellers: Aft - ..... Forward - ..... Propeller Manufacturer: .....

Propeller RPM X Speed in Knots: Service - ..... Maximum - .....

FUEL TANKS AND CONSUMPTION

Fuel Oil Tanks: Diesel Oil - ..... tons ; Intermediate Fuel Oil - ..... tons ; Bunker C - ..... tons

Fuel Consumption at Normal Service Speed: Main Engine/s - ..... liters per hour of (Fuel Type) ..... ; Auxiliary Engines- ..... liters/hr

Lubricating Oil Tanks: ..... tons Lube Oil Consumption per Day: System Oil - ..... liters; Cylinder Oil - ..... liters

REMARKS:

Prepared by: Date:	Certified Correct by: Date:	Received by: Date: .....
.....	.....	.....
Sign over Printed Name	Sign over Printed Name	Sign over Printed Name
.....	.....	.....
Position in Company	Position in Company	Position in MARINA

ANNEX B

RECOMMENDED ROUTE INVENTORY QUESTIONAIRE

MARITIME INDUSTRY AUTHORITY
DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS
5TH FLR. PPL BUILDING, UN AVENUE, ERMITA, MANILA

ROUTE INVENTORY QUESTIONNAIRE

Company Name: ______________________________ Company Code: __________

ROUTE (in sequence of port calls)	Type of Authority	Case No.	Date Issued	Valid Until	Vessel	Currently Operating?
Example: Cebu - Tabog - Cebu	CPC	89-099	2May89	1May94	Tabog Express sank : to be replaced	No

TRUCTIONS: List all the franchises issued to your company/vessels, regardless of whether or not the routes are currrently served.

ANNEX C

RECOMMENDED MARITIME PERSONNEL COMPENSATION
SURVEY FORM

MARITIME INDUSTRY AUTHORITY

DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS
REPUBLIC OF THE PHILIPPINES
5TH FLOOR, PPI BUILDING, UN AVENUE, ERMITA, MANILA

MARITIME PERSONNEL COMPENSATION SURVEY

SHIPPING COMPANY:

CONTROL NO.

SALARY SCALES

POSITION	NO. OF PERSONNEL	ANNUAL BASIC PAY (P/YR)		ANNUAL ALLOWANCES		EQUIV. ANNUAL BENEFITS	
		MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
Master							
Chief Mate							
2nd Mate							
3rd Mate							
Radio Operator							
Asst. Radio Operator							
Boatswain							
AB/Quartermaster							
Ordinary Seaman							
Deck Cadet							
Chief Steward							
Steward							
Chief Cook							
Asst. Cook							
Messman							
Purser							
Asst. Purser							
Chief Engineer							
2nd Engineer							
3rd Engineer							
4th Engineer							
Electrician							
Machinist/Oiler No. 1							
Reeferman							
Pipefitter							
Welder							
Oiler							
Wiper							
Engine Cadet							
Ship's Physician							
Ship's Nurse							
Ship's Security Officer							
Ship's Security							

INSTRUCTIONS:

1) Please indicate the number of personnel your company employs for each position; cross out the positions not relevant to your company and add any existing position not found in the above printed list to the blank spaces provided. Attach additional sheets if the space provided is not adequate.

2) The ranges of annual basic pay, allowances, and benefits should be based on compensation regularly given to employees; special rates given to short-term relievers should not be considered.

3) 'Equivalent annual benefits' should include all types and forms of benefits, both cash and non-cash, such as clothing, hospitalization and health, insurance (premium only and not the face value of the policy), scholarships for dependents, 13th month pay, bonuses, and other employees' benefits.

VICTUALS/ FOOD PROVISIONS

d you include expenses for victuals and food provisions under your estimate of equivalent annual benefits in the preceding page? ☐ Yes ☐ No

ow much do you provide for victuals/food provisions each day: per officer - ; per crew/rating -

SALARY ADMINISTRATION

hat criteria do you apply in granting a higher or lower compensation for each position? (Tick one or more criterion and add as required)

☐ Employee's length of service to the company

☐ Profitability of the route

☐ Capacity of the vessel

☐ Length of the voyage

☐ Type of vessel, i.e. container, conventional, RoRo

IF SO,	Vessel Type
higher for	
lower for	

☐

☐

ow much do you expect salaries expenses to increase over the next two or three years? Is this covered by a Collective Bargaining Agreement? ☐ Yes ☐ No

Salary Increase (Specify if in % or in Pesos) for:	Next Year		Two Years from Now		Three Years from Now	
	Basic	Allowance	Basic	Allowance	Basic	Allowance
Deck Officers						
Engine Officers						
Steward Officers						
Deck Ratings						
Engine Ratings						
Steward Ratings						

you give any benefits other than SSS and Medicare to: the officers and management? ☐Yes ; ☐No ; the ratings ? ☐Yes ; ☐No

Yes, please describe the package of benefits and indicate an equivalent value for non-cash benefits:

you give any incentive pay, performance bonus, or any form of bonus to: the officers and management? ☐Yes ; ☐No ; the ratings ? ☐Yes ; ☐No

Yes, please give details:

COMPENSATION HISTORY AND OTHERS

ow do present compensation rates compare with the compensation rates last year and two years ago?

