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METHODOLOGY OF DAY-TO-DAY SHIP COSTS ASSESSMENT

ABSTRACT

The paper presents a methodology of assessing the day-to-day fixed costs of maritime cargo ships. The authoress refers the reader to factors that affect the amount of fixed daily costs and the day-to-day voyage costs of ships. In the last chapter the paper presents an estimation of the average daily fixed costs and day-to-day voyage costs of ships per type and size for the year 2003. Besides particular explanations, the reader is referred to databases that authentically impart data on the structure of maritime fleets and their technical characteristics, as well as databases on prices and costs in maritime transport.

KEY WORDS

daily costs, maritime cargo ships, ship's daily voyage costs evaluation

1. INTRODUCTION

In writing professional and scientific papers in the domain of maritime shipping, authors often have difficulty when speaking about ship costs, since they represent data that shipowners consider their greatest business secret. In technical literature and databases referring to maritime shipping we never come upon data on the costs of various types of vessels. In the economics of ships as the basis of any calculation and analysis of costs we take the fixed daily costs of a ship or the fixed costs of a ship in the course of a voyage. The shipowners will tell you that these costs on the same types of ships may vary greatly because the prices of new and second-hand ships are prone to major changes in light of the situation on the maritime market. Operating costs also vary on the same types of ships because shippers employ manpower from different countries, and this has an impact on creating significant differences in the manning costs. There are a few more reasons why the costs of the same types of ships differ; however, in many cases when the authors of various studies talk about circumstances that justify the purchase of new ships, or studies that justify the introduction of new technologies and organizational

methods, they are at a loss to provide evidence for their suggested technological and organizational changes, precisely because of these reasons. This paper aids the readers in the easiest and most down-to-earth way of attaining such evidence.

The paper begins with the basic scheme of the ship's daily costs and the ship's daily costs during a voyage. When calculating the real costs of any type of ship we must have at our disposal certain data that refer to the ship's size, its speed, fuel consumption, and various data on the yearly and daily costs of the ship. In this paper the authoress calls attention to various databases on the distinguishing features of ships and their characteristic costs, from which one may gradually and quite reliably determine the day-to-day costs of ships.

2. DAILY COSTS OF SHIPS

Theory and practice in the economics of ships use the term fixed costs of a ship and in doing so we have in mind the fixed costs of a ship in the course of a year, the daily fixed costs of the ship and the day-to-day costs of the ship during a voyage. When talking about fixed costs of a ship in the course of a year, we then include the yearly operating costs of the ship and the

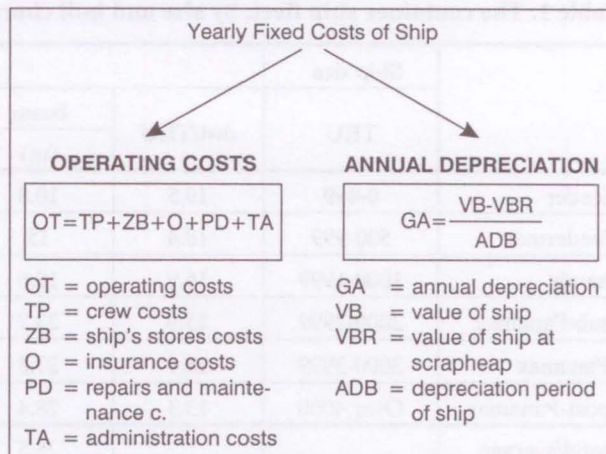


Diagram 1 - Yearly Fixed Costs of Ship

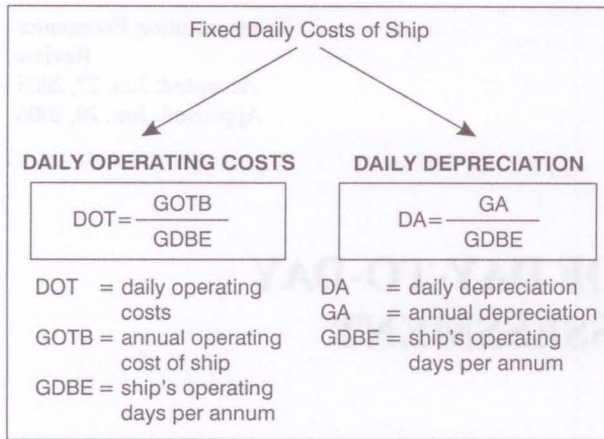


Diagram 2 - Fixed Daily Costs of Ship

yearly depreciation of the ship under the supposition that the ship has a determined liquidation value and according to accountancy standards its life span is 20 years (presentation in Table 1).

