Technical and financial valuation of Nile passenger ships

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Due to the increased number of Nile passenger ships, hotels and restaurants, and its effect on the tourism industry, the valuation technique of these ships is very important. In this paper, the different methods for ship valuation are indicated and the depreciated replacement value method which is considered the only technical and financial method is explained in details. Also a cost analysis is performed to show the importance of each item from the cost point of view. This percentage cost can be used for both ship valuation and the prediction of ship cost for the purpose of ship offering.

نتيجة الزيادة المطردة فى عدد سفن الركاب بنهر النيل مثل الفنادق والمطاعم العائمة وتأثير ذلك على صناعة السياحة ، فإن اسلوب تقييم هذه السفن مهم جدا. في هذا البحث تم استعراض الاساليب المختلفة لتقييم السفن كما تم استعراض طريقة القيمة الاستبدالية بعد حساب الإهلاك بشكل مفصل والتي تعتبر الطريقة الوحيدة التى تأخذ فى إعتبارها الناحيتين الفنية والمالية للسفينة. كذلك تم تحليل قيمة السفينة لإظهار أهمية كل بند من حيث نسبة قيمته إلى القيمة الكلية للسفينة. ويمكن استخدام هذه النسب فى أغراض تقييم السفن وعملية تحديد ثمن السفينة وذلك لغرض تقديم عرض مالى لأى سفينة جديدة

Keywords: Ship valuation, Nile passenger ships, Depreciated replacement value, Ship cost analysis

1. Introduction

The Nile passenger ships include Nile Floating Hotels and Restaurants which have progressed very rapidly during the last 30 years. The number of the Nile Floating Hotels currently exceeds 320 units, most of them working on short cruises from Aswan to Luxor, and a few working on long cruises from Aswan to Cairo. The number of Nile Floating Restaurant is more than 11 units which are working mainly in Cairo area. Nile Floating Hotels and Restaurants represent a very important asset in tourism industry. If the average cost of each is about 20 million L.E., their total cost may reach up to 6.5 billion L.E.

Because of the importance of these units in the tourism industry, the appropriate method used for valuation should be carefully chosen from the different valuation methods, to reflect the real value of the unit. These methods include:

a- Adjusted book value
b- Depreciated replacement value
c- Current value
d- Discounted cash flow

In this paper, different valuation methods will be discussed with particular emphasis on the most appropriate method from the technical point of view.

2. Reasons for valuation

There are several reasons for valuation such as:

1. Insurance purposes
2. Sale and purchase purposes
3. Ascertain company's assets
4. Security for a proposed mortgage
5. Security for an existing mortgage
6. Legal disputes

3. Valuation techniques

There are a few number of approaches which can be used to value a business, or part of a business [1]. The appropriate technique to be used depends upon many factors such as the type of business itself and what it involves, the business is an ongoing concern or closed up, market study and future of the business under consideration.

4. Methods of valuation [1]

4.1. Book value and adjusted book value

Every company keeps books in which the value of each asset in the business is kept as an initial price at the time of purchase, depreciated value at every year, corrected value after any major overhauling, part replacements, or addition. After the assumed life time of an asset, the depreciated value is usually set at 1 L.E. The adjusted book value of an asset should be made to reflect world as well as national inflation, and the exchange rate of foreign currency for the part or whole of the asset which has been imported.

4.2. Depreciated replacement or reproduction value

The replacement or reproduction cost is the estimated cost of buying or building a new asset at the current state of technological development having equivalent production capacity. Reproduction cost concept is appropriate when technology has not changed materially. The replacement cost is then depreciated according to the age of the asset using appropriate depreciation rates. This method is particularly suitable in case of valuating a ship. This is simply because it is possible to subdivide the ship into components; steel, machineries and outfittings and to use the appropriate life time of each component.
The disadvantages of the depreciated replacement value for an ongoing concern are:
1. It ignores the return on the investment during the building time of the ship.
2. It ignores the profit during the time of building of the ship.

4.3. Current or fair market value

The current or fair market value involves an assessment of the going concern value of all assets and liabilities of the subject asset. In this approach, intangibles such as trade name, location, and reputation are taken into account by proper assessment.

