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Substantiating the Decision Regarding the Acquirement of Ships used in Seagoing Transport

The tonnage call and bid has suffered a cyclic evolution on the international seagoing transport market. More than that, the person that wishes to acquire a ship must take into consideration a series of elements. The economical reasoning as well as the international practice emphasize that the profit coming from exploitation prevails over the initial price of the acquisition when the buyer focuses on a certain type of ship. In the current paper we approach the naval investments problems from this perspective.

The evolution of the shipping industry, after the Second World War, has been full of creativity, professionalism, fabulous profits but also some errors. Here we can include the drama of the super-oilers, the "meteorical" growth of navigational stars like Niarchos and Onassis, as well as equally dramatic scandals like the one generated by Tidal Marine by who built a 700.000 tdw transport fleet at the beginning of the 1970`s, being accused afterwards for fraudulently obtaining loans worth over $ 60 mil., by a series of New York bankers. Among the lead errors is the episode registered on the oilers market in 1973, when the super-oilers bid situated itself at over 100 mil. tdw, for which the call never materialized, the result being that few of them were ever used at their full potential economical capacity.

More briefly, the shipping is an industry and at the same times a market that is well over significant. More than 20000 ships of different kinds and capacities can be found at sea at any hour of the day and night. In this context we must emphasize that the shipping market involves a large number of people – freighters, brokers, constructors and bankers – that together realize the very special task of transporting more than 3000 mil. tones of merchandise on water and that make shipping become more than a business.

Many shipping fortunes were realized due to political conflicts especially the ones referring to the close of the Suez Canal in the 1950`s and 1960`s. That is why we cannot allow ourselves to ignore the political aspect of the shipping market. It is true that the more the world economy turned global during the past few

years, the more the strategic importance of the shipping industry has accentuated.

If we want to understand the economical and political forces that have molded the development on the shipping market, we must appreciate the dual interaction between shipping development and world economy development.

Fast and cheap transport was one of the main products of the industrial revolution. Distances shortened at an amazing rate. Day after day the world seems smaller and smaller, and societies that have practically ignored each other for thousands of years are suddenly making contact. The deployment of naval transport under conditions of efficiency mainly implies equipping companies (economical transport agents) with ships of different kinds, capacities and exploitation characteristics. To better respond to the destined purpose, ships must achieve the water transport process, so that the merchandise is delivered to its destination, in the same qualitative and quantitative conditions in which it was found on loading, and the risks that the ships and its sailors undergo are minimal.

The characteristics of naval transport, the necessity of growth in economical efficiency, etc., impose a series of technico-constructive and economical conditions on ships.

The technico-constructive and economical conditions are insured by the project concept that represents the reference material that lies at the basis of constructing (executing) each ship and of testifying through its class certificate. Technico-constructive conditions refer to: durability, floatability, stability, manoeuvrability, installation equipment, devices that guarantee the ship's safety, the safety of the crew and merchandise, the ship's life span etc. The economical conditions regard the growth of profit and the elements through which they are achieved are: space and the necessary arrangements for the stowage, protection and handling of merchandise, the optimal displace speed, higher tdw quotient, lower fuel input and exploitation costs etc.

The efficiency of a ship's activity depends on the technical level of the project on which it's construction was based, activity organization and exploitation of ships, used time, the optimization of the ship fleet's exploitation etc.

On referring to designing of ships it is important to evaluate the economical factors. This highlight considers the investment effort cycle undergoes the following stages: research, design, execution (construction) and finally exploitation. Research is designed to offer new technological, technical, economical solutions in contrast to marketing and strategic management requests. The design must apply the results of the research on a technological and economical layout. The purpose of the execution (construction) is to apply the project having to respond to technical and economical motives. The exploitation is actually the materialization of research, design, execution, including the management and marketing concepts that stand at the basis of the water transport production deployment.

The amplitude of wrong decisions in designing ships has gone up the roof in the last few years, concurrent with the ships' growth and size and variety. It is obvious that the designing of a ship must be made at the highest level, but techni-

cal criteria, like durability and others are not sufficient. Today, a generally accepted fact is that the main criteria by which a ship is selected is an economical one.

Currently buyers based their decision of acquiring a certain ship on the principle of minimizing the exploitation costs instead of the principle regarding the lowest initial price of a ship.

