



THE UNITED REPUBLIC OF TANZANIA
REPORT
OF
FEASIBILITY STUDY
ON
PURCHASING OF AN ADDITIONAL PASSENGER OR
PASSENGER CUM CARGO VESSEL FOR
TANZANIA COASTAL SHIPPING LINE, LTD.

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Preface

In response to a request of the United Republic of Tanzania, the Government of Japan decided to cooperate in conducting technical and economic feasibility studies of purchasing an additional passenger/cargo vessel, and the Japan International Cooperation Agency conducted the study.

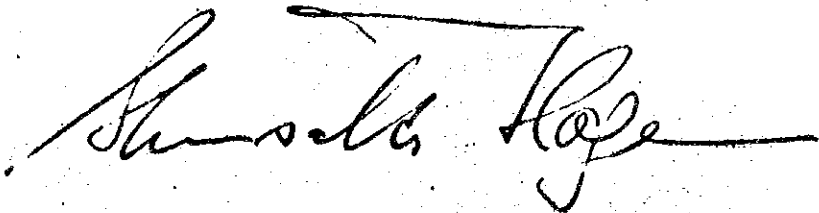
The Agency organized a survey team consisting of six experts, headed by Mr. Yasuyuki Toge, of Ship Bureau, Ministry of Transport and sent it to Tanzania for three weeks from May to June 1978.

The report submitted herewith is based on the findings of the team in Tanzania as its studies in Japan as well as on the discussions held with Tanzanian officials.

I hope this report would prove to be useful in formulating a policy of coastal shipping in Tanzania and contribute to the promotion of friendship between the two countries.

I would like to express my gratitude to the Government of the United Republic of Tanzania and other authorities concerned for their kind cooperation and assistance extended to the team, without which the study would not have been carried out so successfully.

February, 1979



Shinsaku Hogen
President, Japan International
Cooperation Agency

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INTRODUCTION

In compliance with the request of the Government of The United Republic of Tanzania, a comprehensive survey was made for the purpose of studying technically and economically and forming an appropriate judgement on the project of building a new passenger-cum-cargo vessel to be destined to the periodical service along the Tanzanian south coast ranging from Dar es Salaam to Mtwara.

The period of the survey and the members of the survey mission were as follows:

(1) Period of Survey:

22 days from 22 May to 12 June, 1978.

(2) Members of Survey Mission:

Mr. Yasuyuki Tage	Chief of the Mission, Ship Bureau, Ministry of Transportation
Mr. Hiroshi Ota	Shipping Bureau, Ministry of Trans- portation
Mr. Jiro Takahashi	Shipbuilding Research Centre of Japan
Mr. Takaaki Imada	Shipbuilding Research Centre of Japan
Mr. Yukio Okano	Shipbuilding Research Centre of Japan
Mr. Katsuhiko Morita	Shipbuilding Research Centre of Japan

CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

- (1) The north-south transportation of passengers in the southern territory of Tanzania is mainly carried out by means of motor-busses and passenger-cum-cargo vessels belonging to Tanzania Coastal Shipping Line, Ltd. (TCSL). In the rainy season, the interruption of highway traffic along the coast due to flooding of Rufiji River causes an absolute shortage of transportation means and, therefore, their reinforcement is a matter of urgent necessity. A rapid improvement of the coastwise highway is unexpectable because the project of construction of a new dam of Rufiji River will need a long time, and the introduction of new ships is the earliest and cheapest way of reinforcement of the transportation capacity.
- (2) The present project was undertaken for the purpose of meeting this urgent demand, and it consists in procurement of a ship or ships to be operated by TCSL. The main executive body of the project is the National Transport Corporation (NTC), which is parastatal under Ministry and the sole shareholder of TCSL.

NTC has sufficient experiences in operation of marine transportation and TCSL is the only nation-wide coastal shipping corporation operating three owned and several chartered ships, and their capacities are sufficient for the intended project.

- (3) Based on the assumption that the new ship is put into service in 1980, the demands for passenger and cargo transportation in the southern coastal area are estimated as follows:

Estimated demand for passenger transportation:-

1980	Approx.	60,000 persons
1985	"	91,000 "

Estimated demand for cargo transportation:-

1980	Approx.	189,000 pay-tons
1985	"	289,000 "

These demands are expected to increase at a yearly rate of about 9 percent.

- (4) When the operating efficiency, maintenance and management, economical efficiency, soundness of financing, etc. are taken into combined consideration, a vessel of the following type and particulars is proposed as the most optimum model:

No. of vessel	1
Type	Passenger-cum-cargo vessel
Gross tonnage	About 1,000 tons
Principal dimensions:	
Length between perpendiculars	Approx. 61.00 metres
Breadth, moulded	" 11.00 metres
Depth, moulded	" 4.30 metres
Draught, moulded, full load	" 3.00 metres
Number of passengers	" 400 persons
Cargo hold capacity	" 450 cubic metres
Speed, cruising	" 13.5 knots
Main engines	" 1,000 HP x 2 sets

- (5) The total amount necessary for the execution of this project is about ¥965,000,000, consisting of:

Building Cost:	Approx. ¥815,000,000
Spare parts, etc.:	" ¥ 40,000,000
Transportation cost:	" ¥ 40,000,000
Consultant fee:	" ¥ 50,000,000
Contingencies:	" ¥ 20,000,000

- (6) When the life of the present project is assumed to be 20 years, the financial rates of return being as tabulated below. These results show that the project will be financially feasible if it is based on a long-term fund with low interest and the passenger fares can be suitably raised, though its profitability is not so high. In addition, the introduction of the new ship will bring various social and economical benefits which can not be expressed in terms of monetary value. But we can expect such indirect benefits as development of economical activities of local people in the southern coastal area and their better welfare.