Pay Increase (Specify if in % or in Pesos) relative to:	Last Year's Pay			Pay Two Years Ago		
	Basic	Allowance	Incentive	Basic	Allowance	Incentive
Deck Officers						
Engine Officers						
Steward Officers						
Deck Ratings						
Engine Ratings						
Steward Ratings						

your labor force unionized? ☐Yes ; ☐No If Yes, name of Labor Union:

epared by: Date:	Certified Correct by: Date:	Received by: Date:
Sign over Printed Name	Sign over Printed Name	Sign over Printed Name
osition:	Position:	Position:

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ANNEX D

RECOMMENDED LINER SHIPPING & FERRY OPERATOR ANNUAL REPORT FORM FOR SUBMISSION TO MARINA

ANNUAL REPORT

For Corporation

OF

- -
(Name of Authorized Operator)

- -
(Kind of Service)

- -
(Office Address)

TO THE

REPUBLIC OF THE PHILIPPINES

MARITIME INDUSTRY AUTHORITY

FOR THE

YEAR ENDING DECEMBER 31, 19 _____

(DO NOT FOLD)

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COMPANY PROFILE Report No. M-01

Year : _____

1. Company Name: _____ Company Code: _____

2. Business Address: _____

3. Officers:

Official Title	Name
President	
Vice-President	
General Manager	
Secretary	
Treasurer	
External Auditor	
Legal Counsel	

4. Directors:

Name of Director	Address	Term	Expiry Date

5. Capital Stock:

Authorized _____ preferred shares at _____ par value.

Authorized _____ common shares at _____ par value.

- Issued and outstanding _____ shares: P _____
- Subscribed _____ shares, net of subscription receivable of P _____ : P _____
- Paid-in capital in excess of par value : P _____

Total Paid-in Capital P _____

6. Contact Person Regarding This Report:

Name: _____ Position: _____

Address: _____

Telephone Nos.: _____ Fax No. : _____

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FLEET AND MANPOWER DATA Report No. M-02

Year: _____

Company Name: _____ Company Code: _____

1. Company Fleet	Number	Total GRT	Total DWT
Vessels Owned			
Vessels Chartered - PD 760			
Vessels Chartered - Local			
Vessels on Lease/Purchase			
Less: Vessels Time Chartered Out			
" Bareboat Chartered Out			
Total Fleet Operated			

2. Fleet Profile	Number	Total GRT	Total DWT
Passenger - Container Vessel			
Passenger - Breakbulk Cargo			
Passenger - RoRo			
Pure Passenger Ship			
Pure Container Vessel			
Conventional Cargo Vessel			

3. Manpower	Ave. Number of Personnel	Ave. Monthly Take-home Pay
Administrative & Support Personnel		
- Managerial and Supervisory		
- Contractuals/ Advisers/ Consultants		
- Other Personnel		
Sub-total		
Shipboard Personnel		
- Licensed Masters and Chief Engineers		
- Licensed Chief Mates and 2nd Engineers		
- Other Deck Officers*		
- Other Engine Officers**		
- Deck Ratings		
- Engine Ratings		
- Steward Ratings		
- Deck and Engine Apprentices		
Sub-total		
Reserve/Standby Officers and Crew		
- Deck Officers*		
- Engine Officers**		
- Other Reserve/Standby Personnel		
Sub-total		
Total Manpower and Cost		

* Include officers in the radio/communications department, steward department, medical department, and security department under deck officers.

** Include officers in the electrical department, reefer department, and other departments applying the engineering sciences under engine officers.

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PERATIONS DATA

Report No. M-03

ear :

ompany Name: _____ Company Code: _____

Vessel Name ---------->					
Vessel Code ---------->					
Items					
Selected Vessel Particulars:					
1.1 Service Type					
1.2 Year Built					
1.3 Gross Revenue Tonnage (GRT)					
1.4 Deadweight in Tons (DWT)					
1.5 Container Capacity in TEUs					
1.6 Vehicle Capacity in PCUs					
1.7 Passenger Capacity					
1.8 Speed					
1.9 Main Engine BHP					
Vessel Performance:					
2.1 Days In Commission					
2.1.1 At Sea					
2.1.2 In Port					
2.2 Days Out of Commission					
2.2.1 Drydocked					
2.2.2 Afloat Repairs					
2.2.3 Bad Weather					
2.2.4 Laid-up					
2.3 Mileage for the Period					
2.3.1 Nautical Miles Run					
2.3.2 No. of Round Voyages					
2.4 Cargo/Passenger Load					
2.4.1 Total M. Tons Transported					
2.4.2 Total Cu. Meter Transported					
2.4.3 Total TEUs Transported					
2.4.4 Total PCUs Transported					
2.4.5 1st Class Passenger Served					
2.4.6 2nd Class " "					
2.4.7 3rd Class " "					
Vessel Manpower					
3.1 Officers					
3.1.1 Deck					
3.1.2 Engine					
3.2 Crew					
3.2.1 Deck Ratings					
3.2.2 Engine Ratings					
3.2.3 Steward Ratings					
3.2.4 Deck & Engine Apprentices					

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Prepare this report for each vessel managed and/or operated)