Note that there is a difference between the market value and sale value. Sometimes when evaluating the market value of a ship, consultants and brokers refer to the sale value of the other similar ships, but this should be adjusted. This is simply because sales occur under many and varying conditions of the market and the companies involved in the sale and purchase. A company may be compelled to sell her ship under-priced because of financial problems. Also, a purchaser may pay more for a certain ship which satisfies his requirements at that particular time. To put it in another form, the universal law of supply and demand plays an important role in deciding upon the sale value as compared with the market value. In case of ships, the seller usually approaches at least three brokers to define the fair market price and offer his unit at the mean average price obtained from the various brokers.

4.4. Discounted Cash Flow (DCF)

This is a purely financial method which considers mainly the profits yielded in some previous years to be extrapolated for the future remaining life time of the asset. Of course, this would definitely reflect the management potential of the asset, which is considered in many cases as unfair. On the other hand, the process of extrapolating the yielded profits is also unfair simply because of the many variations in the market conditions.
According to this method, the valuation of an asset takes place through defining the net of the discounted cash flows which are to be expected from this asset for a specific future period (remaining life time), with the deduction factor which is based upon:
1. Expected risk in the future.
2. Prevailing interest rate and the risk of the asset activity.
3. The inflation rate and the risk of the industry in this field.
The valuation steps pass through the following stages:
1. To consider the balance sheet of the previous 3-5 years, and analyze the income, expenses and thus the Gross Operating Profit (GOP) and the Net Operating Profit (NOP).
2. Preparation of the expected cash flow list for the remaining life time, taking full account of expected income and expected expenses to

arrive at the GOP, then deducting tax to get the NOP.
3. Define the expected number of years for the continuation of the asset operation.
4. Define the suitable discounted factor.
5. Define the scrap value of the asset.

Most of these methods are used by economists and financial analysts; however, the only technical-financial method is the depreciated replacement value which involves engineers as well. The details of the calculation using this method will be given later in the case study.

5. Ship life time

Many studies assumed that depreciation period for seagoing ships is 20-25 years [2-4], and may extend this period to 30-35 years for inland fresh water ships. It should be noted that, it is preferred to divide the ship into items and assume the appropriate depreciation period for each item. For example, life time of hull for a Nile ship is 35 years, and for parts of hull such as superstructures is 40-45 years. Life time of machineries 25 years, outfitting 30 years, fixed decorations 30 years, and movable decorations 10 years. In Egypt, the life time or period of depreciation in most cases is dictated upon by the Central Auditing Organization which assumes that the depreciation time for sea going ships is 20 years while for Nile ships is 25 years.

6. Examples for ship valuation using depreciated replacement value

The valuation of ships using depreciated replacement value can be performed according to the following steps:
1. Itemization of ship's components.
2. Estimation of replacement value.
3. Estimation of depreciated replacement value using appropriate depreciation rates.
4. Estimation of present worth value according to the technical condition of the different items after survey.

Sometimes, it is required to consider the return on the investment and the profit during the assumed building time of the ship to estimate the fair value of the ship since it is going for sale as an ongoing concern and then add the scrap or residual value to arrive at the fair sale value.

6.1. Case study (1): Nile floating hotel "nephtis"

The hotel has the following particulars [5]:

Length overall	= 71.15 m
Breadth overall	= 13.20 m
Depth	= 3.350 m
Total height	= 11.90 m
Draft	= 1.400 m
Air draft	= 10.50 m
Speed	= 8.000 knots

Table 1 shows the detailed calculation of the replacement value for each item of the ship and thus the total replacement value of the Floating Hotel. It also gives the life time expectancy of each item and consequently the depreciated replacement value. The table also gives the condition of each item as a percentage of the brand new, after a full survey was made on the ship and consequently the present worth value.

6.2. Case study (2): Nile floating restaurant "Opal"

The restaurant has the following particulars [5]:

Length overall	= 61.00 m
Breadth	= 9.500 m
Depth	= 1.600 m
Draft	= 1.150 m
Speed	= 8.000 knots

Table 2 shows the detailed calculation of the depreciated replacement value as well as the present worth value for the restaurant.
An analysis for the replacement value of Nephtis and Opal is performed to determine the cost percentage for each item. The ship is divided into three groups; the first for the steel work including the hull steel and steel outfitting, the second for the machineries in engine room and on the deck, while the third group for the remaining outfittings. Each group is subdivided into smaller items. This cost analysis represents a good base for the assumption of the replacement value of any item for similar ships when it is not available. Also, this analysis may be used for the estimation of ship total cost for a shipyard offer of a new design.