Current fare -----	-1.53%
Fare modification proposal 1 (20% rise at every 4th year) -----	3.09%

Fare modification proposal 2 (6% rise every year)	3.97%
Fare modification proposal 3 (50% rise at evry 10th year) -----	3.93%
Fare modification proposal 4 (twiced) -----	5.38%

- (7) The Alternative Proposal of a high speed vessel (about 700 GT 320 passengers, 22 knots) and another one of two small vessels (about 600 GT, 320 passengers each, 12 knots) result in negative (minus) financial rates of return. The vessels of these proposals involve further problems relating to seaworthiness and maintenance, and not feasible.
- (8) The proposals in connection with the execution of the present project are as follows:
 - 1) The vessel of the Alternative Proposal 1 should be built.
 - 2) The interest of the capital fund for the execution of the present project should be limited to the possible minimum and the term of its redemption should be at least 20 years.
 - 3) The current passenger fares should be suitably raised with due considerations for the financial aspect of operation, the national economy, the fares of bus traffic, etc. These fares should also be subject to equity adjustment in the following years so that they may follow the general rise of prices as per as practicable.
 - 4) It is advisable that the finance concerned with operation of the new vessel may not be charged with financial burdens of other department of TCSL.
 - 5) In building the new vessel, it is recommended to appoint a technical consultant to consult about the works of sailing home and training of crew, in addition to the building work.
 - 6) The new vessel should be operated as a regular service vessel, and its sailing schedule should strictly be observed.
 - 7) The service for the passengers should be improved.
 - 8) Important crew members to be on board should be dispatched to the building yard for training while the vessel is being built and sailed to the home port.
 - 9) The navigation aids in and around the calling ports should be repaired and/or improved.
 - 10) It is advised that the Port of Mafia may have a new causeway and a shallow draught boat for landing of passengers.

1. GENERAL DESCRIPTION OF SURVEY

1-1 BACKGROUND AND PURPOSES OF SURVEY

The United Republic of Tanzania is placed approximately at the midst of the East Africa and has an extent of about 1,200 km both from east to west and from north to south. It has a population of about 16,000,000 and its principal products are agricultural ones. As for the communication and transportation facilities, there are several railways and highways between its eastern and western territories, while such facilities between the northern and southern territories, particularly in the coastal area extending southwards from the capital Dar es Salaam, are subject to extremely unfavourable conditions. There is no coastwise railway and the land traffic by the highway running along this coast is interrupted in the rainy season (approximately six months a year) by flooding of the Rufiji River, the largest river in this country flowing from west to east to form an enormous obstruction to the land traffic.

Though a project of improving land traffic including building of bridges is under progress, this project can be realized only after completion of a dam for flood control. At the present stage, there is no practicable prospect of improvement of highway traffic by this project. The present situation is that the coastal marine transportation seems to be the only realizable way of improving the north-south traffic in the earliest date.

This coastal marine transportation is carried out by TCSL totally owned by NTC, which operates two passenger-cum-cargo boats, a cargo boat and several chartered ships. The capacity of this fleet for passenger transport is quite insufficient for the existing demands and the discontent of passengers is large because accommodations services for them are very poor.

For the purpose of improving such adverse conditions, the Government of Tanzania has decided to carry out a feasibility study on the possibility of purchasing a new ship to improve the passenger transport along the Coastal areas of Tanzania.

Based on these situations, the present survey has been undertaken in order to study and evaluate the trend of demands for passenger and cargo transport, the propriety of introduction of a new vessel, the specifications of the vessel to be introduced, the process of its procurement, various problems relating to the operation, the financial and economical possibilities, etc.

1-2 METHODS OF SURVEY

The survey was conducted by the following three methods.

(1) Collection of Data and Hearing

The members of the survey mission visited the following public offices, organizations and agencies for collecting data concerned with the present survey and direct hearing from the personnels concerned.

- a) Ministry of Communication and Transportation
- b) National Transport Corporation
- c) Tanzania Coastal Shipping Line, Ltd. (Head Office and branches)
- d) Tanzania Harbour Authority
- e) Tanzania Tourist Corporation
- f) National Shipping Agencies Co., Ltd.
- g) Air Tanzania Corporation
- h) Tee-tee-co Co., Ltd.
- i) Transport Licence Authority
- j) Statistics Bureau

(2) Field Survey

The members of the survey mission visited the following ports other than Dar es Salaam to make the on-the-spot survey of the harbours, local branches of TCSL and local passengers.

- a) Tanga
- b) Mafia Kilindoni and Chole Bay
- c) Kilwa
- d) Lindi
- e) Mtwara
- f) Zanzibar

(3) Questionnaire

The members of the survey mission had direct interview with many passengers at the following places for the purpose of getting supplementary data through questionnaire.

- a) TCSL Dar es Salaam Terminal
- b) Tee-tee-co Dar es Salaam Bus Terminal
- c) Dar es Salaam Air Port

1-3 MAIN EXECUTIVE BODY OF PROJECT

The present project is primarily under the control of the Ministry of Communication and Transportation (MOCT) and NTC, a parastatal of the Ministry, is its main executive body.

NTC is a public service corporation established in compliance with the Public Corporation Act (Ref. Appendix) for the operation of sea and land transportation. This corporation has sufficient experiences in the field of these activities and, therefore, has a sufficient capacity as the main executive body of the present project.

