Economics of Operation of 38′ G. R. P. Fishing Vessels issued by the A. D. B. Fisheries Project—A Case Study

By

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Introduction

Conceived in 1971 and formulated during 1972 the Asian Development Bank aided Sri Lanka Fisheries Project, envisages introduction of 30 G. R. P. 38′ combination fishing vessels, besides 200 FRP 28′ fishing vessels, in its effort to augment the sea fish production of Sri Lanka. The 30 GRP 38′ vessels are to be introduced through private enterprises and the necessary finance for bying these boats are arranged through the two state owned banks viz. the Bank of Ceylon and the People's Bank. The introduction of 38′ boats is considered to be the second phase in the development of off shore fishing in the country, the first being the 28′ class vessels. Although the project was formulated during 1972, the actual issue of fishing boats by it began only towards the latter half of 1976. So far six 38′ vessels have been sold. The main purpose of this paper is to make a financial and economic evaluation of the operation of this class of vessels. It is thought that the best possible way to do this is to base the evaluation on the actual performance of the first boat sold.

Material and Methods

The first 38′ GRP vessel was sold to company X towards the end of November 1976 and the boat was commissioned for fishing during December 1976. The actual catch, effort and earning of this vessel during the 10 months from December 1976 to September 1977 are furnished in Table I. The major specification of the vessel and the number and types of gear provided and operated are given in Annexe I. The boat was operated mainly from Kalpitiya except during the months of June and July when she was operated from Mullaitivu. She was exclusively engaged in gill netting. Table I also shows the anticipated catch during the first year of operation which has been projected purely on the basis of the 10 months catch and effort. The most important task involved in a study of this nature is an evaluation of the ' Catch Per Cycle Time, ' translated into costs and returns. The depth and dimension of this study, however, depend on several factors. A number of methods are available to measure the financial and economic performance of fishing vessels with respect to its owners, sponsors and to society at large. In the present study in addition to the four standard methods of evaluation viz. (1) a study of the simple rate of return, (2) break even analysis, (3) financial analysis, and (4) economic analysis; a fifth method of calculation of costs and returns as employed by the owner of the vessel and is widely prevalent among the fishery enterprises in Sri Lanka is also adopted.

Species Composition

From Table I it may be seen that about 43 percent of the catch consisted of larger tunas while about 34 percent comprised skipjack. Thus tuna, skipjack tuna, seer and tuna like fish together accounted for about 87 per cent of the total catch.

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TABLE I

Actual catch ex-vessel price and market price of the 38′ vessel from December 1976 to September 1977 (10 months)

Species	*Quantity lbs.*	*Ex-vessel Price Rs.*	*Colombo Market Price Rs.*	*Projected Catch 1st year*	*Percentage*
Tuna	65,701	78,847	143,155	78,852	42.62
Skipjack	52,078	46,870	85,097	62,500	33.78
Shark	14,382	11,506	20,890	17,250	09.33
	9,77620,530	37,272	11,727	06.34	—
Tunalike Fish	5,670	7,087	12,867	6,806	03.69
Horse Mackeral	1,017	1,525	2,769	1,236	0.66
Other quality fish	1,414	1,414	2,565	1,702	0.92
Misc. varieties	4,095	2,866	5,202	4,920	02.66
Total	154,138	170,645	309,817	185,000	100.00

Simple Rate of Return

Table II gives the total anticipated catch and earning during the first year. It also shows the distribution of earning between the crew and the owner of the vessel and the income derived from marketing of fish. It is essentially a two stage operation. The crew is paid a percentage of the value of the catch priced ex-vessel. The owner then transports and sells the fish in Colombo through commission agents. It is interesting to note that the profit from marketing is more than the owners share from fishing operation. The profit during the first year of operation after paying the full loan instalments and interest is estimated at 16 percent on a net investment of Rs. 5 lakh. The average price of fish obtained at Colombo is Rs. 2.01/lb.