Table 1
Total replaced values of the floating hotels (1998 values)

Item	Replacement Value	Life Time	Remaining Time Ratio	Replacement Value After Depreciation	Actual Condition %	Present Value
Hull below windows	760,000	30	0.8	608,000	82	623,200
Hull above windows	1,320,000	40	0.85	1,122,000	87	1,148,400
Steel outfittings	350,000	40	0.85	297,500	87	304,500
Propulsion system	1,780,000	30	0.8	1,424,000	80	1,403,000
Diesel generators	480,000	25	0.78	364,800	80	384,000
Main switchboard	250,000	30	0.8	200,000	82	205,000
Sub switchboards and cables	390,000	30	0.8	312,000	80	312,000
Engine room auxiliaries	410,000	27	0.78	319,800	80	328,000
Water purification	140,000	25	0.76	106,400	0.8	112,000
Sanitary system for toilets	150,000	15	0.6	90,000	60	90,000
H.V.A.C. systems	840,000	25	0.76	638,400	80	672,000
Piping systems	430,000	30	0.8	344,000	80	344,000
Insulation	180,000	40	0.85	153,000	85	153,000
Interior building system	2,660,000	30	0.8	2,128,000	85	2,261,000
Flooring	290,000	5	0.65	188,500	65	188,500
Light current systems	480,000	25	0.76	364,800	80	384,000
Swimming pool	360,000	25	0.76	273,600	74	266,400
Galley and equipment	720,000	25	0.76	547,200	75	540,000
Laundry	120,000	20	0.7	84,000	70	84,000
Fire detection and fighting	300,000	35	0.83	249,000	85	255,000
Life saving appliances	200,000	40	0.85	170,000	87	174,000
Windlass	180,000	30	0.8	144,000	85	153,000
Wheel house equipment	150,000	30	0.8	120,000	85	127,500
Navigation lights	100,000	30	0.8	80,000	80	80,000
Interior furniture	2,780,000	27	0.78	2,168,400	80	2,224,000
Operating equipment	400,000	15	0.6	240,000	60	240,000
Decorations	360,000			250,000		250,000
Design, drawing and supervision	1,250,000			250,000		250,000
Total	17,830,000	28	0.77	13,237,400	76	13,556,500

Table 2
Total depreciated replacement value and present value for the replacement (1998 values)

Item	Replacement Value	Life Time	Remaining Time Ratio	Replacement Value After Depreciation	Actual Condition %	Present Value
Hull below main deck	400,000	30	0.9	360,000	90	360,000
Hull above main deck	680,000	40	0.925	629,000	95	646,000
Steel outfittings	175,000	40	0.925	161,875	95	166,250
Propulsion system	330,000	30	0.9	297,000	90	297,000
Diesel generators	220,000	25	0.88	193,600	90	198,000
Electrical system	210,000	30	0.9	189,000	90	189,000
Engine room equipment	180,000	25	0.88	158,400	90	162,000
H.V.A.C. systems	280,000	25	0.88	246,400	90	252,000
Piping systems	180,000	30	0.9	162,000	90	162,000
Interior building system	473,000	25	0.88	416,240	90	425,700
Flooring	80,000	5	0.4	32,000	40	32,000
Light current systems	60,000	20	0.85	51,000	85	51,000
Galley and equipment	310,000	25	0.88	272,800	90	279,000
Fire detection and fighting	130,000	35	0.915	118,950	95	123,500
Life saving appliances	65,000	40	0.925	60,125	95	61,750
Windlass	90,000	30	0.9	81,000	95	85,500
Wheel house equip.& lights	180,000	30	0.9	162,000	90	162,000
Furniture	120,000	5	0.4	48,000	40	48,000
Operating equipment	160,000	15	0.8	152,000	80	152,000
Design, drawing and supervision	200,000			200,000		200,000
Total	4,523,000	27	0.84	3,991,390	85	4,052,700

From this analysis, it should be noted that the outfitting cost is considered the major part of the Nile Floating Hotels which represents about 2/3 the total cost of the hotel as shown in table 3. While the outfitting cost of the Nile floating restaurant is about half the total cost of the restaurant as shown in table 4.

The high percentage of the outfitting cost of the Nile floating hotels and restaurants is due to the interior building system, furniture and galley equipment which represent the most important items of the outfitting.