The annual cost of a ship in the shipper's practice boils down to the daily costs of a ship and these are derived from the number of a ship's operating days. The understanding is that a ship is not in operation when undergoing maintenance and repairs in a shipyard and during periods when a ship is laid up due to excessive supply of ship space on the maritime market.

In shipper's practice one other group of costs can be accounted for as fixed cost; these are the daily voyage costs. [1,8]

During a voyage the ship runs all 24 hours and ordinarily in conformity with an accurately agreed-on speed from which the ship's structural hull characteristics already allow the establishing of fuel consumption per day at any determined speed. See Tables 1, 2, 3.

The data from the preceding tables were taken from Martin Stopford's book, »Maritime Economics«, hence the factual information on the number and hull characteristics of the various types of vessels are

Table 1: The container ship fleet, by size and hull characteristics

	Ship size		Hull characteristics				
	TEU	dwt/TEU	beam (m)	draft (m)	speed (nm/h)	consumption (t/day)	% geared with cranes
feeder	0-499	19.5	10.8	6.3	13.8	16.8	30.9
feedermax	500-999	18.4	15	8.6	16.4	32.4	49.7
handy	1000-1999	16.9	18.6	10.2	18.5	60.9	28.9
sub-Panamax	2000-2999	15.9	23.7	11.7	29.8	93.1	3.7
Panamax	3000-3999	14.4	27.3	12.5	22.2	108.2	0
post-Panamax	Over 4000	13.3	28.4	13.1	24	155.6	0
total/average			25.5	9.5	18.2	59	

Source: Container ship Register 1996, Clarkson Research Studies

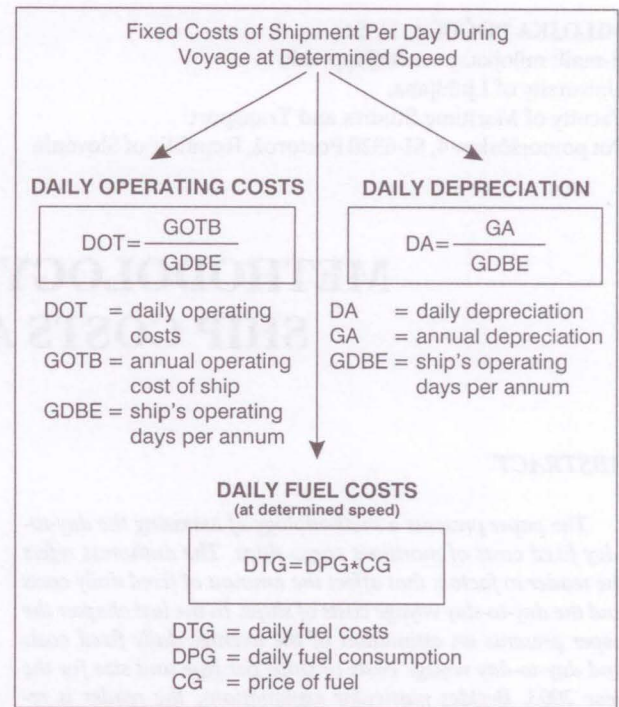


Diagram 3 - Fixed Costs of Shipment Per Day During Voyage at Determined Speed

outdated, but they do refer to the data sources that can be bought from the cited institutes and associations.

The daily fixed costs of a vessel and daily voyage costs are the basic elements of calculation of the ship's voyage, which has a determined number of navigation days and a determined number of days in seaports. In ports with daily fixed costs it is necessary to add port charges and cargo handling costs.