TABLE II

Distribution of earnings from the 38′ boat and income from marketing of fish

	Rs.	*Rs.*
Vessel operating account		
Ex-vessel price of 185,000 lbs. of fish		204,774
Cost of fuel	24,000	
Cost of ice	5,472	
Cost of food for crew	13,704	
Crew share 40% (*less* cost of fuel, ice and food)	64,639	
Repair account 10%	16,159	
Owner's share 50%	80,799	
		204,774
Fish Marketing account		
Sale proceeds from 185,000 lbs. of fish sold at Colombo		371,782
Ex-vessel price of 185,000 lbs. of fish	204,774	
Cost of ice	14,797	
Transport charges to Colombo	18,497	
Salary of shore staff	10,800	248,868
Profit from fish marketing		122,914
Combined Account		
Share from boat operation	80,799	
Profit from fish marketing	122,914	
Gross profit	203,713	
Loan instalment and interest 1st year	123,940	
Net profit 1st year	79,773	

Table III provides a statement of the projected cost and earnings from the vessel during the second year of operation in a standard form. The assumption here is that the catch would improve by 10 percent during the second year due to the location of better fishing grounds, gaining of better skills by the crew and due to a host of other reasons. The price of fish is held constant while the cost of inputs are increased as detailed in Annex 2. Instead of loan instalment depreciations on vessel and gear are provided for. The rate of return works out to about 24.5 percent. The catch is estimated at 203,500 lbs. and the sale proceeds at Rs. 409,035.

TABLE III

Cost and second year Earnings from the 38′ GRP boat

1. *Capital Cost*

Vessel	387,400
Fishing gear	89,500
Working capital	23,100
Total capital cost	500,000

Days spent in fishing	210
No. of trips	120
Average No. fishing days/month	17.5

2. *Vessel Operating Expenses*

Fuel and lubricants	24,000
Ice and fish boxes	20,503
Food for crew	13,974
Crew share	73,083
Transport of fish to Colombo	18,695
Repair and maintenance	18,800
Insurance	7,844
Management overheads	12,000
Total Operating expenses	186,889

CATCH AND EARNINGS

Species	*Quantity lbs.*	*Unit Price Rs.*	*Value Rs.*
Tuna	86,731	2.18	189,175
Skipjack	68,742	1.63	112,050
Shark	18,986	1.45	27,591
Seer	12,901	3.81	49,256
Tuna like fish	7,509	2.27	17,046
Horse Mackerel	1,343	2.72	3,653
Other quality fish	1,872	1.81	3,389
Misc. varieties	5,416	1.27	6,875
	203,500	2.01	409,035

3. *Financial Charges*

Depreciation on vessel	30,000
Dep. on fishing gear	29,833
Int. on investment	39,838
Total financial Charges	99,671
Total expenses	286,560
Profit	112,475
Total	409,035

409,035

Break Even Analysis

Break even analysis, inspite of its limitations, provides a simple and effective method of indicating the effects of costs and revenue at varying levels of output. For the purpose this analysis, costs and revenue given in Table III or those given for the second year in the cash flow statement (table IV) have been used. Employing the above cited figures the variable cost/lb of fish works out to 79 cents. If fixed cost is represented by F, variable cost/lb by V. selling price/lb. by S, profit by P, total production by N, then NS=F+NV+P· At break even point P=C and N will represent the number of lbs of fish. Thus using the formula NS=F+NV or $N=-\frac{S}{F}V$ it may be seen that the cost and revenue break even at 10,2881 lbs. of fish or at 50.5 percent of the production estimated for the second year.

Sensitivity analysis shows that an increase of fixed costs by 10 percent, keeping the variable costs constant would place the break even point at 113,169 lbs of fish (55.6 percent) while in increase of variable cost by 10 percent keeping the fixed costs constant would bring down the BEP to 110,100 lbs of fish (54 percent). An increase in both the fixed and variable costs by 10 percent maintaining the same selling price would place the BEP at 121,110 lbs. of fish (59.5 percent). It will thus be seen that break even point will be reached under the worst circumstances between 50 and 60 percent of the estimated production.