Report No. M-04
Page ___ of ___

/ESSEL INCOME STATEMENT
/ear : _____

Vessel Name : _____
Vessel Code : _____

	Last Year (P '000)	This Year (P '000)
)PERATING REVENUE:		
'reight Revenue		
'assenger Revenue		
Revenue from Vessel Charter		
)ther Vessel Revenue		
Total Operating Revenue		
/ESSEL OPERATING EXPENSE:		
/oyage Expenses		
Bunker Fuel		
Diesel Fuel		
Special Fuel Oil		
Stevedoring & Wharf Labor		
Pilotage		
Port Charges		
Common Carrier's Tax		
Commission		
Passenger Meals		
Total Voyage Expense		
Running Expense		
Lubricants		
Drydocking, Repairs & Maintenance		
Salaries & Wages		
Employee Benefits		
Food & Subsistence		
Insurance - Protection & Indemnity		
Insurance - Hull		
Deck & Engine Supplies		
Steward Supplies		
Water		
Claims & Damages		
Taxes & Licenses		
Charter Hire Expense		
Misc. Running Expense		
Total Running Expense		
Capital Expense		
Depreciation at Cost		
Depreciation on Appraisal Increment		
Amortization of Capitalized Expenses		
Total Capital Expense		
Total Vessel Direct Operating Expense		
Gross Operating Profit/(Loss)		

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Company Name : _____ Company Code : _____

STATEMENT OF INCOME & RETAINED EARNINGS

Year:

	Last Year (P '000)	This Year (P '000)
OPERATING REVENUE:		
Freight Revenue		
Passenger Revenue		
Revenue from Vessel Charter		
Other Vessel Revenue		
Total Operating Revenue		
VESSEL OPERATING EXPENSE:		
Bunker Fuel		
Diesel Fuel		
Special Fuel Oil		
Stevedoring & Wharf Labor		
Pilotage		
Port Charges		
Common Carrier's Tax		
Commission		
Passenger Meals		
Lubricants		
Drydocking, Repairs & Maintenance		
Salaries & Wages		
Employee Benefits		
Food & Subsistence		
Insurance - Protection & Indemnity		
Insurance - Hull		
Deck & Engine Supplies		
Steward Supplies		
Water		
Claims & Damages		
Taxes & Licenses		
Charter Hire Expense		
Misc. Running Expense		
Depreciation at Cost		
Depreciation on Appraisal Increment		
Amortization of Capitalized Expenses		
Total Vessel Direct Operating Expense		
GROSS OPERATING PROFIT/(LOSS)		

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Company Name : _____ Company Code : _____

STATEMENT OF INCOME & RETAINED EARNINGS
Year: _____

	Last Year (₱ '000)	This Year (₱ '000)
TERMINAL OPERATING EXPENSES :		
Salaries & Wages		
Employee Benefits		
Fuel & Lubricants		
Repair & Maintenance - Container Vans		
Repair & Maintenance - Others		
Rentals - Container Vans		
Rentals - Others		
Storage & Other Cargo Charges		
Insurance - Container Vans		
Insurance - Others		
Taxes, Licenses, & Fees		
Depreciation at Cost:		
-Container Vans		
-Others		
Depreciation on Appraisal Increment:		
-Container Vans		
-Others		
Amortization of Capitalized Terminal Expenses		
Misc. Terminal Operating Expense		
Total Terminal Operating Expense		
GENERAL & ADMINISTRATIVE EXPENSES :		
Salaries & Wages		
Employee Benefits		
Rentals		
Power, Light & Water		
Repairs & Maintenance		
Communications		
Office Supplies		
Professional & Legal Fees		
Security & Janitorial Services		
Advertising		
Insurance		
Taxes, Licenses, & Fees		
Transportation & Travel		
Representation Expenses		
Membership & Dues		
Bad Debts		

(Continued on page 3)

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ompany Name : _____ Company Code : _____

TATEMENT OF INCOME & RETAINED EARNINGS
ear:

	Last Year (P '000)	This Year (P '000)
Continuation of General and Administrative Expenses)		
Bank Charges		
Contributions & Donations		
Depreciation at Cost		
Depreciation on Appraisal Increment		
Amortization of Capitalized Gen. Admin. Expenses		
Misc. General & Admin Expenses		
Total General & Administrative Expenses		
IET OPERATING INCOME/(LOSS)		
)ther Income/(Expenses)		
Interest Income		
Interest Expense		
Other Income		
Other Expenses		
Total Other Income/(Expenses)		
let Income/(Loss) Before Tax		
rovision for Income Tax		
IET INCOME/(LOSS) AFTER TAX		
ETAINED EARNINGS, BEGINNING		
\dditions Appropriated for Higher Cost of Property & Equipment		
)ividends Paid		
rior Year's Adjustment		
ETAINED EARNINGS, END		

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Company Name : _____ Company Code : _____

BALANCE SHEET
As of End of Year : _____

	Last Year (P '000)	This Year (P '000)
ASSETS		
Current Assets		
Cash & Marketable Securities		
Depreciation Fund		
Notes and Trade Accounts Receivable		
Other Receivables		
Spare Parts, Materials & Supplies		
Prepaid Expenses		
Other Current Assets		
Total Current Assets		
Due from Affiliated Companies		
Investment in Shares of Stocks		
Property and Equipment (Net)		
Floating Assets at Cost		
Appraisal Increment on Floating Assets		
Sub-Total : Vessels/ Floating Assets		
Other Property & Equipment at Cost		
Appraisal Increment on Other Property & Eqpmt		
Sub-Total: Other Property & Equipment		
Total Property & Equipment		
Other Assets		
TOTAL ASSETS		