2.1. Daily operating costs of ships

We will never get the data on operating costs of a ship from a shipowner, since this information is a business secret, and owners will tell you that such

Table 2: The bulk carriers fleet, by size and hull characteristics

	Hull characteristics					
	length	beam (m)	draft (m)	speed (nautical mile/h)	consumption (t/day)	% geared with cranes
handy						
10-19999	147	21.6	8.9	14.3	24.6	73
20-24999	165	23.5	9.8	14.6	29.3	70
25-29999	174	24.4	10.1	14.6	32.5	85
handymax						
30-39999	189	27.3	10.9	14.6	34.8	76
40-49999	181	30.3	11.2	14.5	34.2	67
Panamax						
50-59999	218	31.7	12.4	15	47.5	15
60-79999	223	32.1	13.1	14.5	43	8
capsize						
80-99999	245	37.1	13.3	14.5	50.1	0
100-149999	266	42.2	16.6	14.4	56.5	0
150000+	287	46.8	17.8	13.9	58.5	0
total/average	189	28.1	11.2	14.5	36	57

Source: Bulk carrier Register 1996. Clarkson Research Studies

Table 3: The tanker fleet, tanker size and their hull characteristics

	Tanker hull characteristics				
	length	draft (m)	speed (nautical mile/h)	consumption (t/day)	% double hull
handy					
10-19999	144	8.4	14.3	21.5	14
20-29999	172	10.2	15.1	33.6	8
30-49999	180	11.3	15	37.9	17
Panamax					
50-69999	224	12.7	15.1	43.1	10
afamax					
70-99999	240	13.5	15.1	55.2	22
suezmax					
100-199999	269	16.2	15.1	70.9	18
VLCC					
200-249999	326	19.6	14.9	83.5	1
250-299999	329	20.9	15.1	87.5	11
ULCC					
300000+	371	23.1	15.2	97.5	0
total/average	217	13	14.9	45.7	14

Source: Sample of bulk carriers from the Clarkson »bulk Carrier register« and »Ports of the World«

costs on the same type and size of vessel can be widely different, due to the diverse crew costs, dissimilar maintenance costs as consequence of vessel's age as well as the quality of past maintenance. The differences in operating costs of vessels may result from the costs of insurance, since shippers have various bonuses and penalties for loss experience (*malus*) and finally the operating costs of a ship per day depend on the number of days that the ship is in commercial operation. As a rule, older ships in the course of a year spend more days in ship repair yards hence they have

Table 4: Sample of operating costs of handysize bulker from database of OpCost 2004, Moore Stephens

Type of vessel	Handysize bulker	
DWT	20,000-40,000	
World fleet- 2003 – number of ships	2,156	
Average size of group in-2003 DWT(TEU)	29,605	
Average age of fleet	1985	
Number of ships in the sample	89	
Average age of sample	1985	
Average size of sample-DWT(TEU)	28,909	
Average 1 year Time Charter per day	9,043	
	annual costs US\$	daily costs US\$
Crew wages	443,424	1,215
Victuals	45,154	124
Other crew costs	60,213	165
Total crew costs	548,791	1,504
Lubricants	60,019	164
Stores other	87,442	240
Stores total	147,461	404
Spares	85,041	233
Repairs & maintenance	77,155	211
Repairs & maintenance total	162,196	444
P&I insurance	72,292	198
Insurance	59,631	163
Insurance total	131,923	361
Registration costs	6,992	19
Management fees	141,608	388
Sundries	59,676	164
Administration total	208,276	571
Total operating costs 2003	1,198,647	3,284
Total operating costs 2002	1,108,136	3,033

a smaller number of days in commercial operation, which immediately results in higher daily operating costs.

On the international market of databases that refer to the shipping trade we will come upon the publication *OPCOST-Benchmarking vessel running cost* published by *Moore Stephens Chartered Accountants* of London, member of a global network of independent accountants. The mentioned publication gives factual information on the operating costs of certain types of ships that represent the average costs of the vessels for which the Moore Stephens chartered accountants do their accounting. Such chartered accountant firms are entrusted to keep the business secrets of their clients, but the keeping of statistics on ships' costs is permissible. This publication gives data on the costs of certain types of ships in their statistics base in which they have 740 vessels. The data on the operating costs of ships are published once a year. This publication was issued for the first time in the year 2000. The data is organized in such a way as to show which statistic sample was considered in relation to the world fleet of a given type of ship and its average age. [2]

Data on the costs of vessels are expressed in accordance with the structure of operating costs and their sum total per annum and from it the daily operating costs on the basis of 365 days are derived. The data also show the average age of ship taken as the selected sample. The data of vessel running costs are shown for the current and the preceding year and for most types of ships information is also given regarding the daily time charter rental for a one-year commercial leasing of the ship.