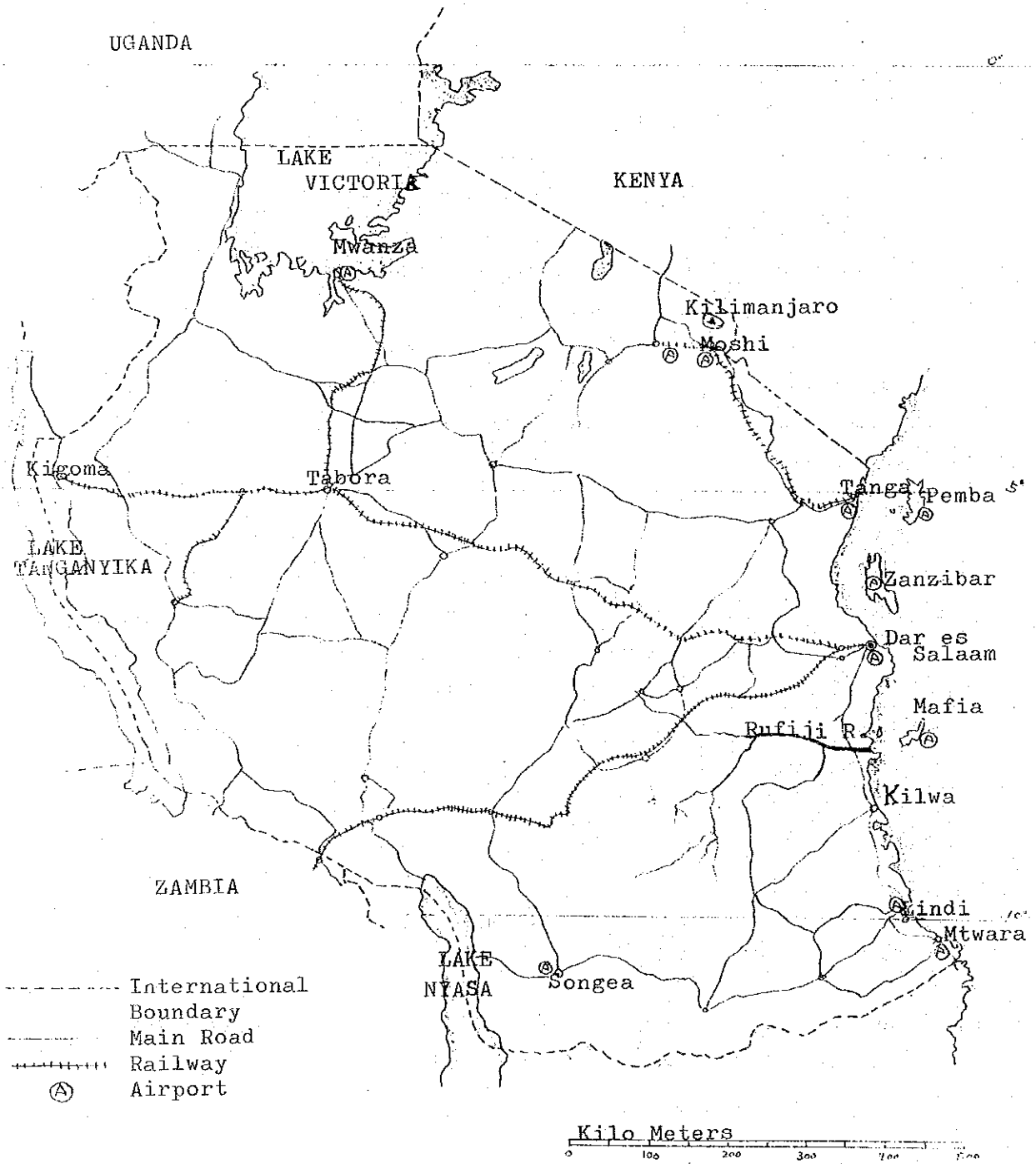
TCSL is a corporation totally owned by NTC and appointed to be the operator of the vessel to be built under the present project. TCSL is the only nation-wide domestic shipping corporation operating two owned passenger-cum-cargo vessels, an owned cargo vessel and several chartered vessels. The Head Office has Accounting, Traffic and Technical Departments, and control branches are established at necessary local terminals. Though there are some minor points needing improvements, the capacity of the corporation is sufficient for operation of the vessel to be built under the present project.

1-4. ACTUAL SITUATION OF PASSENGER TRANSPORT IN SOUTHERN COASTAL AREA AND ITS INVESTMENT PLAN

1-4-1 ACTUAL SITUATION OF PASSENGER TRANSPORT IN SOUTHERN COASTAL AREA

The domestic traffic network in Tanzania is shown in Fig. 1-4 (a).

Fig. 1-4(a)



(1) Railway Transport

The railway network in Tanzania is Tanzania Railways Corporation established by the three. These railways extend to the inland districts from coastal terminals

and do not connect the towns in the southern coastal area. Therefore, the railways contribute nothing to the communication in the southern coastal area, and the Government has no plan of laying railways along the coast.

(2) Bus Transport

There are two routes of bus transport between Dar es Salaam and Mtwara, one through the coastal link road and another through the inland route via Songea.

The coastal link road is under very unfavourable traffic conditions. Particularly, the crossing of Rufiji River raises up the most serious problem. Because of lack of bridges, the traffic must rely on ferry boats at Utete and Ndumdu, which are stopped due to flooding in the rainy season. The bus transport by the coastal link road is possible ordinarily for a period of about six months, July to December, though this period partly depends on the actual weather conditions.

The bus transport by the inland route via Songea can be operated throughout the year, while a stable and periodical operation is not always possible because the road condition is not satisfactory and, further, the route makes a long detour. The outline of these two bus operations is shown in Table 1-4 (b). Though the operating conditions are very unfavourable, the insufficient capacity causes incessant overflow.

Table 1-4 (b)

Outline of Bus Transport (Dar es Salaam to Mtwara)

Item	Route	Coast link road	Via Songea
Mileage		385	1,082
Time, required		Approx. 14 hours	Approx. 42 hours
Fare (Shillings)		72*	203
Busses (Seats (Wagons		289 5	580 10
Service period		Dry season only (July to December)	The whole year
Frequency of service**		Daily	Daily
Coefficient of utilization		100%	100% rainy season 75% dry season

*Estimated on the basis of the revised fare table, 1, June, 1978.

**Though one daily service is shown in the time table, services are frequently tied up.

Source: Hearing

(3) Sea Transport

The passenger transport via sea route from Dar es Salaam to Mtwara via several southern ports is carried out by TCSL, which operates two passenger-cum-cargo vessels for this purpose. These vessels, each of which being capable of accommodating 150 passengers, have large cargo spaces and are operated on the basis of cargo ship schedules. The cargo transport has priority over the passenger transport, and the calling ports are not always some and the vessels lie in ports very long. The outline of operation of these vessels is shown in Table 1-4 (c).