Financial and Economic (Social) Analysis

It is well known that this analysis is done for the purpose of comparing the capital and recurring costs of a project with its revenue and in the case of economic analysis other social benefits and to arrive at an indicator of the profitability of the project in comparison to the costs of capital. Table IV gives a financial cash flow statement for the project under study. As this is prepared from the point of view of the investors or owners, only the estimated net capital investment viz. Rs. 5 lakhs is taken into consideration. Table V furnishes a discounted cash flow statement based on the financial statements contained in Table IV. From Table V it may be seen that the Internal Rate of Return works out to about 36 percent.

The internal rate of return arrived at on the basis of financial cash flows is very often not regarded as a satisfactory basis to judge the economic worth of a project from the point of view of society as a whole. This is mainly because of the subsidies etc. involved in such project. While the subsidies received on vessel and gear are benefits to the owner, they are costs to the society. Although a strict economic analysis in the case of 38′ fishing vessel operation is beyond the scope of this study, a cash flow statement reflecting the estimated full direct costs involved in the 38′ boat project is given in Table VI. From Table VII it may be seen that the internal rate of return on this basis works out only to about 19 percent, mainly because of the fact that the 35 percent subsidy on the cost of the vessel and the refund of feecs on fishing gear are not regarded as benefits in this case.

DISCUSSION

This case study is based on the actual performance of one of the 38′ GRP fishing vessel for a period of 10 months. Normally the first year of operation of a new class of fishing vessel or by a new firm is regarded as trial period, as it is likely to take at least one year to get over the teething troubles. The fact that during the first year of operation of the vessel, it has earned a simple rate of return of about 24 percent (Table III) speaks volumes about the profitability of this venture. The break even analysis shows that under normal circumstances the cost and revenue should break even at about 50 percent

of the estimated production in the second year or 55 percent of the production during the first year. These simple indicators are generally considered adequate for average and small size investment. The fact that the owner of this boat has pruchased a second 38′ GRP vessel during the 8th month of operation of the first boat lends further support to the profitability of the venture.

The internal rate of return and the accompanied cash flow statement given in Tables V and IV are intended to meet the requirements of large and medium size investors who are likely to be public or private Ltd. companies. An internal rate of return of about 36 percent should be regarded as quite satisfactory especially when the lending rate is 10.25 percent for the project. From the point of view of the state also it appears (Tables VI and VII) that the investment is justifiable.

From the foregoing discussion it may be seen that investment in 38′ GRP off-shore fishing vessels is quite attractive and profitable. If some of the owners are finding that the boats are not as paying as stated above, the reasons for this have to be looked elsewhwere. This could be due to lack of trained operators, over simplification and consequent inefficient management of the boats, lack of incentive to the crew etc. As an individual sho has managed a very large fleet of deep sea fishing vessels for over 15 years, the author wishes to state that there is an ocean of difference between the management and operation of 28′ and 38′ fishing vessels.

Acknowledgements

I am grateful to Mr. M. A. W. Ariyadasa, Project Assistant, for having helped me in the collection and processing of data required for this paper. My grateful thanks are also due to the unidentified owners of the boat, who have been kind enough to extend all facilities and co-operation in obtaining the requisite information. I wish them a third boat before the end of the year.

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TABLE IV

Cash Flows Statement for Financial Analysis Based on the Operations of a 38′ GRP Fishing Vessel