From the above sample we have the opportunity to see the level of reliability of the presented data regarding size in relation to the world fleet and the average age of the fleet. From the above sample we conclude that the average age and size of the ship corresponds to the world fleet characteristics of the type of ship demonstrated. In the structure of costs of the demonstrated ship by far the greatest share of 37% refers to the crew wages. And it is precisely the crew wages that can vary greatly from ship to ship in light of the nationalities of the crews [3]. On occasion of making use of this data, shippers and other analysts should in calculation of this category of costs in their computations of crew wages take into consideration their own policy and plans for crew employment.

For a more dependable calculation of daily fixed costs of vessels, the shippers should, in light of their experience and familiarity with the age of the ship, assess the number of days of commercial operation that may have a considerable effect on the rise of daily costs on the older types of vessels [4]. The data on the daily operating costs of the vessel shown in the sample are calculated for 365 days. The technical publications

Table 5: Average prices of newbuildings in the period from 1980 to 2003

Type & size of ship	1980	1985	1990	1995	2000	2002	2003
30-50.000 dwt bulk carrier	17	11	24	25	20	15	22
32-45.000 dwt tanker	19	18	29	34	29	26	30
70-74.000 dwt bulk carrier	24	14	32	29	23	20	25
80-105.000 dwt tanker	28	22	42	43	41	35	41
120.000 dwt bulk carrier	32	27	45	40	40	31	47
250-280.000 dwt tanker	75	47	90	85	76	67	75
125-138.000 m ³ LNG	200	200	225	245	165	164	155
75.000 m ³ LPG	77	44	78	68	60	60	59
15.000 dwt general cargo	14	12	24	21	19	16	16
2.500 TEU full containership	-	26	52	50	35	28	38

Source: UNCTAD: Review of Maritime Transport 2004,

of UNCTAD warn shippers that in practice every vessel is outside of commercial operation at least 15 days in the course of a year, and in the case of older vessels certainly much more than that.

2.2. Ship's depreciation and methods of its calculation on sea-going vessels

The economic theory on depreciation of capital assets deals with the different methods of calculating depreciation and recommendations for using various methods on occasion of a range of business policies but also taking into account the various functions of depreciation. When depreciation is used for purposes of calculation, the use of a balanced temporal method that also respects the ship's salvage value is recommended. [5,4] Ships are expensive capital assets and are mainly purchased on bank credit loans. The crediting conditions may differ, but as regards the basic conditions they are somehow more uniform; today these conditions for new ships are 7 – 8 years of deferred payment at an interest rate of 7 – 8% per annum, with the shipper's own downpayment of 20 – 30%. Since ships are very expensive, the interest rates on credits are very high and on occasion of calculating the base for depreciation it is necessary to take them into consideration.

In our sample on the daily operating costs of a ship we also include the daily costs of depreciation. In calculating depreciation we must primarily know the price of the vessel. The prices of ships on the market of maritime transport are very variable and reflect the situation on the maritime market (see Table 5). [4,9]

The ship in our sample was built in 1985 and for the sake of reality we will take the prices of ships in 1985. Ship prices can be obtained from several sources. One

of them is the Review of Maritime Transport issued by UNCTAD that is released each year and among other information presents the average prices of new ships of the various standard types and sizes of vessels. Much more detailed data on ship prices are provided by Lloyd's Register of Shipping -Statistical Tables of London and Newbuilding Ship Prices by the Fairplay Information System of London who in their databases have prices of concrete ships, but insight into these databases is subject to payment.