The passengers' information service and booking system of TCSL are not satisfactory and the passengers must visit the TCSL counters several times for confirmation of sailing schedule, booking and re-confirmation until embarkation. In addition, the general service for passengers is unsatisfactory as is shown by an example that the passengers' waiting space of Dar es Salaam terminal is a space commonly used for handling of cargo and livestock. Nevertheless, these two vessels of TCSL are always extremely crowded because passengers having no other proper means of communication are concentrated to them. Thus, the sea transport by means of these two vessels is the only means of mass transportation in the southern coastal area available throughout the year and, accordingly, plays a most important role, while passengers' discontent is very large because of the uncertain sailing schedule, unsatisfactory booking and ticketing services, unfavourable accommodation on board, etc.

Table 1-4 (c)

Outline of Sea Transport (Dar es Salaam to Mtwara)	
Vessels in operation	M/V Mtwara & M/V Lindi (each accommodating 150 passengers)
Route & distance	Dar es Salaam to Mtwara approx. 270 nautical miles
Time, required	2 - 3 days (One way voyage, Dar es Salaam to Mtwara)
Fare	36 Shilling (Between Dar es Salaam and Mtwara)
Frequency of service	1 - 2 round trips a week (by 2 ships)
Coefficient of utilization	100% rainy season 70 - 80% dry season

(4) Air Transport

The air transport from Dar es Salaam to southern cities including Mtwara is operated by Air Tanzania Corporation, and passengers from some limited classes utilize air transport because of its high fare. The periodical air services to the southern coastal area are outlined in Table 1-4 (d). As is clear from this table, the air transport has a large capacity as compared with bus or sea transport, while the coefficient of utilization can rarely exceed 60%.

Table 1-4 (d)

Outline of Air Transport	
Equipment in operation	FKF (44 persons) x 2 B737 (114 persons) x 1
Route & distance	Dar es Salaam to Mtwara, approx. 450 km
Time, required	80 minutes (FKF) 50 minutes (B737)
Fare	340 Shillings (Dar es Salaam to Mtwara)
Frequency of service	Approx. one daily service
Coefficient of utilization	Approx. 60%

1-4-2 TRANSPORT INVESTMENT PLAN FOR SOUTHERN COASTAL AREA

As the long-term development project of the United Republic of Tanzania, the 3rd five-year program was published by the Government. The program says that special consideration should be given to the development of the comparatively under-developed southern and central territories. Among several items, special importance is placed on the improvement of traffic and transportation systems, and the means to be taken at the present stage are as follows:

- (1) The mass transportation system is to consist of bus and sea transports, and does not contain any plan of railway construction. The bus transport can, however, be improved only after the completion of highways including the bridge across Rufiji River. Though the improvement of highways is contained in the long-term project, the construction of bridge will be possible only after the flood control of Rufiji River will have been completed. Though the Rufiji River Dam Project is under progress, it is still at the first stage and, accordingly, any forecast for the schedules of completion is impossible.
- (2) Though the capacity of transportation needs augmentation both for passengers and cargo, the problem of passenger transport needs urgent solution at the present stage.
- (3) For improvement of transportation capacity, the introduction of ships needs the least investment and the shortest time. Therefore, this is the very measure that must be most urgently pushed forward.
- (4) Even after the situations of highways will have been improved in future, the bus and sea transports should be in competitive coexistence, so that the competition between them will contribute to the improvement of the capacity and services.

2. DEMAND ESTIMATION FOR SEA TRANSPORT IN THE COASTAL AREA

2-1 OUTLINE OF DEMAND ESTIMATION PROCEDURE

The demand for sea transport in the coastal area of Tanzania was estimated by approach by means of macro-model as shown in Fig. 2-1 (a). The procedure is outlined as follows.

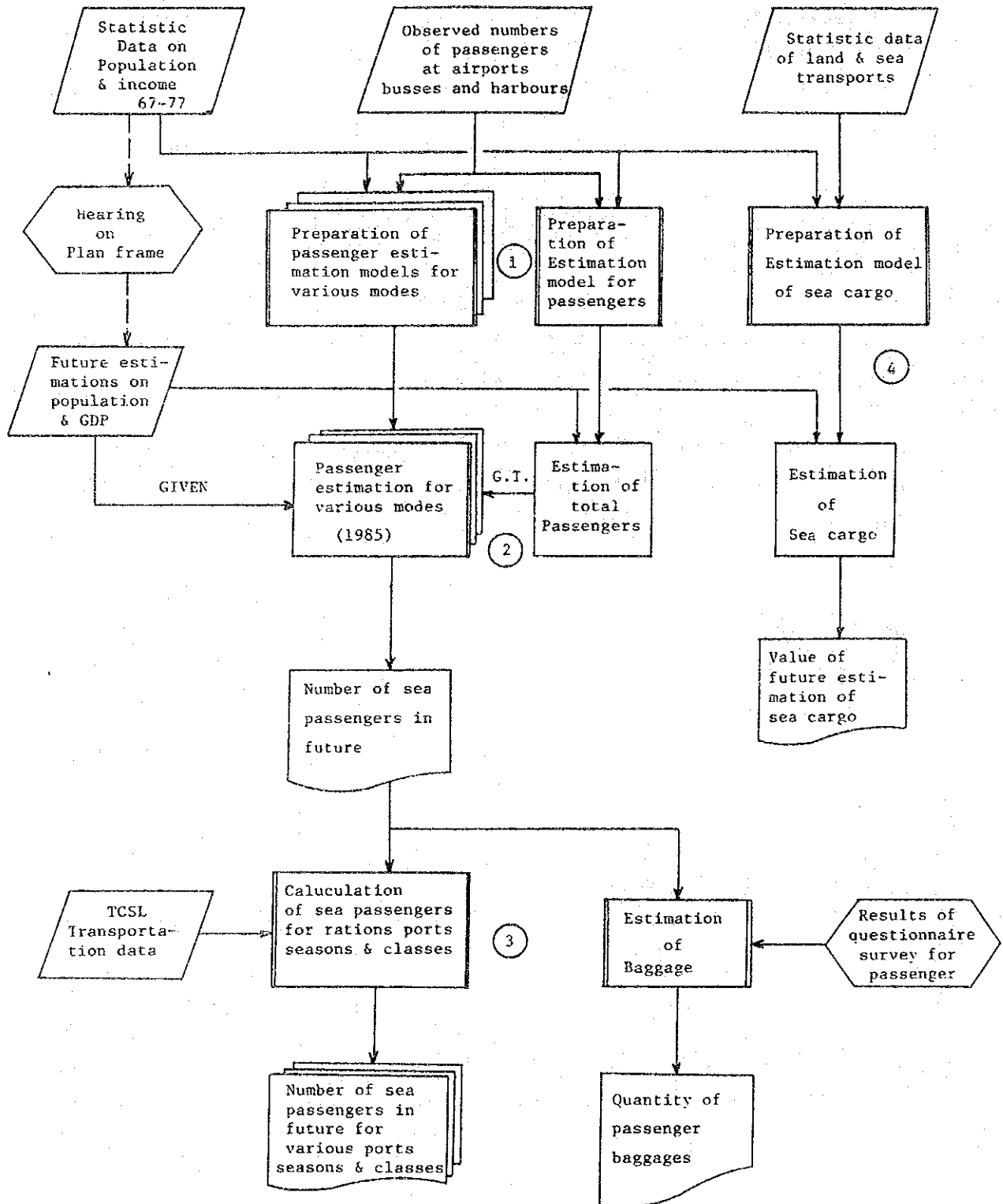
As for the passengers, the demands were estimated for individual transportation facilities on the basis of actual numbers of passengers of respective transportation facilities with the given conditions of the population, income and the capacity of TCSL. Next, the passenger demands were estimated for respective ports, seasons and classes and, in addition, estimations of baggages were also made on the basis of the results of questionnaire.