Company Name : _____ Company Code : _____

BALANCE SHEET (cont'd)
As of End of Year : _____

	Last Year (P '000)	This Year (P '000)
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current Liabilities		
Accounts Payable		
Accrued Expenses		
Income Tax Payable		
Current Portion of Long-term Debt		
Other Current Liabilities		
Total Current Liaibilities		
Due to Affiliated Companies		
Long-term Liabilities		
Other Liabilities		
Total Liabilities		
Stockholders' Equity		
Authorized Capital		
Subscribed Capital		
Paid-in Capital		
Revaluation Surplus		
Retained Earnings		
Less: Cash Dividends		
Total Stockholders' Equity		
TOTAL LIABILITIES & STOCKHOLDERS' EQUITY		

SCHEDULE OF PROPERTY AND EQUIPMENT

Year: ________

(All Costs In P '000)

	Historical Cost								Appraisal Increment			
Fixed Asset Category	Date Acquired	Start of Operation	Acquisition Cost	Capitalized Expense	Service Life	Salvage Value	Accum. Depreciation	Net Book Value	Latest Year of Appraisal	Appraisal Increment	Accum. Depreciation	Net Appraisal Increment
Vessels/Floating Assets : (Specify data for each vessel)												
Total Floating Assets												

SCHEDULE OF PROPERTY AND EQUIPMENT

Year:

(All Costs In P '000)

Fixed Asset Category	Historical Cost								Appraisal Increment			
	Date Acquired	Start of Operation	Acquisition Cost	Capitalized Expense	Service Life	Salvage Value	Accum. Depreciation	Net Book Value	Latest Year of Appraisal	Appraisal Increment	Accum. Depreciation	Net Appraisal Increment
Land												
Buildings												
Terminal Equipment												
Container Vans												
Construction In Progress												
Transportation Equipment												
Communication Equipment												
Office Furniture & Equipt.												
Other Property & Equipment												
Total Non-Floating Assets												
otal Property & Equipment												

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Report No. M-08

CHANGES IN PERMANENT ASSETS

Year: _____

(in P '000)

Asset Category	Balance Beginning of Year	Additions During Year	Assets Retired During Year	Adjustments During Year	Balance End Of Year
Property and Equipment In Service:					
Land					
Building					
Floating Assets/ Vessels					
Other Transport Equipment					
Services & Shop Equipment					
Office Furniture & Equipment					
Others					
_____					
_____					
_____					
_____					
_____					
Total Assets In Service					
Property and Equipt Not In Service: (Specify each fixed asset/vessel)					
_____					
_____					
_____					
_____					
_____					
_____					
_____					
_____					
_____					
Total Assets Not In Service					
TOTAL					

AUTHORIZED ROUTES & ROUTES SERVED

Year : _____

Page ___ of ___

Company Name: _____

Company Code: _____

ROUTE (listed according to sequence of port calls)	Route Number	Official Route Code	Type of Authority	Case No.	Date Issued	Valid Until	Vessel	Currently Served?
Example: Cebu - Tabog - Cebu	1	F199	CPC	89-099	2May89	1May94	Tabog Express sank ; to be replaced	No

INSTRUCTIONS: List all the routes that were served by your company/vessels (including chartered vessels). Also list all your authorized routes, regardless of whether or not the routes were served.
Assign a number to each route under the column "Route Number", do not write the official route code unless you are certain that it is correct.

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CARGO AND PASSENGER TRAFFIC (Non-Container Vessel)

Report No. M-10

Page ___ of ___

Vessel Name : ______________________ Ex-Name : ______________ Vessel Code : ________

Voy. No.	Date Voy. Start	Date Voy. End	Route Number	Official Route Code	Route Leg: Port of Origin	Route Leg: Port of Destin.	Cargo Carried: Cubic Meter	Cargo Carried: Metric Ton	Total M. Tons Equiv.*	Freight Revenue ₱ '000	Passengers Transported: 1st Class	Passengers Transported: 2nd Class	Passengers Transported: 3rd Class	Passenger Revenue (in P '000): 1st Class	Passenger Revenue (in P '000): 2nd Class	Passenger Revenue (in P '000): 3rd Class	Passenger Revenue ₱ '000
							Total This Page >>>										

*conversion factor: ____ metric ton = 1 cubic meter

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CARGO AND PASSENGER TRAFFIC (Non-Container Vessel)

Report No. M-10a
Page ___ of ___

Vessel Name : _____ Ex-Name : _____ Vessel Code : _____

Month* From	Month* To	Route No.	Official Route Code	Route Leg Port of Origin	Route Leg Port of Destin.	No. of Orig-Dest Voyages	Cargo Carried Cubic Meters	Cargo Carried Metric Tons	Total M. Tons Equiv.**	Freight Revenue ₱ '000	Passengers Transported 1st Class	Passengers Transported 2nd Class	Passengers Transported 3rd Class	Passenger Revenue (in P '000) 1st Class	Passenger Revenue (in P '000) 2nd Class	Passenger Revenue (in P '000) 3rd Class	Passenger Revenue ₱ '000

This form may be used in lieu of Report No. M-10 by ferry operators and/or vessels which have plied more than 100 voyages during the year.