Table 3
Nile Floating Hotel "Nephtis"

Total building cost analysis: (100%)	
Hull steel cost including steel outfitting	13.63 %
Machinery Cost including H.V.A.C. system	20.70 %
Outfitting Cost	65.67 %
Steel cost analysis: (100%)	
Hull steel	85.60 %
Steel outfitting	14.40 %
Machinery and equipment cost analysis: (100%)	
Propulsion system / steering	48.24 %
Diesel generators	13.01 %
Engine room auxiliaries	11.11 %
H.V.A.C. System	22.76 %
Windlass	4.88 %
Outfitting cost analysis: (100%)	
Main switchboards	2.13 %
Sub-switchboards and cables	3.33 %
Water purification	1.20 %
Toilet system	1.28 %
Piping systems	3.67 %
Insulation	1.53 %
Interior building system	22.72 %
Flooring	2.48 %
Light current systems	4.10 %
Swimming pool	3.07 %
Galley and equipment	6.15 %
Laundry	1.02 %
Fire detection and fighting	2.56 %
Life saving appliances	1.71 %
Wheelhouse equipment	1.28 %
Navigation and outside lights	0.85 %
Interior furniture	23.74 %
Operating equipment	3.42 %
Decoration	3.07 %

Table 4
Nile Floating Restaurant "Opal"

Total building cost analysis: (100%)	
Hull steel cost including steel outfitting	27.75 %
Machinery cost including H.V.A.C. system	24.32 %
Outfitting cost	47.93 %
Steel cost analysis: (100%)	
Hull steel	86.06 %
Steel outfitting	13.94 %
Machinery and equipment cost analysis: (100%)	
Propulsion System / steering	30.00 %
Diesel generators	20.00 %
Engine room auxiliaries	16.36 %
H.V.A.C. system	25.46 %
Windlass	8.18 %
Outfitting cost analysis: (100%)	
Switchboards and Cables	9.69 %
Piping systems	8.30 %
Interior building system	21.82 %
Flooring	3.69 %
Light current systems	2.77 %
Galley and equipment	14.30 %
Fire detection and fighting	6.00 %
Life saving appliances	3.00 %
Wheelhouse equipment	8.30 %
Interior furniture	5.54 %
Operating equipment	7.38 %

To compare the cost analysis of Nile Floating Hotel and Restaurant with a sea going cargo ship, a 500 tons water tanker is considered [6]. The main particulars of the tanker are:

Length = 46.00 m
Breadth = 7.200 m
Depth = 3.300 m
Draft = 2.700 m
Speed = 9.000 knots

As seen in table 5, the cost analysis of the tanker differs from that of the Nile passenger ships in the following:

1- The outfitting cost which represents the highest value in case of Nile Floating Hotels and Restaurants has a smallest value in case of cargo ships.

2- The steel cost in case of cargo ships is the most important part of the ship's total cost, while its value is smaller in case of passenger ships.

3- The machinery cost is around 25% of the total cost, in both cases of cargo and passenger ships.

7. Conclusions

From this study the following concluding remarks may be noted:

- Among the methods which can be used for valuating ships, the depreciated replacement value is considered the only technical-financial method which can be used by engineers as well as economists and financial analysts.
- The percentage cost of individual item from the total cost of the ship can be used to indicate the importance of each item from the cost point of view.
- This percentage cost can be used also in the process of prediction of ship cost in case of ship valuation or for the purpose of cost estimation for new offers.
- The outfitting cost is the most important item in case of passenger ships, while steel cost is the most important in case of cargo ships.

Table 5
500 Tons Fresh Water Tanker

Total building cost analysis: (100%)	
Hull steel cost including steel outfitting	59.69 %
Machinery cost	29.00 %
Outfitting cost	11.31 %
Steel cost analysis: (100%)	
Hull steel	72.04 %
Steel outfitting	27.96 %
Machinery cost analysis: (100%)	
Main engines and shafting	65.50 %
Diesel generators	4.85 %
Diesel pumps	8.09 %
Motor pump	3.23 %
Deck machinery and equipment	19.13 %
Outfitting cost analysis: (100%)	
Wooden outfitting	26.24 %
Painting and cementing	16.39 %
Piping systems including cargo systems	32.80 %
Galley equipment	1.96 %
Electrical fittings	11.49 %
Wheelhouse equipment	3.94 %
Life saving appliances	1.96 %
Fire fighting equipment	1.96 %
Others	3.27 %

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