As for the sea-borne cargo, the demands were estimated on the basis of actual quantity of transported cargo, with the given condition of income.

As for the passenger demand in Zanzibar, no computation model was made but the estimation was separately made on the basis of the results of the above estimations.

Fig. 2-1 (a)

Process of Estimation of Demand for Utilization of Ships in Coasted Area



2-2 DEMAND ESTIMATION MODEL & PROCESS OF COMPUTATION

2-2-1 DEMAND ESTIMATION MODEL FOR TOTAL PASSENGERS AND FOR RESPECTIVE MODES

(1) Model Flow

The model flow is shown in Fig. 2-2 (a). Taking as the exogenous values the urban population in the coastal area, the gross domestic production (GDP) and the transportation capacity of TCSL, the total demand of passengers of respective transportation facilities and the individual total passenger demands were estimated and the number of ship's passengers was adjusted as control total.

(2) Model Equation

- 1) Number of trips of air passengers in the southern coastal area.

$$T_a = - 1713 + 50.781 \bar{P}_d$$

$$(R = 0.98578)$$

\bar{P}_d : Population of Dar es Salaam (1,000 persons)

- 2) Number of trips of bus passengers in the southern coastal area.

$$T_b = - 31293 + 12.8243 B - 9852 \bar{D}_s$$

$$(\bar{R}^2 = 0.98140)$$

B : Number of busses for domestic traffic in Tanzania

\bar{D}_s : Transportation capacity of TCSL passenger boats (index)

$$B = - 3335 + 0.82284G$$

G : Gross domestic production of Tanzania
(Million Shillings)

$$(R = 0.94899)$$

- 3) Number of trips of ship passengers in the southern coastal area.

$$T_s = - 24528 + 71.9266 P_u + 10042 D_s$$

$$(\bar{R}^2 = 0.98089)$$

P_u : Urban population in southern coastal area
(1,000 persons)

- 4) Total number of trips of passengers in the southern coastal area.

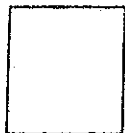
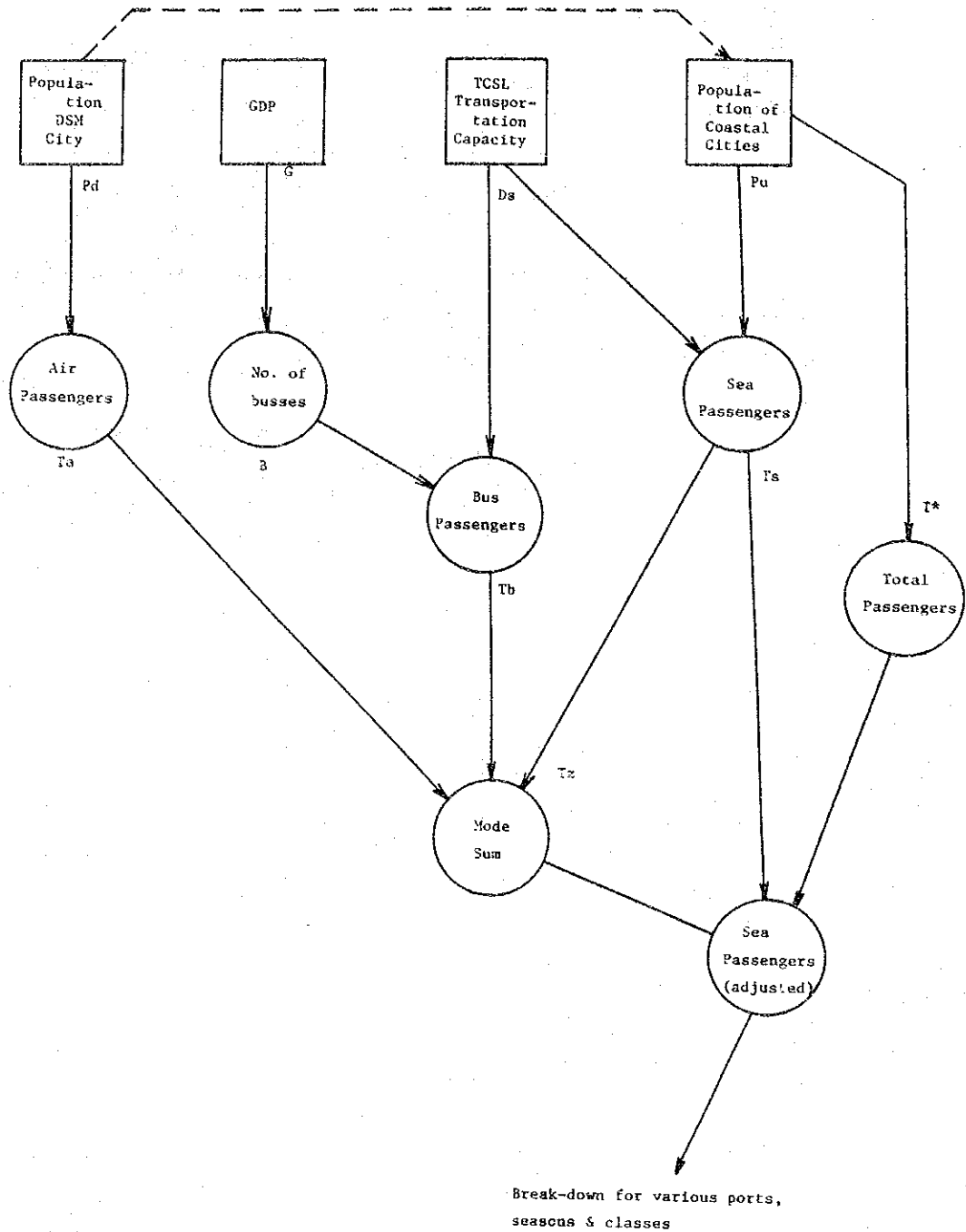
$$T_* = (- 56 + 0.23065 P_u) \times 1000$$