* Indicate inclusive dates of the month if the vessel served more than one route during any month; otherwise, report traffic for each month.

**conversion factor: _____ metric ton = 1 cubic meter

CARGO AND PASSENGER TRAFFIC (Container Vessel)

Report No. M-11
Page ___ of ___

Vessel Name : _____ Ex-Name : _____ Vessel Code : _____

Voy. No.	Date Voy. Start	Date Voy. End	Route No.	Official Route Code	Route Leg Port of Origin	Route Leg Port of Destin.	No. of Containers (in TEUs) Empty	No. of Containers (in TEUs) Loaded	No. of Containers (in TEUs) Total	Cargo Carried Cubic Meter	Cargo Carried Metric Ton	Total M. Tons Equiv.*	Freight Revenue ₱ '000	Passengers Transported 1st Class	Passengers Transported 2nd Class	Passengers Transported 3rd Class	Passenger Revenue (in P '000) 1st Class	Passenger Revenue (in P '000) 2nd Class	Passenger Revenue (in P '000) 3rd Class	Passenger Revenue ₱ '000
						Total This Page >>>														

*conversion factor: _____ metric ton = 1 cubic meter

CARGO AND PASSENGER TRAFFIC (Container Vessel)

Report No. M-11a
Page ___ of ___

Vessel Name: _____ Ex-Name : _____ Vessel Code : _____

Month* (From/ To)	Route No.	Official Route Code	Route Leg Port of Origin	Route Leg Port of Destin.	No. of Orig-Dest Voyages	No. of Containers (in TEUs) Empty	No. of Containers (in TEUs) Loaded	No. of Containers (in TEUs) Total	Cargo Carried Cubic Meter	Cargo Carried Metric Ton	Total M. Tons Equiv.**	Freight Revenue ₱ '000	Passengers Transported 1st Class	Passengers Transported 2nd Class	Passengers Transported 3rd Class	Passenger Revenue (in P '000) 1st Class	Passenger Revenue (in P '000) 2nd Class	Passenger Revenue (in P '000) 3rd Class	Passenger Revenue ₱ '000
Total This Page >>>																			

This form may be used in lieu of Report No. M-11 by ferry operators and/or vessels which have plied more than 100 round voyages during the year.

* Indicate inclusive dates of the month if the vessel served more than one route during any month; otherwise, report traffic for each month.

**conversion factor: _____ metric ton = 1 cubic meter

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CARGO AND PASSENGER TRAFFIC (Roll-on-Roll-off Vessel)

Report No. M-12
Page ___ of ___

Vessel Name : _____ Ex-Name : _____ Vessel Code : _____

Voy. No.	Date Voy. Start	Date Voy. End	Route No.	Official Route Code	Route Port of Origin	Leg Port of Destin.	Vehicles/Rolling Cargoes Transported Type A	Type B	Type C	Type D	Type E	Total PCUs Equiv.	Freight Revenue ₱ '000	Passengers Transported 1st Class	2nd Class	3rd Class	Passenger Revenue (in P '000) 1st Class	2nd Class	3rd Class	Passenger Revenue ₱ '000
						Total This Page > > >														

Vehicle Types:
A - Cars, Light Vehicles ; B - 4Whlr & 6Whlr Trucks, Minibuses ; C - 10 Whlr Trucks, Buses ; D - Heavy Equipment, Dumptrucks, Grader ; E - Motorcycle/Tricycle

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CARGO AND PASSENGER TRAFFIC (Roll-on-Roll-off Vessel)

Report No. M-12a
Page ___ of ___

Vessel Name: _____ Ex-Name : _____ Vessel Code : _____

Month* (From/ To)	Route No.	Official Route Code	Route Leg		No. of Orig-Dest Voyages	Vehicles Rolling Cargoes Transported**					Total PCUs Equiv.	Freight Revenue ₱ '000	Passengers Transported			Passenger Revenue (in ₱'000)			Passenger Revenue ₱ '000
			Port of Origin	Port of Destin.		Type A	Type B	Type C	Type D	Type E			1st Class	2nd Class	3rd Class	1st Class	2nd Class	3rd Class	
Total This Page >>>																			

This form may be used in lieu of Report No. M-12 by ferry operators and/or vessels which have plied more than 100 round voyages during the year.

* Indicate inclusive dates of the month if the vessel served more than one route during any month; otherwise, report traffic for each month.

