

As seen above, there is no year in which the expenses will surpus the income. So long as the purchase of the mothership is counted as an initial investment, the cumulative total is in red even for the last year. If the mothership is counted as free-of-charge, the net present value (NPV) is 6,104 thousand shillings, and the cost benefit ratio is 1,245, provided that the discount ratio is 8%.

This means that the operation of the mothership will have possibility of not jeopardizing TAFICO's financial standing only if the mothership is counted as free-of-charge and if TAFICO achieves the target amount of catches of internationally viable quality within the specified number of fishing days.

5-1-2 Fleet

(1) Sales

For the purpose of a cash flow analysis of the trawl fleet consisting of the mothership and five small trawlboats, the annual sales of the catches by the small trawlboats are calculated here.

As stated in Chapter 2, the target annual catches are as follows:

° Prawns

5.4 tons/month x 11 months = 59.4 tons

° Fish

21 tons/month x 11 months = 231 tons

Thus, the annual sales are as follows:

° Shrimps

59.4 tons x 56 thousand shillings = 3,326 thousand shillings

° Fish

231 tons x 10 thousand shillings = 2,310 thousand shillings

Total: 5,636 thousand shillings

(2) Cash flow

The following shows the cash flow for the entire fleet. As the small donated trawlboats are a year old, the operating expenses are counted as from the 2nd year. Every year, their depreciation cost is counted for repayment of loans to be invested in the replacement of trawlboats after expiration of their useful life.

(Unit: Thousand shillings)

Year	0th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Sales										
Mothership	0	4,488	4,488	4,488	4,488	4,488	4,488	4,488	4,488	4,488
Trawlboats	0	5,636	5,636	5,636	5,636	5,636	5,636	5,636	5,636	5,636
Subtotal	0	10,124	10,124	10,124	10,124	10,124	10,124	10,124	10,124	10,124
Sale of assets	0	0	0	0	0	0	0	0	0	870
Cash inflow, total	0	10,124	10,124	10,124	10,124	10,124	10,124	10,124	10,124	10,994
Operating expenses										
Mothership	0	3,209	3,404	3,530	3,593	3,657	3,721	3,783	3,847	3,910
Trawlboats	0	2,813	2,828	2,837	2,845	2,853	2,861	2,775	2,813	2,828
Subtotal	0	6,022	6,232	6,367	6,438	6,510	6,582	6,558	6,660	6,738
Purchase of assets	8,700	0	0	0	0	0	0	0	0	0
Repayment of debts	0	156	156	156	156	156	156	156	156	156
Cash outflow, total	8,700	6,178	6,388	6,523	6,594	6,666	6,738	6,714	6,816	6,894
Net cash inflow	-8,700	3,946	3,736	3,601	3,530	3,458	3,386	3,410	3,308	4,100
Cumulative total	-8,700	-4,754	-1,018	2,583	6,113	9,571	12,957	16,367	19,675	23,775

Internal rate of return, 75.4%

Even when the cost of the mothership is included, the cumulative total becomes black from the 3rd year. The internal rate of return is calculated to be as high as 75.4%, but it should be noted that this high value presupposes the operation of all the trawlboats as planned and in concert with the mothership.

Compared with the independent operation of the mothership alone, the operation of the fleet is more complicated; if TAFICO is to operate the fleet as planned, it will have to be committed to intensive efforts.

For reference, Costs and Returns Trends in the Gulf of Mexico Shrimp Industry of J.P. Warren & W.L. Griffin are attached in the end of text.

5-2 ECONOMIC ANALYSIS

This economic analysis attempts to evaluate effects of the proposed aid of a mothership can trawler, ice making facilities, skiffs and fisheries relevant equipment on Tanzanian national economy.

This analysis, as like the financial analysis, are developed on a basis that target catches set in Chap. 2 are fulfilled by TAFICO.

It must be noted in mind that implementation of the proposed aid without fulfilment of target catches does not lead to the result of following analysis.

The major benefits available from the prawn fishing project include the following:

- 1) Collection of foreign currency by export of prawn.
- 2) Increase in income by sale of fish within the country.
- 3) Improved preservation of freshness of catches through the use of ice.
- 4) Expansion of employment opportunities.

Of these the following quantifiable benefits are evaluated.

- 1) Collection of foreign currency by export of prawns.
- 2) Increase in income by sale of fish within the prawns.