$$(R = 0.99681)$$

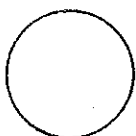
- 5) Adjusted number of ship passengers

$$T_s^* = T_s \times T_* / (T_a + T_b + T_s)$$

Fig. 2-2 (a)



Exogenous variable (Given)



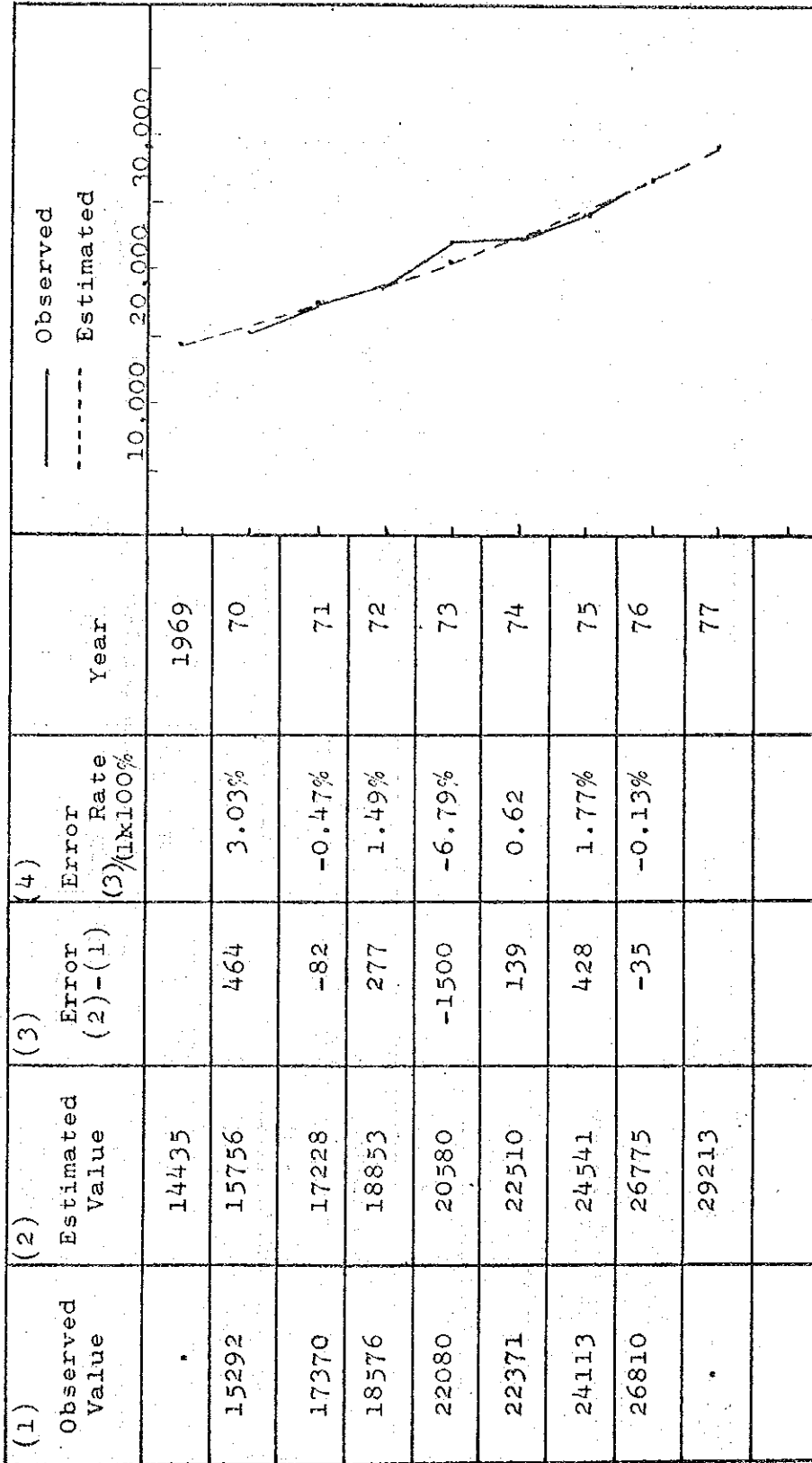
Endogenous variable

(3) Fitness test of Model Equations

For testing the fitnesses of the above model equations, the correlation coefficient (R) or the determinant coefficient (\bar{R}^2) was shown. In addition, the results of tests of the actual observed values and estimated values are shown in Figs. 2-2 (b) - (f). Though the periods of sampling for the obtained data were comparatively limited, the results of estimation have proved very reliable.