Year	1	2	3	4	5	6	7	8	9	10
Fish Production lbs.	185,000	203,500	203,500	203,500	203,500	203,500	203,500	203,500	203,500	203,500
Sale Proceed Rs.	371,616	409,035	409,035	409,035	409,035	409,035	409,035	409,035	409,035	409,035
Less										
Fuel and lubricants	24,400	24,400	25,200	25,200	26,460	26,460	27,783	27,783	29,172	29,172
Ice and Fish Boxes	20,300	20,503	20,708	20,915	21,124	21,335	21,548	21,764	21,982	22,203
Fish Transport	18,500	18,685	18,871	19,060	19,251	19,443	19,638	19,834	20,032	20,231
Food for crew	13,700	13,974	14,253	14,538	14,829	15,125	15,428	15,737	16,051	16,372
Crew share	64,600	73,083	73,083	73,083	73,083	80,391	80,391	80,391	80,391	80,391
Maintenance and Repairs	16,000	16,800	17,600	18,500	19,450	39,450	21,400	23,540	25,900	28,500
Insurance	8,716	7,844	5,491	7,687	5,381	3,767	2,636	1,845	1,292	904
Interest	47,667	39,838	32,029	31,184	25,162	19,141	24,949	17,903	10,862	3,816
Depreciation—Vessel	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Depreciation—Fishing Gear	29,833	29,833	29,833	20,000	20,000	20,000	30,000	30,000	30,000	30,000
	273,316	274,560	267,068	260,167	254,740	275,112	273,773	268,797	265,682	261,589
Net Profit Before tax	98,300	134,475	141,967	148,868	154,295	133,923	135,262	140,238	143,353	147,446
Add—Depreciation	59,833	59,833	59,833	50,000	50,000	50,000	60,000	60,000	60,000	60,000
Funds Generated Before tax	158,133	194,308	201,800	198,868	204,295	183,923	195,262	200,238	203,353	207,446
Funds Generated After tax	158,133	194,308	201,800	198,868	204,295	73,569	78,105	80,095	81,341	82,978

TABLE V

Calculation of Internal Rate of Returns on the Basis of Cash Flows in Table IV

Year	*Cash out Flow Rs.*	*Cash in Flow Rs.*	*Net Cash Flow*	*Discounting Factor at* 35%	*Net Cash Flow Discounted at* 35%	*Discounting Factor at* 40%	*Net Cash Flow Discounted at* 40% *Rs.*
0	500,000	—	−500,000	1·00	−500,000	1·00	−500,000
1	—	205,800	205,800	0·74	152,292	0·71	146,118
2	—	234,146	234,146	0·54	126,439	0·51	119,414
3	—	233,829	233,829	0·40	93,532	0·36	84,178
4	60,000	230,052	170,052	0·30	51.016	0·26	44,213
5	—	229,457	229,457	0·22	50,480	0·18	41,302
6	—	92,710	92,710	0·16	14,834	0·13	12,052
7	120,000	103,054	−16,946	0·12	−2,033	0·09	−1,525
8	—	97,998	97,998	0·09	8,820	0·06	5,880
9	—	81,341	81,341	0·06	4,880	0·04	3,253
10*	—	174,194	174,194	0·05	8,710	0·03	5,226
			+1,002,581		+8,970		−38,889

*Including the Residual value of vessel Rs. 87,400.

$$\text{IRR} = 35 + 5 \times \frac{8{,}970}{47{,}859} = 35 + 0.93 = 36\%.$$

TABLE VI

Cash Flows Statement for Economic Analysis Based on the Operation of a 38′ GRP Fishing Vessel