In the economic analysis, the prices are evaluated in terms of opportunity costs. For this reason, the domestic market prices are usually converted to international market prices (boundary prices). During its stay in Tanzania, the survey team could not collect sufficient useful data for the calculation of the standard conversion coefficient and consumption conversion coefficient with which to convert the domestic prices into boundary prices. The calculations here are accordingly, made in terms of domestic market prices.

The results of a cost-benefit analysis are as shown in the following table.

Cost-benefit Analysis

(in thousand shillings)

Year	Investment	Material cost	Labor cost	Ship's cost	Expenses	Total cost	Export	Domestic sales	Total benefits	Net benefits	Cost at the discount rate 8%	Benefit at the discount rate 8%
1982	17,500	3,312	537	130	411	21,890	9,880	2,200	12,080	-9,810	21,890	12,080
83	0	3,312	537	306	433	4,588	9,880	2,200	12,080	7,492	4,248	11,186
84	0	3,312	537	420	446	4,715	9,880	2,200	12,080	7,365	4,042	10,358
85	0	3,312	537	478	451	4,778	9,882	2,200	12,080	7,302	4,071	9,592
86	0	3,312	537	534	460	4,843	9,880	2,200	12,080	7,237	3,844	8,882
87	0	3,312	537	591	467	4,907	9,880	2,200	12,080	7,173	3,340	8,225
88	5,500	3,312	537	648	473	10,470	9,880	2,200	12,080	1,610	7,128	7,615
89	160	3,312	537	700	479	5,188	9,880	2,200	12,080	6,892	3,029	7,053
90	0	3,312	537	758	487	5,094	9,880	2,200	12,080	6,986	2,974	6,531
Total	23,160	29,808	4,833	4,565	4,107	66,473	88,920	19,800	108,720	42,247	54,566	81,523

Internal rate of return: 72.3%; Cost-benefit ratio: B_0/C_0 (discount rate, 8%) = 1.494

As for cost and benefit of small trawl boats, amount accrued and increased by implementation of the proposed and aid considered.

If the discount rate is set at 8%, the cost-benefit ratio is 49.4%, the net present value (NPV) 26,957 thousand shillings, and the internal rate of return 72.3%.

The proposed aid together with improvement of TAFICO's management for fishing activity can gain a improvement of fishing operation of small trawlboats, a step up in production of natural resources in Tanzania, a betterment of quality of products, and contribute to the earning of foreign currency.

This data substantiates the implementation of the Fisheries Development Project, centering on the mothership and ice-making facilities as having a substantial positive effect upon the Tanzanian economy.

APPENDICES

I FORMATION OF SURVEY TEAM

The survey team was organized as follows, and was headed by Mr. Eiji Saito, Fishing Boat Inspector, Fishing Boat Division, Oceanic Fisheries Department, Fisheries Agency.

Team leader	Eiji Saito	Fishing Boat Inspector Fishing Boat Div., Oceanic Fisheries Department, Fisheries Agency, MAFF
Planning	Masaru Yonenaga	Fisheries Inspector International Affairs Div., Oceanic Fisheries Department, Fisheries Agency, MAFF
Equipment	Kuniaki Takahashi	Fisheries Engineering Co., Ltd.
Fishing vessel	Kanji Yoshimi	Fisheries Engineering Co., Ltd.
Fishing vessel	Koichiro Nakamura	Fisheries Engineering Co., Ltd.

II ITINERARY

The survey was conducted for nineteen days from June 21 to July 9, 1981. Its itinerary was as shown below.

<u>No.</u>	<u>Date</u>	<u>Description</u>
1	Jun. 21 (Sun)	Left Tokyo. LH651
2	Jun. 22 (Mon)	Arrived at Frankfurt.
3	Jun. 23 (Tue)	Left Frankfurt. LH534
4	Jun. 24 (Wed)	Arrived at Dar es Salaam. Courtesy call the Japanese Embassy. Preliminary discussions with TAFICO officials.
5	Jun. 25 (Thu)	Paid a courtesy call to the Fisheries Directorate of the Ministry of Natural Resources and Tourism. Paid a courtesy call to TAFICO headquarters. Surveyed the ice-making facilities in Kurasini, Kigamboni shore base, and the FRP trawlboats granded by Japan.
6	Jun. 26 (Fri)	Conferred with Tanzanian officials at TAFICO headquarters. Discussions within the survey team.
7	Jun. 27 (Sat)	Conferred with Tanzanian officials at TAFICO headquarters. Signed the minutes. Participated in the reception held at the Kilimanjaro Hotel under the sponsorship of TAFICO.
8	Jun. 28 (Sun)	Visited Pagamoyo.
9	Jun. 29 (Mon)	Visited Rufiji and Kisiju.
10	Jun. 30 (Tue)	Visited Kundochi.