**Vehicle Types: A - Cars, Light Vehicles ; B - 4Whlr & 6Whlr Trucks, Minibuses ; C - 10 Whlr Trucks, Buses ; D - Heavy Equipment, Dumptrucks, Grader ; E - Motorcycle/Tricycle

NERAL REMARKS

ar : _____

mpany Name: _____ Company Code: _____

Manpower Adequacy:
Do you feel that the existing level of competence of your officers is adequate :

a) for good vessel maintenance ? ☐ Yes ; ☐ No
b) for fuel cost minimization ? ☐ Yes ; ☐ No
c) for avoidance of accidents ? ☐ Yes ; ☐ No
d) for promoting good service/relations with passengers and shippers ? ☐ Yes ; ☐ No

How many licensed officers is the company expecting to employ over the next two years ? _____

Which positions did you have difficulty in hiring ? _____

Labor Relations :
Is labor force unionized ? _____ ; If yes, state name of union : _____

Is there any collective bargaining agreement with labor ? _____
If yes, describe any salary adjustments over the succeeding years.

_____

Was there any labor strike/slowdown during the report period? _____ If yes, how long? _____

Accidents and Safety Aspects:
How many accidents occured during the period covered by this report ? (Indicate number below)

Accidental Deaths: Involving Passengers _____ ; Involving Employees _____
Personal Injuries : Involving Passengers _____ ; Involving Employees _____
Total Loss/CTL of Vessel : Estimated Value of Loss: _____
Hull/Machinery Damage : Estimated Value of Loss: _____
Cargo and Baggage Damage : Estimated Value of Loss: _____

What measures were taken to minimize/avoid such accidents ?

_____

If any vessel was totally lost or rendered inoperable, list the vessels and cause of damage below:

_____

Shiprepair and Support Services:
Do you feel there are adequate ship repair facilities in the Philippines to meet your needs? _____
If no, cite problems encountered and recommend measures for MARINA to undertake in the course of its development and regulation of shipyards.

_____

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State hereunder any other occurence of material importance or problems encountered during the report period.

Has the utility paid the supervision and regulation fees to the MARINA corresponding to the year which this report is filed ? _____

Amount Paid P _____

Number and date of official receipt _____

INDEPENDENT ACCOUNTANTS CERTIFICATION

I/WE have examined the Balance Sheet of ____ as of December 31, 19 ____ and the related Income Statement for the year then ended, together with the supporting schedules, as set forth in this Annual Report to be filled with the MARITIME INDUSTRY AUTHORITY pursuant to section 17 (h) of Commonwealth Act. No. 146, as amended. My/Our examination was made in accordance with the generally accepted auditing standards, and accordingly included such test of the accounting records and such auditing procedures as I/we considered necessary in the circumstances.

In my/our opinion, the said Balance Sheet and income Statement present fairly the financial position at December 31, 19 ____ and the results of operation for the year then ended of _____ in conformity with the generally accepted accounting principles applied on the basis consistent with that of the proceeding year.

_____

Certified Public Accountant

Date

Place

PROPELLER DIAMETER VERSUS PRIMEMOVER OUTPUT

(All Diameters are in Millimeter)

Primemover HP Output	Propeller Maker	Contr. Pitch Model	RPM	No. of Blades	Propeller Diameter
600	Hanshin	C47UN26	400	3	1,650
750	Hanshin	C47UN26	400	3	1,750
900	Hanshin	C47UN26	400	3	1,800
1,200	Hanshin	C53UN26	400	3	1,900
1,600	Hanshin	C53UN32	395	3	2,050
1,800	Hanshin	C63UN32	300	3	2,450
2,000	Hanshin	C63UN32	320	3	2,400
2,200	Hanshin	C68UN32	310	3	2,500
2,200	Hanshin	CX68N32	310	4	2,450
2,800	Hanshin	CX78N40	300	4	2,750
3,000	Hanshin	CX78N40	300	4	2,700
3,600	Hanshin	CX90N48	265	4	3,000
4,000	Hanshin	CX90N48	245	4	3,200
4,500	Hanshin	CX90N48	220	4	3,500

Source of Basic Data: The Hanshin Diesel Works, Ltd.

Primemover HP Output	Propeller Maker	Contr. Pitch Model	RPM	No. of Blades	Max. Dia.	Shaft Dia. in MM
350-500	Kamome	CPR-38	286-405	3 or 4	1,700	130-160
600-800	Kamome	CPR-45	269-359	3 or 4	1,900	150-180
900-1100	Kamome	CPR-53	220-340	3 or 4	2,200	180-220
1200-1500	Kamome	CPR-65	242-343	3 or 4	2,600	210-260
1600-2100	Kamome	CPR-80	228-365	3 or 4	3,000	250-290
2200-2800	Kamome	CPR-80A	228-365	3 or 4	3,000	250-290

Primemover HP Output	Propeller Maker	Side Thruster Model	RPM	No. of Blades	Propeller Diameter
60	Kamome	TF-04	1360	4	400
85	Kamome	TF-06	939	4	600
140	Kamome	TF-10	809	4	700
180	Kamome	TF-15	715	4	800
270	Kamome	TF-20	571	4	1,000
370	Kamome	TF-30	498	4	1,150
560	Kamome	TF-50	432	4	1,350
700	Kamome	TF-70	383	4	1,500
880	Kamome	TF-90	351	4	1,700
1100	Kamome	TF-110	303	4	1,900
1270	Kamome	TF-130	250	4	2,150
1480	Kamome	TF150	223	4	2,400
1670	Kamome	TC-170	195	4	2,600
1860	Kamome	TC-200	183	4	2,800