Year	1	2	3	4	5	6	7	8	9	10
Fish Production—lbs.	185,000	203,500	203,500	203,500	203,500	203,500	203,500	203,500	203,500	203,500
Sales Proceeds—Rs.	371,616	409,035	409,035	409,035	409,035	409,035	409,035	409,035	409,035	409,035
Less										
Fuel and lubricants	24,000	24,000	25,200	25,200	26,460	26,460	27,783	27,783	29,172	29,172
Ice and Fish Boxes	20,300	20,503	20,708	20,915	21,124	21,335	21,548	21,764	21,982	22,201
Fish Transport	18,500	18,685	18,871	19,060	19,251	19,443	19,638	19,834	20,032	20,233
Food for crew	13,700	13,974	14,253	14,538	14,829	15,125	15,428	15,737	16,051	17,372
Crew share	64,600	73,083	73,083	73,083	73,083	80,391	80,391	80,391	80,391	80,391
Maintenance and Repairs	16,000	16,800	17,600	18,500	19,450	39,450	21,400	23,540	25,900	28,500
Insurance	8,716	7,844	5,491	7,687	5,381	3,767	2,636	1,845	1,292	904
Interest	47,667	39,838	32,029	31,184	25,162	19,141	24,949	17,903	10,862	3,816
Depreciation—Vessel	44,600	44,600	44,600	44,600	44,600	44,600	44,600	44,600	44,600	44,600
Depreciation—Fishing Gear	45,833	45,833	45,833	20,000	20,000	20,000	30,000	30,000	30,000	30,000
	303,916	305,160	297,668	274,767	269,340	289,712	288,373	283,397	280,282	276,189
Net Profit Before Tax	67,700	103,875	111,367	134,268	139,695	119,323	120,662	125,638	128,753	132,840
Add Depreciation	90,433	90,433	90,433	64,600	64,600	64,600	74,600	74,600	74,600	74,600
Funds Generated Before Tax	158,133	194,308	201,800	198,868	204,295	183,923	195,262	200,238	203,353	207,446
Funds Generated After Tax	158,133	194,308	201,800	198,868	204,295	73,569	78,105	80,095	81,341	82,978

TABLE VII

Calculation of Internal Rate of Return on the Basis of Cash Flows in Table VI

Year	*Cash out Flow Rs.*	*Cash in Flow Rs.*	*Net Cash Flow Rs.*	*Discounting 16%*	*Net Cash Flow Discounting at 16% Rs.*	*Discounting Factor at 20% Rs.*	*Net Cash Flow Discounting 20% Rs.*
0	756,725	—	−756,725	—	−756,725	—	−756,725
1	—	205,800	205,800	0.86	176,988	0.83	170,814
2	—	234,146	234,146	0.74	173,268	0.69	161,560
3	—	233,829	233,829	0.64	149,650	0.57	133,282
4	60,000	230,052	170,052	0.55	93,528	0.48	81,625
5	—	229,457	229,457	0.47	107,844	0.40	91,782
6	—	92,710	92,710	0.41	38,011	0.38	30,594
7	120,000	103,054	−16,946	0.35	−5,931	0.28	−4,745
8	—	97,998	97,998	0.38	29,399	0.23	22,539
9	—	92,203	92,203	0.26	23,973	0.19	17,518
10*	—	236,794	236,794	0.22	52,094	0.16	37,887
			+819,318		+82,099		−13,869

*Including the Residual value of vessel Rs. 150,000.

$$\text{IRR} = 16 + 4 \times \frac{82,099}{95,968} = 16 + 3.42 = 19\%.$$

ANNEXE I

Major Specifications of 38′ GRP Fishing Vessel and the Number and Types of Nets Operated

I. Specifications of the Vessel

Overall length	38′	Beam	10′
Depth	5.5′	Draught	2.2′
Displacement tonnage	11.0	Net tonnage	3.5
Material	G.R.P.	Horse power of Engine	67 at 1500 r.p.m.
Forward deck space	105 sq. ft.	Fishhold capacity	5,000 lbs. of fish on ice
Fuel capacity	180 gal.	Fresh water tank	90 gal.
Average speed	8 Knots	Fuel consumption	0.75 gal/hr.
Furno R.T. NS. 11	1 No.	Net hauler and steering gear	hydraulic

II. Specifications of Fishing gear provided

(1) 5″ Nylon gill net 3 × 9 ply	100 pieces
(2) 5″ Nylon 5.5″ mesh	100 pieces

(Normally only 80 to 120 pieces of nets are operated).