No.	Date	Description
11	Jul. 1 (Wed)	Left Dar es Salaam. Arrived at Tanga.
12	Jul. 2 (Thu)	Visited Pangani. Inspected trawling operations. Surveyed ice-making facilities, cold store, and shipbuilding yard.
13	Jul. 3 (Fri)	Left Tanga. Arrived at Dar es Salaam.
14	Jul. 4 (Sat)	Left Dar es Salaam. Discussion with Mr. R.A. Mrope, Chairman and Managing Director of TAFICO.
15	Jul. 5 (Sun)	Arrived at Dar es Salaam.
16	Jul. 6 (Mon)	Paid a courtesy call to the Ministry of Treasury Submitted a report to the Japanese Embassy. Data collection.
17	Jul. 7 (Tue)	Left Dar es Salaam. Arrived at Zürich.
18	Jul. 8 (Wed)	Left Zürich for Tokyo via Paris.
19	Jul. 9 (Thu)	Arrived at Tokyo.

III TANZANIAN PARTICIPANTS IN DISCUSSIONS

The following is a list of the Tanzanian officials with whom the survey team held discussions.

<u>Name</u>	<u>Title</u>
Mr. R.A. Mrope	Chairman and Managing Director TAFICO
Mr. Libaba	Director of Fisheries Ministry of Natural Resources and Tourism
Mr. Mbena	Finance Officer Ministry of Treasury
Mr. A.B.C. Killango	Deputy Director of Fisheries MNRT
Mr. T.A. Mhanga	Planning and Development Manager TAFICO
Mr. A.J. Mkumbae	Fishing Operation Manager TAFICO
Mr. R.D. Nzowa	Workshop Superintendent TAFICO
Mr. N.C. Kimalo	Workshop Superintendent TAFICO

IV MINUTES OF DISCUSSIONS

The minutes were signed by and between Mr. Saito, head of the survey team, and Mr. Mrope, Chairman and Managing Director of TAFICO, on June 27, 1981.

The following is a copy of the minutes.

MINUTES OF DISCUSSIONS

In response to the request made by the Government of the United Republic of Tanzania for the Fisheries Development Project (hereinafter referred to as "the Project"), the Government of Japan has sent, through the Japan International Cooperation Agency (JICA), a team headed by Mr. Eiji SAITO, Fishing Boat Inspector, Fishing Boat Division, Fisheries Agency, to conduct a basic design survey for 19 days from June 21, 1981.

The team had a series of discussions and exchanged views with the authorities concerned.

As the result of the study and discussions, both parties have reconfirmed the items of request for Japanese Assistance with their order of priority made by the Government of the United Republic of Tanzania as listed in the Annex attached hereto.

Upon request of the Tanzania side, the Japanese side agreed to convey the desire of the Government of the United Republic of Tanzania that latter will consider the possibility of extending its grant assistance for the implementation of the project.



.....
EIJI SAITO

Team Leader

Japanese Basic Design Survey Team



.....
R. A. MROPE

Chairman & Managing Director

Tanzania Fisheries Corporation

JUNE 27, 1981.

ANNEX

Items of the request in the order of priority

1. Mothership cum Trawler.
2. Ice Making Facility.
3. Skiff Boats.
4. Fisheries relevant equipment.

V PRODUCTIVITY AND PROFITABILITY OF SOUTH CAROLINE SHRIMP VESSELS, 1971-75

The following gives the balance of payment position of the shrimp fishing boats of 55 feet and over surveyed by T.M. Jones during the 1971-75 period.