Table 6: Sample of depreciation calculus for a ship purchased on credit against a 20% downpayment for an 8-year repayment and an 8% interest rate

Type of vessel	Handysize bulker
Year of building	1985
DWT	28,909
Price of ship for payment in cash	11,000,000
Downpayment share 20%	2,200,000
Amount of credit	8,800,000
Coefficient of credit for 8 instalments at 8% interest	0.17401476
Annuity	1,531,329
Credit amount with cost of interest	12,250,639
Price of ship with cost of capital	14,450,639
Liquidation value % of price of new vessel	2%
Liquidation value	2,890,128
Depreciation basis	11,560,511
Annual depreciation during the ship's 20 year life span	578,026
Daily depreciation -365 days	1,584

In our sample we calculate the depreciation of the ship on occasion of its purchase at a condition of 20% of the shipper's downpayment, 8 years of payment by instalment at a payment of annuity and 8% interest. The interest computed in this way is ascribed to the purchase price of the ship and reduced by 2% of the liquidation value. The percent of the liquidation value is estimated on the basis of the weight of the vessel and average prices of scrap iron at the shipbreaking yards in 1985. The prices of scrap iron vary as much as the prices of old and new ships and reflect the momentary situation in the supply and demand on the market of maritime transport.

Such a calculation of the ship's depreciation is accurate if the vessel was purchased in 1985 and remained in the shipper's ownership the whole time; but if the ship was sold in the meantime at the price of a second-hand ship during a market swing period or a market recession period and sold under a credit payment arrangement, it will certainly be higher or lower, which makes the calculation of annual and daily fixed costs inaccurate.

2.3. Fuel costs

Fuel costs represent the highest percentage within the structure of voyage costs. Fuel consumption is in relation with the structural shape of the ship's hull and its main engine. Due to the fuel oil crisis of 1973-1985, fuel costs in maritime transport increased as much as up to 950%, which brought about a change in the balance of costs. During that period shipyards invested in the building of more economical vessels. Changes in hull characteristics and driving engines had a substantial effect on improving fuel efficiency and decreasing fuel consumption. Improvements in utilization of propellant energy have likewise been accomplished on auxiliary engines wherein the heating system uses the exhaust emission of the main driving engine. The shipowner cannot influence fuel prices, but does control fuel costs by purchasing a ship whose hull renders better propulsion and diminishes the consumption of propulsive fuel and its engine enables better utilization of fuel oil. A more sophisticated method of running the vessel can also reduce fuel costs, that is, the prices of fuel are not the same everywhere, thus for ex-

Table 7: Price of fuel 12/2004 (\$/t)

	HFO	IFO	MDO
Singapore	183	193	292
Rotterdam	133	150	260
Fujairah	170	181	436
Houston	130	151	397

Source: Lloyds Shipping Economist 12/2004.

ample at certain destinations in the world we encounter a wide disparity of fuel prices for main and auxiliary engines (Table 7). When planning their voyages, shippers pay close attention to the ports of call and quantity of fuel to be tanked in light of the disparity in fuel prices, and take into consideration the length of the voyage, the probable quantity of loaded cargo and the freight rate.

Fuel consumption largely depends on the ship's speed and the extent of fouling (encrustment) of the underwater part of the hull. Table 8 shows the differences in fuel consumption at different speeds. The sample is taken from Martin Stopford's book, issued in 1997, which most probably means that the fuel consumption on modern ships today is lower [6,7].

Table 8: Effect of speed on oil consumption of a Panamax bulk carrier

Speed in knots/h	Fuel consumption in t / day
16	44
15	36
14	30
13	24
12	19
11	14

Source: M. Stopford: Maritime Economics. London, 1997

Fuel consumption of two Panamax bulk carriers could differ by 20 to 30%, depending on the age, machinery and hull condition. Of course, the amount of the cost also depends on the fuel price, which has been on the rise in recent years.

If we take into consideration all the factors of influence on fuel costs mentioned so far, the existence of the disparity in fuel consumption between ships of a similar size and speed becomes clear.