Fig 2 - 2 (b)

Fitness Test of Estimation Model: Air Passengers

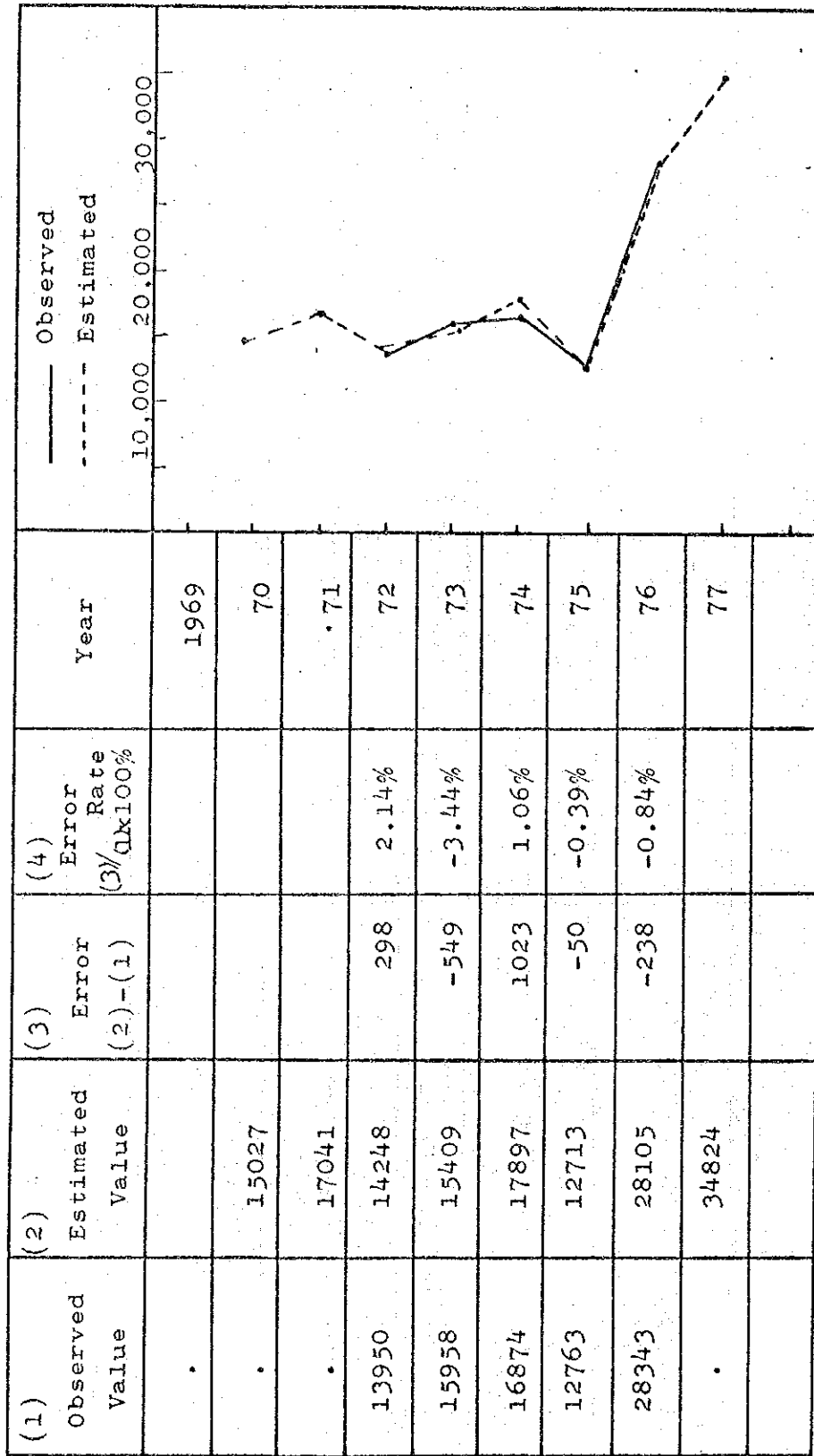


Ta = -1713 + 50.781 Pd

R = 0.98578

Fig 2 - 2 (c)