Source of Basic Data: Kamome Propeller Co., Ltd., Japan

LIST OF FIELD VARIABLES UNDER THE THEOCOST MODEL

Vessel Particulars

{1} Vessel Name
{2} Vessel Type
{3} Year and Place Built
{4} Age
{5} Gross Registered Tonnage (GRT)
{6} Net Registered Tonnage (NRT)
{7} Length
{8} Breadth
{9} Depth
{10} Draft
{11} Class
{12} DWT
{13} Passenger Capacity
{14} Unit Capacity
{15} Crew Complement
{16} No. of Decks
{17} Main Engine Make
{18} No. of Main Engines
{19} Maximum Horsepower Rating of Main Engine
{20} Total HP of Auxilliary Engines
{21} Service Speed
$\{22\}_f$ Fuel Consumption of Main Engines (Li./Hr)
{23} Fuel Consumption of Auxilliary Engines (Li./Day)
{24} Current Market Value of the Vessel

Operating Assumptions

{25} Liner Route
{26} Provision for Drydocking
{27} Provision for Afloat Repairs
{28} Provision for Bad Weather
{29} Commissionable Days
{30} No. of Days per Round Trip (for liner operations)
or
No. of Round Trips per Day (for ferry operations)
{31} Total No. of Round Trips per Year
{32} Fuel Requirements
$\{32\}_1$ Bunker
$\{32\}_2$ SFO
$\{32\}_3$ Diesel
{33} System Oil Requirement
{34} Hydraulic Oil Requirement
$\{35\}_P$ Food & Water Provisions
$\{35\}_F$ Food Requirements
$\{35\}_W$ Water Provisions
{36} Personnel Requirement

Traffic Assumptions

$\{37\}^L_t$ Route Link Traffic
$\{38\}^L$ Route Link Distance
$\{39\}_T$ Total Traffic
{40} Ave. Passenger Load Factor
{41} Ave. Cargo Load Factor

Price Assumptions

$\{42\}^L_t$ User Rates
{43} Common Carrier's Tax
$\{44\}_f$ Fuel Prices per Liter
$\{44\}_1$ Bunker
$\{44\}_2$ Special Fuel Oil (Blended)
$\{44\}_3$ Automotive Diesel Oil
$\{45\}_f$ Lube Oil Prices
$\{45\}_1$ System Oil
$\{45\}_2$ Hydraulic Oil
{46} PPA Charges
{47} Port Clearing per Port Call
{48} Mooring & Unmooring
$\{49\}_B$ Employees'Benefits
{50} Passenger Meals

{51} Crew Subsistence
{52} Fresh Water
{53} Stores
{54}$_{Eng}$ Spare Parts
- {54}$_{ME}$ Main Engine Parts
- {54}$_{AE}$ Aux. Engine Parts
- {54}$_{OM}$ Other Machinery Parts

{55} Repairs & Maintenance
{56}$_{Z}$ Annualized Drydocking
- {56}$_{GS}$ General Services
- {56}$_{H}$ Hull Preservation
- {56}$_{A}$ Anchors, Chains & Lockers
- {56}$_{R}$ Rudder, Propeller & Shaft Works
- {56}$_{SV}$ Sea Valves, Sea Chests & Strainers
- {56}$_{T}$ Tank Works
- {56}$_{P}$ Pipe Works
- {56}$_{M}$ Machinery Works
- {56}$_{E}$ Electrical Works
- {56}$_{CG}$ Cargo Gear Works
- {56}$_{SW}$ Steel Works
- {56}$_{O}$ Other Shipyard Accounts
- {56}$_{L}$ Lifeboat/Liferaft Servicing
- {56}$_{TX}$ Value Added Tax on Drydocking

{57}$_{TX}$ Local Government Taxes & Fees
{58} Hull & Machinery Insurance Rate
{59} Insurance Deductible
{60} Protection & Indemnity
{61} Passenger Accident Insurance
{62}$_{VF}$ Vessel Forms
- {62}$_{1}$ Passenger-Related Forms
- {62}$_{2}$ Cargo-Related Forms

{63} Ave. Cargo Handling Rate

Estimate of Annual Costs

Vessel Operations
{64} Passage
{65} Freight
{66} Common Carrier's Tax
{67} Net Revenue
{68} Fuel & Lubes
{69} PPA Charges
{70} Clearing Expenses
{71} Mooring & Unmooring
{72} Total Voyage Expenses
{73} Passenger Meals & Other Exp.
{74} Cargo Handling & Other Exp.
{75} Total Traffic-Related Expenses
{76} Vessel Salaries & Wages
{77} Employees'Benefits
{78} Subsistence
{79} Fresh Water
{80} Stores & Spare Parts
{81} Repairs & Maintenance
{82} Accrued Drydocking
{83} Taxes & Licenses
{84} Hull & Machinery Insurance
{85} Other Insurance & P&I
{86} Vessel Depreciation
{87} Amortization of Vessel Capital Expenditures
{88} Miscellaneous Vessel Expenses
{89} Total Running Expenses
{90} Vessel Contribution to Overhead