3. ASSESSMENT OF DAY-TO-DAY FIXED COSTS OF A SHIP

On estimation of the daily fixed costs of a determined type and size of ship, it is in the beginning necessary to use the OpCost database that shows the characteristic operating costs of the average ship, which was taken as a sample from the mentioned database. In the operating cost structure of a ship the costs incurred by the crewing of the vessel are among the highest. Therefore, on occasion of any individual estimation of operating costs it is necessary to adjust the crew costs by implementing the concrete price of the crew (national, F. oc. or mixed crews). In the individual estimation of operating costs special attention should be dedicated to the cost of maintenance. If the

ship in the OpCost database is older or younger, the maintenance costs should be adjusted accordingly. A certain amount of adjustment arising from the disparity in the age of vessels should also be implemented in the case of insurance costs.

On the assessment of capital costs of a ship, which we have in this sample shown through depreciation, it is by all means necessary to add to the average costs of the ship its day-to-day depreciation computed per price of new ships in the year when it was built. Such an estimation of the depreciation is realistic only if the ship has always been under the ownership of the same shipowner. If the ship was during its lifespan sold »second hand«, then its purchasing price was different and depended on the then-prevailing conditions of supply and demand on the maritime market and on crediting conditions. In the case of an old vessel when calculating its depreciation, the ship's remaining lifespan is up to 20 years of the standard (bookkeeping) age of a capital asset.

If the ship was purchased through the use of a financial lease, then the daily cost of leasing dues should be added to the assessment of the ship's daily operating costs [4].

Table 9: Daily fixed costs of ship

Type of vessel	Handysize bulker
Year of building	1985
DWT	28,909
TEU	
Speed	14.6
Fuel consumption per day	32.5
Price of fuel in \$	152
Lifespan of ship 20 years	
365 days of service	365
Operating costs per day in \$	3,284
Daily depreciation in \$	1,584
Fixed costs per day in \$	4,868

4. EVALUATION OF SHIP'S DAILY VOYAGE COSTS

If we wish to calculate the average day-to-day voyage costs, and thereby the average daily price for a transported ton of cargo (clean transport without port costs) or a TEU, we shall then add to the daily fixed costs the daily fuel costs, taking into account the determined speed and actual consumption of the concrete ship, bearing in mind the ship's hull characteristics, the state of the main engine machinery, the state of

fouling of the underwater part of the hull and the current price of fuel.

Table 10: Daily voyage costs of ship

Type of vessel	Handysize bulker
Year of building	1985
DWT	28,909
TEU	
Speed	14.6
Fuel consumption per day	32.5
Price of fuel in \$	152
Lifespan of ship 20 years	
Days of service 365	365
Operating costs of ship per day in \$	3,284
Daily depreciation in \$	1,584
Fixed costs of ship per day in \$	4,868
Daily cost of fuel in \$	4,940
Daily voyage costs of ship	9,808

5. PRESENTATION OF DAILY FIXED VOYAGE COSTS OF SHIPS WITH A COMPARATIVE ANALYSIS OF DAILY COSTS OF TRANSPORT PER TON OF CARGO IN ACCORDANCE WITH THE VARIOUS TYPES OF SHIPS

In the continuation of this paper and using the mentioned method of calculating the day-to-day costs of a ship and the day-to-day voyage costs of a ship, we have worked out presentations of the calculations of the daily costs and the daily voyage costs of bulk carriers, tankers and container ships. The operating costs of the ships refer to the year 2003, the depreciation costs were calculated on the basis of the price of new ships in the year of building of the sample ships, and the price of fuel was the price that was relevant in December of 2003. [10] Taking into consideration all the significant factors that affect the operating cost of ships, this presentation is an estimation of the average costs of running various types of ships.

5. CONCLUSION

In this paper we have presented the methodology of assessment of the day-to-day fixed costs of ships and the day-to-day voyage costs of ships. On the basis of the mentioned methodology we have assessed the average daily fixed costs of ships and the daily voyage costs as per various types and sizes of ships in the year

Table 11: Daily voyage costs of bulk carriers

Type of ship	Handysize bulker	Handymax bulker	Panamax bulker	Capsize bulker
Year of building	1985	1994	1990	1989
DWT	28,909	46,291	69,359	154,424
Speed	14.6	14.5	14.5	13.9
Daily fuel consumption at 14.6 knots	32.5	34.2	43	58.5
Price of fuel in \$	152	152	152	152
20-year life span of ship				
Days of service 365	365	365	365	365
Daily operating costs in \$	3,284	3,406	4,167	4638
Daily depreciation in \$	1,584	2,398	3,444	3,229
Fixed costs per day in \$	4,868	5,804	7,611	7,867
Daily cost of fuel in \$	4,940	5,198	6,536	8,892
Daily voyage costs of ship	9,808	11,002	14,147	16,759