Investing in a ship with a given specificity usually implies four main factors: the construction cost of the ship; the operational costs in the period when the ship is active; the bulk of merchandise and traveller's traffic and the level of existing shipment. By taking into consideration these facts we can establish the profit determining the rate of investment recuperation. This point of view is often assumed by specialists belonging to shipping companies who use current cash flow techniques and current net value. Much such estimation is made to design the ship that will produce the most desirable global investment recuperation, thus considering every circumstance.

An essential element that must be regarded is the transport of cargo that is close to the ship's capacity. In most of the cases ships do not operate at full capacity especially when transporting general merchandise, when besides the weight we must also consider their volume. Thus we make a series of combined estimates so that we obtain the most favourable financial results.

Generally, there are two major options for designing ships. The first is the preliminary design that includes a main estimate of the price by the constructor, as an answer to a simple suggestion at the request of the ship owner. The second is the detailed design, made by the ship's constructor and based on an entire declaration of requests. But there is also a more or less recent practice that involves a tight collaboration between he, constructor of the ship and the company that will own it, the latter having the possibility to employ naval architects as consultants.

After a number of such competitive proposals have been made by shipyards through out the country and abroad, an evaluation will be made and the contract will be assigned to the shipyard that's has presented the best offer, considering: the price of the ship, delivery date, credit availability and the standard of the ship worker.

The architect, working in a tight bond with the constructor of the ship, must take into consideration the following information: the evaluation of the market's call for a new tonnage, which means research of the market and other managerial techniques; establishing possible types of ships; dimensions and total and practical capacity, optimal for the market's requests; elaborating preliminary technical specifications, offering an array of alternatives to designing ships. To this extent computer based techniques will be often used to realize estimates of the ship's costs and operational costs, potential income included.

A closer look on the factors that influenced the final design of the ship will lead to the conclusion that this is a phase in the blueprint of the project, which needs to be evaluated before a final selection is made. We must of course consider the main parameters of designing a ship for one or more purposes like: ship capac-

ity, maximum and economical speed, fuel input, the number of operational days in a year, the cargo factor that may vary pending on the commerce dynamic and season, competitive level; investment effort; initial price of the ship.

It is clear to say that it isn't the initial cost of the ship that represents the final argument but its competitiveness and profitability during it's operational life.

To establish a criteria for determining the optimal investment that shows if the construction order of a certain type of ship is profitable, and if so, when the construction need to start, we must regard a series of elements: gross income during the period the ship is exploited, initial cost of the ship and exploitation costs; the period during which the ship is exploited; the allocation of income and operational expenses over the period in which the ship is exploited; the value of the shop at the end of the exploitation period.

For example we have a firm X that wishes to order a bulk ship with a 8.000 tdw capacity.

In a first variant in which the equipment of the ship would be made with indigenous gear the problem's data are the following:

- The ship's acquisition price (A) = 4.800.000 $;
- Exploitation period = 20 years;
- Annual profit rate (g) = 7%;
- Capital reparations presented in table no.1

Period dynamic and capital reparations costs in time

Table 1

Year	Period - days -	Reparation Costs $
5	-	100.000
9	50	300.000
13	90	800.000
16	120	1.000.000

We will make table no. 2 in which each line will, correspond to a year of ship exploitation. In the first column you will find the years of the exploitation period, beginning with the year of construction, and ending with the year in which the ship was annulled. In the second column, we find the income (V_i) correspondent to each year of exploitation and in the third column annual expenses (C_i). By making the difference between income and expenses we obtain annual profits (P_i) which will be found in column no.4.

Data for the estimate of the current net investment value
(variant 1)

Table 2

i	V_Ii	C_i	P_i	$(1+g)^{-i}$	$P_i(1+g)^{-i}$
1.	1.500.000	800.000	700.000	0,934576	654205
2.	1.500.000	800.000	700.000	0,873439	611407
3.	1.500.000	800.000	700.000	0,816298	571408
4.	1.500.000	800.000	700.000	0,462895	534026
5.	1.500.000	800.000	600.000	0,712986	427791
6.	1.500.000	800.000	700.000	0,666342	466439
7.	1.500.000	850.000	650.000	0,622750	404787
8.	1.300.000	900.000	600.000	0,582009	349205
9.	1.500.000	1.076.000	224.000	0,543934	121841
10.	1.500.000	860.000	640.000	0,508349	325343
11.	1.500.000	1.000.000	500.000	0,475093	237546
12.	1.500.000	1.050.000	450.000	0,444012	199805
13.	1.500.000	1.591.000	-461.000	0,414964	-191298
14.	1.500.000	900.000	600.000	0,387817	232690
15.	1.500.000	1.000.000	500.000	0,362446	181223
16.	1.500.000	1.671.000	-665.000	0,338735	-225258
17.	1.500.000	950.000	550.000	0,316574	174115
18.	1.500.000	1.100.000	400.000	0,294864	118345
19.	1.500.000	1.200.000	300.000	0,276508	82952
20.	1.500.000	1.300.000	200.000	0,258419	51683