ANNEXE II

Assumption; Built into cash flows Statments

1. Investment	In the financial analysis the cost of capital is taken as Rs. 5 lakhs including a working capital of Rs. 23,100/- while in the case of economic analysis the cost of capital is taken as Rs. 756,725/-. In the former case it is assumed that the subsidy and refund on feecs are received within two months of taking over of the boats and these amounts are set off against the loan account immediately while in the latter case these are assumed as costs to the society, although they are benefits to the owner.
2. Production	During the first year the production is estimated at 185,000 lbs. of fish while during the second and subsequent years it is placed at 203,500 lbs. of fish.
3. Sale Price	The average actual sale price obtained during the first 10 months of operation viz. Rs. 2.01 is held constant throughout the 10 years.
4. Fuel and Lubricants, Ice, etc.	Every second year 5 percent increase in the cost of fuel is assumed while in the case of ice, transport of fish, etc. 1 percent increase every year is built in. The cost of food for crew is increased by 2 percent yearly while the repair cost increased by 5 percent per annum (during the 6th year and additional provision of 25 percent of the cost of the engine is also added).
5. Crew Share	40 percent of the ex-vessel price of the fish less cost of fuel, ice and food. During the 6th year provision for a 10 percent increase is made.
6. Interest	10.25 percent as stipulated by the Banks.
7. Pay Back Period	10 years as stipulated by the Bank.

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8. Depreciation	10 percent on a straight line basis (after providing for a residual value of Rs. 87,400/- in the case of vessel) and 33.3 percent in the case of fishing gear.
9. Tax	A tax holiday is assumed during the first 5 years of operation and thereafter tax is calculated at 60 percent of the profit.
10. Insurance	In accordance with the prospectus issued by the Insurance Corporation of Sri Lanka the following rates of insurance have been applied on the depreciated value :

1st to 3rd year — 2.25 percent
4th to 6th year — 3.5 percent
7th to 10th year — 3.5 percent and 15 percent of the 3.5 percent

The following rates of depreciation have been applied for the purpose of arriving at the insurance premium :

1st and 2nd year — 10 percent
3rd year — 30 percent
4th year — 10 percent
5th to 10 year — 30 percent

DISCUSSION

Chairman — Stated that the Vans were meant for the marketing apex unions but it may be possible to make some of them available to fleet operators.

Mr. Laus Rodrigo — Expressed his regret that this symposium was conducted entirely in English and he as a fishermen and very many others who are actually in the fishing industry were unable to follow the entire proceedings. He requested the chariman that in future this should be conducted in the national language as practically all the participants present could understand Sinhala.

Chairman — Stated that he realised the short coming and regretted the fact that time was very short to arrange this symposium. Arrangements could not be made to have proceedings in Sinhala only or translated into Sinhala and said that he would make a note in future to have proceedings translated simultaneously into Sinhala.

Mr. Laus Rodrigo — Continued to state that he started fishing in the early 1960s' and to get his first out-board motor he had to borrow money for the initial deposit. From his earnings he bought a 28′ vessel for cash in 1967. His ambition from then was to go in for a bigger vessel since the range of the 28′ vessel was limited to about 30 miles. He bought the first project 38′ vessel nearly one year ago and he has gone in the second vessel.

He stated that this vessel can be operated very successfully if one applies himself whole heartedly to it. The benefit over the 28′ vessel is that he has a wider range of operation. He could have invested in ten 28′ vessels with the same amount invested in one 38′

vessel. He is now getting as much production from this vessel using 6 men, whereas he would have had to employ about 50 men on 28′ vessels, apart from the increase in costs of operating ten vessels. One of his main problems was the insufficient storage space in the 38′ vessel and the high expenditure on ice. If provision could be made for refrigeration he would be able to improve his operations and there-by his profits. He requested that radio communication on facility be extended to enable operators to communicate directly between vessel and the shore independent of the CFC.

Chairman — Said he was not in a position to make any comment on radio communication at the moment without going into it further.

Mr. Stanley Fernando — Wanted clarifications on the difference in the amount given on insurance premiar in the working paper (Rs. 8,000) and Mr. Rodrigo (Rs. 30,000).

Mr. Joseph — Premium at present was temporary one and the negotiations were proceeding, and that this question will be dealt by the banks when they present their paper.

A participant pointed out that according to table II of the paper the boat shows a loss on exvessel price of fish and shows profit only when the marketing profit is included, and wanted clarification on this.

Mr. Joseph said this paper was not a feasibility report but an actual case study, and the figures were given according to the data of supplied.