Item	1971 n = 6	1972 n = 9	1973 n=13	1974 n=21	1975 n=21	Average
Variable costs						
Repairs and Maintenance	\$4,165	\$3,617	\$3,963	\$3,559	\$3,404	\$3,741
Ice	727	917	664	501	780	718
Fuel and oil	2,490	3,086	3,629	4,984	5,841	4,006
Fishing nets	593	1,863	1,521	1,320	1,066	1,272
Crew share	6,746	9,302	12,311	7,787	13,146	9,859
Heading and Packing	2,336	1,961	2,403	2,619	2,040	2,682
Supplies	4,325	2,619	2,681	2,885	1,899	2,682
Others	1,201	1,362	1,119	888	1,062	1,124
Total	22,583	24,727	28,291	24,543	29,242	26,084
Fixed costs						
Insurance	1,950	2,302	2,110	2,276	2,512	2,230
Taxes	701	500	272	375	1,343	638
Interest	2,496	2,802	1,791	1,709	1,845	1,929
Depreciation	3,659	4,052	5,088	5,129	4,893	4,564
Dues	25	25	30	30	29	27
Licenses	92	132	130	97	136	118
Office supplies	131	85	85	325	183	162
Legal expenses	112	275	359	254	233	247
Utilities	-	-	44	182	86	62
Others	2,622	2,317	1,844	1,830	2,139	2,150
Total	11,788	12,490	11,753	12,207	13,399	12,127
Total cost	34,371	37,217	40,044	36,750	42,640	38,211
Total revenue	31,157	30,314	40,586	27,092	44,040	34,638
Net revenue	-3,214	-6,903	542	-9,658	1,400	-3,573
Return on original investment and management	-6.3%	-13.7%	1.1%	-19.0%	2.8%	-6.2%

(T.M. JONES, Marine Fisheries Review, April 1979)

In the survey, T.M. Jones analyzed the relationship between catches and fishing efforts by making use of a regression formula.

The relationship between the catches and the main engine output of a fishing boat is given by the following formula:

$$Y = 1,939.88 + 104.46X \dots\dots\dots (1)$$

Where, Y: Shrimp catches (pounds)

X: Main engine output (ps)

$$R^2 = 0.41 \quad n = 40$$

The multiple correlation of the catches, fuel consumption and skipper's experience of fishing boats of 55 feet and longer is given by the following formula:

$$Y = 2,411.12 + 1.19X_1 + 282.16X_2 \dots\dots\dots (2)$$

$$R^2 = 0.52$$

Where, X_1 = Fuel consumption (gallons)

X_2 = Skipper's experience (years)

The multiple correlation of the catches, main engine output and fuel consumption of the fishing boats of 55 feet and longer is given by the following formula.

$$Y = 6,184.08 + 2.73X_1 + 20.39X_2$$

Where, X_1 = Main engine output

X_2 = Standard number of operating days a year
(number of days, 10 hrs. fishing per day)

$$R^2 = 0.54 \quad n = 21$$

According to the coefficients R^2 of these formulas, it is found that the skipper's experience and fuel consumption (that is, operating hours) have a greater bearing on the catches than the main engine output. It is obvious that the catches can be increased by effective fishing operations led by experienced skippers and by endeavors to find fishing grounds and trawling nets rather than by increasing the ship size and engine output.

VI — Gulf of Mexico Shrimp Industry, 1971-78 by J.P. Warren & W.L. GRIFFIN

	Year	0	1	2	3	4	5	6	7	8
Investment ¹		179,981	0	0	0	0	0	0	0	0
Down payment		35,997	0	0	0	0	0	0	0	0
Loan balance		143,984	131,197	117,022	101,616	84,765	66,333	46,172	24,120	0
Receipts		0	135,216	135,216	135,216	135,216	135,216	135,216	135,216	135,216
Capital sales		0	0	0	0	0	0	0	0	179,981
Total cash inflow		0	135,216	135,216	135,216	135,216	135,216	135,216	135,216	315,197
Cash operating expenses ²		0	103,556	103,556	103,556	103,556	103,556	103,556	103,556	103,556
Loan payments ¹		0	12,877	14,085	15,406	16,851	18,432	20,161	22,052	24,121
Principal		0	12,436	11,228	9,906	8,461	6,880	5,151	3,260	1,191
Interest		0	0	0	0	0	0	0	0	0
Income taxes ³		0	1,012	1,277	1,568	1,886	2,234	2,614	3,030	3,486
On recaptured depreciation ⁴		0	0	0	0	0	0	0	0	25,736
Capital purchases ¹		35,997	0	0	0	0	0	0	0	0
Total cash outflow		35,997	129,881	130,146	130,436	130,754	131,102	131,482	131,898	158,090
Net cash inflow		-35,997	5,335	5,070	4,780	4,462	4,114	3,734	3,318	157,107
Cumulative position		-35,997	-30,662	-25,592	-20,812	-16,350	-12,236	-8,502	-5,184	151,923
Approximate internal rate of return (percent)										28

¹Based on new vessel cost of \$179,981; 80 percent financed for 8 years; 12 equally amortized payments per year, at 9.00 percent interest rate.

²Exclusive of principal and interest payments.

³Based on income tax rate of 22 percent.

⁴Based on sales price of \$179,981.

Source: Department of Agricultural Economics, Texas A&M University

JICA