Table 12: Daily voyage costs of container ships

Type of ship	Firedmax	Container ship	Container Main Liner
Year of building	1985	1989	1988
TEU	9,880	22,663	44,154
DWT	537	1,341	2,777
Speed	16.4	18.5	20.8
Daily fuel consumption at 15.1 knots	32.4	60.9	93.1
Price of fuel in \$	152	152	152
20-year lifespan of ship			
Days of service 365	365	365	365
Daily operating costs in \$	2,664	3,750	4,257
Daily depreciation in \$	1,670	5,140	5,732
Fixed costs per day in \$	4,334	8,890	9,989
Daily cost of fuel in \$	4,925	9,257	14,151
Daily voyage costs of ship	9,259	18,147	24,140

2003. We could not find the mentioned data in literature nor in the databases since the operating costs of ships is a business secret of every shipowner. The fixed costs of ships and the day-to-day voyage costs of vessels of similar type and size can in reality be at a very wide disparity; however, we can consider the calculations of these costs as average costs, which can be adjusted in concrete samples.

Upon calculation of daily costs in concrete samples, special attention should be dedicated to the various factors of cost dynamics such as the nationalities of crews, ship age and its effect on the costs and maintenance time, price changes of new and old ships, price changes of fuel. In each concrete calculation sample,

every category of cost should be separately analyzed and should be the subject of separate evaluation.

Alongside the accompanying clarifications regarding the structure and factors of the costs in maritime shipping, we also refer the reader to the relevant databases that may be employed in such examples.

The mentioned types of costs can be useful for many purposes, such as: calculations of overseas voyage costs, calculations to explain the necessity of time chartering a ship, calculations to justify the purchase of new or second-hand vessels, calculations justifying the introduction of new organizational and technological solutions in shipping, ports and government administration of maritime affairs.

Table 13: Daily voyage costs of oil tankers

Type of ship	Product tanker	Handy product	Panamamax tanker	Aframax tanker	Suezmax tanker	VLCC
Year of building	1987	1992	1984	1990	1984	1997
DWT	22,363	42,363	63,591	97,778	151,039	297,291
Speed	15.1	15	15,1	15.1	15.1	15.1
Daily fuel consumption at 15.1 knots	33.6	37.9	43.1	55.2	70.9	78.5
Fuel price in \$	152	152	152	152	152	152
20-year life span of ship						
Days of service 365	365	365	365	365	365	365
Daily operating costs in \$	4,405	4,769	5,767	5,605	5,754	7,283
Daily depreciation in \$	1,937	4,787	2,389	4,574	3,588	6,960
Fixed costs per day in \$	6,342	9,556	8,156	10,179	9,342	14,243
Daily cost of fuel in \$	5,107	5,761	6,551	8,390	10,777	11,932
Daily voyage costs of ship	11,449	15,317	14,707	18,569	20,119	26,175

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SAŽETAK

METODOLOGIJA PROCJENE DNEVNIH TROŠKOVA BRODOVA

U članku je prikazana metodologija procjene dnevnih fiksnih troškova morskih teretnih brodova. Autorica upućuje čitatelja na faktore koji utječu na visinu dnevnih fiksnih troškova i dnevnih troškova brodova u plovidbi. U posljednjem poglavlju je predstavljena procjena prosječnih dnevnih fiksnih troškova i dnevnih troškova brodova u plovidbi po pojedinim tipovima i veličini brodova za 2003 godinu. Uz pojedinačna obrazloženja čitatelja se upućuje na baze podataka, koje vjerodostojno iskazuju podatke o strukturi pomorske flote i njenim tehničkim karakteristikama kao i baze podataka o cijenama i troškovima u morskom brodarstvu.

KLJUČNE RIJEČI

dnevni troškovi teretnih morskih brodova, procjena dnevnih troškova broda u plovidbi

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