Terminal Operations
{91} Salaries & Wages
{92} Employees'Benefits
{93} Subsistence
{94} Forms & Tickets
{95} Office Rental
{96} Light & Water
{97} Gasoline & Oil
{98} Postage & Telephone
{99} Transport & Travel
{100} Repairs & Maintenance
{101} Representations & Donations
{102} Advertisements & Notices
{103} Depreciation & Amortization
{104} Miscellaneous Terminal Expenses
{105} Total Terminal Expenses

{106} Total Contribution to Overhead

General Administration

{107} Salaries & Allowance
{108} Employees'Benefits
{109} Ship Management Fee
{110} Legal & Audit Fee
{111} Board Honoraria & Meeting Expenses
{112} Supplies & Xerox
{113} Postage & Telephone
{114} Transport & Travel
{115} Repairs & Maintenance
{116} Representations/Donations
{117} Advertisements/Notices
{118} Taxes & Licenses
{119} Insurance
{120} Depreciation & Amortization
{121} Miscellaneous Admin Expenses
{122} Total Administrative Expenses

Consolidated Income Statement
(partial list only)

{123} Operating Income
{124} Bank Interest
{125} Other Interest
{126} Other Income, Net
{127} Net Income Before Tax
{128} Provision for Income Tax
{129} Net Income (Loss)

Additional Algorithms for Determining Unit Cost When Vessel Capacity is Expressed in Various Cargo Units

The Vessel Inventory file may contain vessels which indicate cargo capacity in different units. In estimating unit costs, the cost model user will either have to apportion total cost to each type (or unit) of cargo service or to divide total cargo cost by the total equivalent capacity of the vessel as expressed in a given unit of cargo capacity. Thus, this Annex provides additional procedures and algorithms for determining either the actual or theoretical cost of sea transport per cargo unit under circumstances when the vessel indicates various cargo capacity measures.

Conventional Cargo Vessels

Conventional cargo vessels normally indicate cargo capacities in terms of deadweight, but other capacity units may sometimes be indicated, such as bale, grain, TEU, deeptank cubic, reefer hold cubic, etc. For purposes of cost analyses, conventional cargo vessels (classified either as vessel type 1 or type 5), as well as landing crafts (under type 9) used primarily for transporting bulk and general cargoes, will only reckon with deadweight tons as a unit of cargo measure. For such vessels, therefore, the algorithms presented in the main text of this report are deemed adequate. This also means that no calculations will have to be performed for other cargo unit costs, such as cost per TEU, cost per lane-meter, etc.

Roll-on-Roll-off Vessels

RoRo vessels usually indicate their capacities in terms of number of passenger car units (PCUs), number of 8.5t trucks, deadweight tons, or in terms of vehicle deck area, or of vehicle-lane meters. For purposes of cost analyses, roro vessels (classified either as vessel type 2 or type 6) and landing crafts (under type 9) known to be predominantly used in the transport of rolling stocks will adopt lane-meters as the unit of cargo measure. In case the number of lane-meters on a roro vessel is not specified, this is estimated as follows:

If No. of Passenger Cars and/or No. of Trucks are specified

$$\text{Lane-meters} \cong (\text{No. of Passenger Cars}) * 4 + (\text{No. of 8.5t Trucks}) * 8.5$$

If No. of Passenger Cars and Trucks are not specified

$$\text{Lane-meters} \cong \text{PCU} * 4 \cong [\text{ field } \{23\} \text{ of VUCA }] * 4$$

Dividing the total operating cost by the actual or estimated vehicle lane-meters on the vessel will yield the estimated cost per lane meter. No calculations need to be done for cost per cargo unit other than for cost per lane meter.

Container Vessels

The cargo capacity of a container vessel is commonly expressed in TEUs, although other units such as deadweight tons, bale, grain, etc. may also be provided. Vessels designed to carry containers would normally have a deadweight tons (DWT) to TEU capacity ratio of less than 25. In vessels which carry partly containers and partly breakbulk cargoes, the DWT to TEU ratio would understandably be higher.

For cargo vessels under vessel types 3 or 7 which have a DWT to TEU ratio of less than 25, the algorithms for determining cost per TEU, as discussed in the main text of this DOSOCOM volume, could provide adequate and fairly reliable results. For such vessels, no calculations will have to be performed for cargo unit costs other than cost per TEU.

For cargo vessels with information on actual TEU capacity and with DWT to TEU ratio of more than 25, separate calculations for cost per DWT and for cost per TEU will have to be performed. The procedures and algorithms for estimating these unit costs are as follows:

a) Allocate the share of cargo operations in the operating cost to container and to breakbulk operations. (Note that figures in braces refer to the field codes as shown in the VUCA form)

Let $K_3 = \dfrac{TEU * 20}{DWT * .85}$

Share of container operations in total cargo operations $\cong K_3 *$ Cargo Share in Total Opg Cost

and

Share of breakbulk/bulk operations in total cargo operations $\cong [1 - K_3] *$ Cargo Share in Total Opg Cost

b) Compute for cost per TEU by dividing the computed share of container operations in total cargo operations by the declared TEU capacity of the vessel.

c) Estimate the portion of deadweight capacity that is not used for carrying containers. The following formulae may be applied:

Payload for breakbulk $\cong$ Maximum [DWT*.85 - TEU * 20, 0]

d) Compute for cost per ton by dividing the computed share of breakbulk operations in total cargo operations by the estimated payload for breakbulk cargoes.