The dynamic of profits in time must be achieved. Income that is been obtained in past years can be estimated using the following formula:

$$V_n = V_0 (1+g)^n$$

in which:
V_n – updated income in the „n^{th} ” year
V_0 – initial income;
g – annual profit rate
n – the number of years by which the update is made

From the last relation we deduct:

$$V_0 = V_n (1+g)^{-n}$$

This relation expresses the sum of the income obtained after "n" years, to which the rebate factor is applied $(1+g)^{-n.}$

The rebate factors, estimated for the given uses of n and g, will be assigned to the fifth column of the mentioned table. By making the product between the digits of the 4th and 5th columns we will obtain the profits or the current annual losses, the make up the 6th column of the table. By summing up the digits found in the 6th column the current net value of the investment will be obtained (VPN).

$$VPN = \sum_{i=0}^{n} P_i (1+g)^{-i}$$

An estimate alternative for the current net investment value is the deduction, of the initial cost of the ship from the sum of co-dependent profits.

$$VPN = \sum_{i=0}^{n} P_i (1+g)^{-i} - A$$

For this variant based on the data of the 2nd table we can estimate the current net value of the investment which is:

VPN = 5.328.255 - 4.800.000 = 528.255 $

Just as it results from the estimate, the current net value is positive, which means that the project is profitable. Next we will compare this value to that which results from the project for selecting the optimal solution.

In the second variant in which the equipment of the ship would be made with a main and auxiliary engine, pumps, wiring etc. imported from firms that have experience in the area. The data of the problem is:

- The ship's acquisition price (A) = 5.600.000 $
- Exploitation period = 20 years
- Annual profit rate (g) =7%

The reparations are made in the terms of the 3rd table.

The dynamic of periods and capital reparation costs in time

Table 3

Year	Period	Reparation Costs
5	-	100.000
9	-	200.000
13	60	500.000
16	90	700.000

The estimate of the current net value in this variant will be made based on the information in table no. 4.

Data for the estimate of the net investment value
(variant 2)

Table 4

i	V_i	C_i	P_i	$(1+g)^{-i}$	$P_i (1+g)^{-i}$
1.	1.550.000	750.000	800.000	0,934479	747663
2.	1.550.000	750.000	800.000	0,873439	698751
3.	1.550.000	750.000	800.000	0,816298	653038
4.	1.550.000	750.000	800.000	0,762895	610316
5.	1.550.000	850.000	700.000	0,712986	499090
6.	1.550.000	750.000	800.000	0,666342	533073
7.	1.550.000	800.000	750.000	0,622750	467062
8.	1.550.000	850.000	700.000	0,582009	407406
9.	1.550.000	1.100.000	450.000	0,543934	244770
10.	1.550.000	850.000	700.000	0,508349	355844
11.	1.550.000	900.000	650.000	0,475093	308810
12.	1.550.000	980.000	570.000	0,444012	253086
13.	1.295.000	131.000	-23.000	0,414964	-9544
14.	1.550.000	900.000	650.000	0,387817	252081
15.	1.550.000	1.000.000	550.000	0,362446	199345
16.	1.167.000	1.453.000	-286.000	0,338753	-96878
17.	1.550.000	1.000.000	550.000	0,316574	174115
18.	1.550.000	1.100.000	450.000	0,295864	133138
19.	1.550.000	1.200.000	350.000	0,276508	96777
20.	1.550.000	1.300.000	250.000	0,258419	64604

According to data resulting from the table we obtain the level of the current net value for the 2nd project.

VPN = 6.592.547 - 5.600.000 = 992.547 $

To conclude we may say that any freighter that would have to choose from these two options for building a ship would chose the second that insures a substantial inflated profit through out the total of twenty years of exploitation. Higher investment efforts are though needed.

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