Fitness test of Estimation Model: Bus Passengers

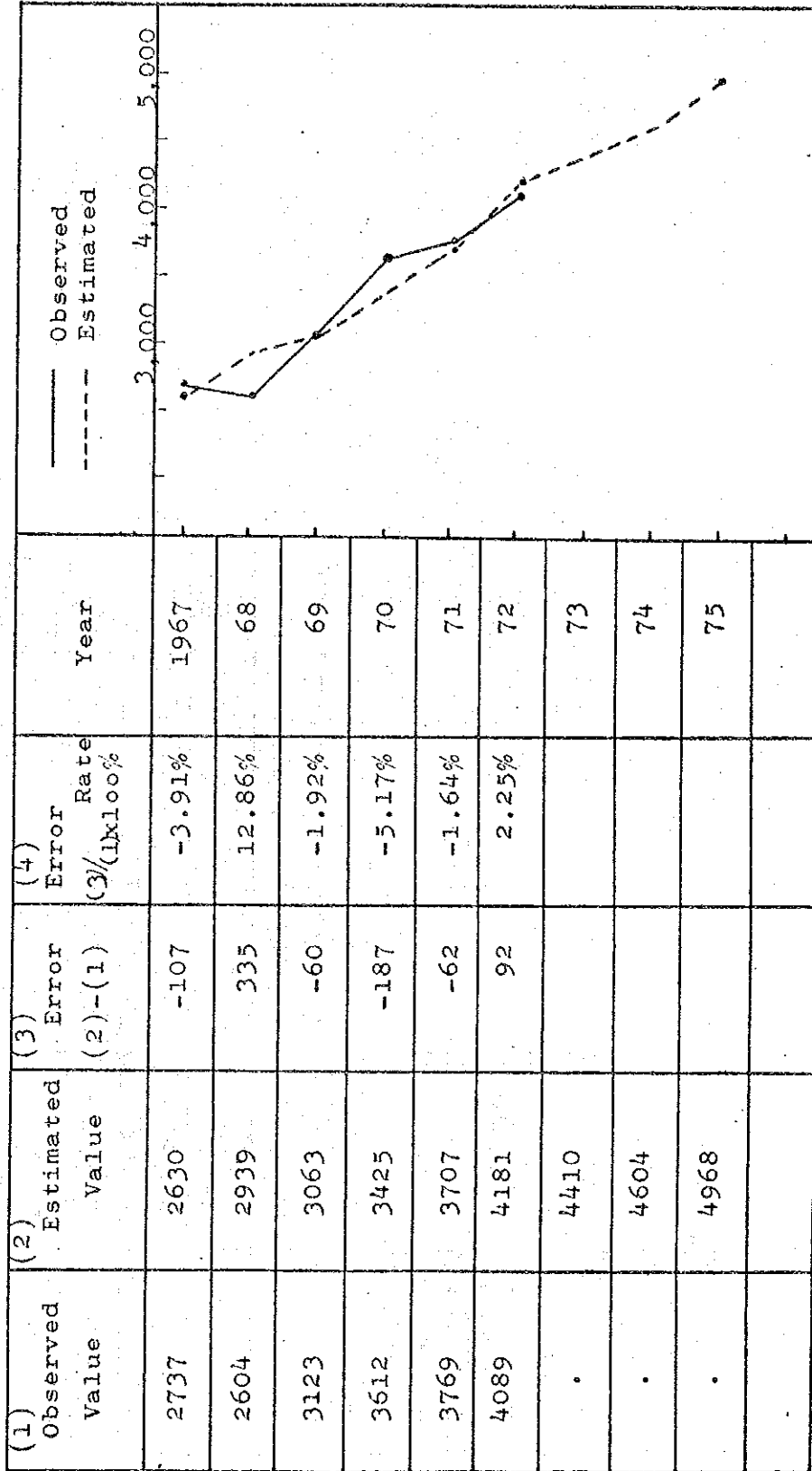


$\bar{R}^2 = 0.98140$

$T_b = -31293 + 12.8243 B - 9852 D_s$

Fig 2 - 2 (d)

Fitness Test of Estimation Model: Number of Buses

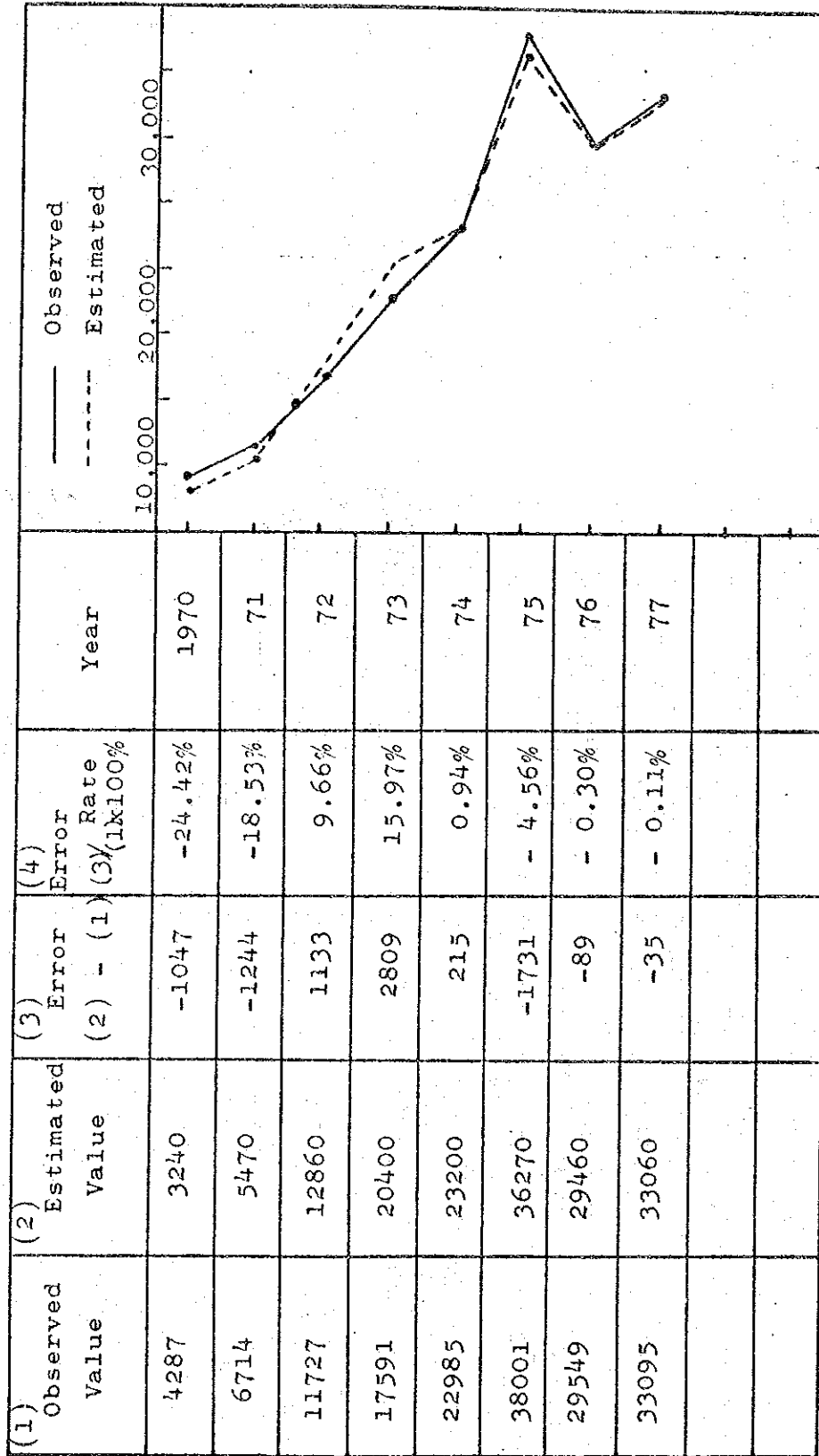


$$B = 3335 + 0.82284 \bar{G}$$

$$R = 0.94899$$

Fig 2 - 2 (e)

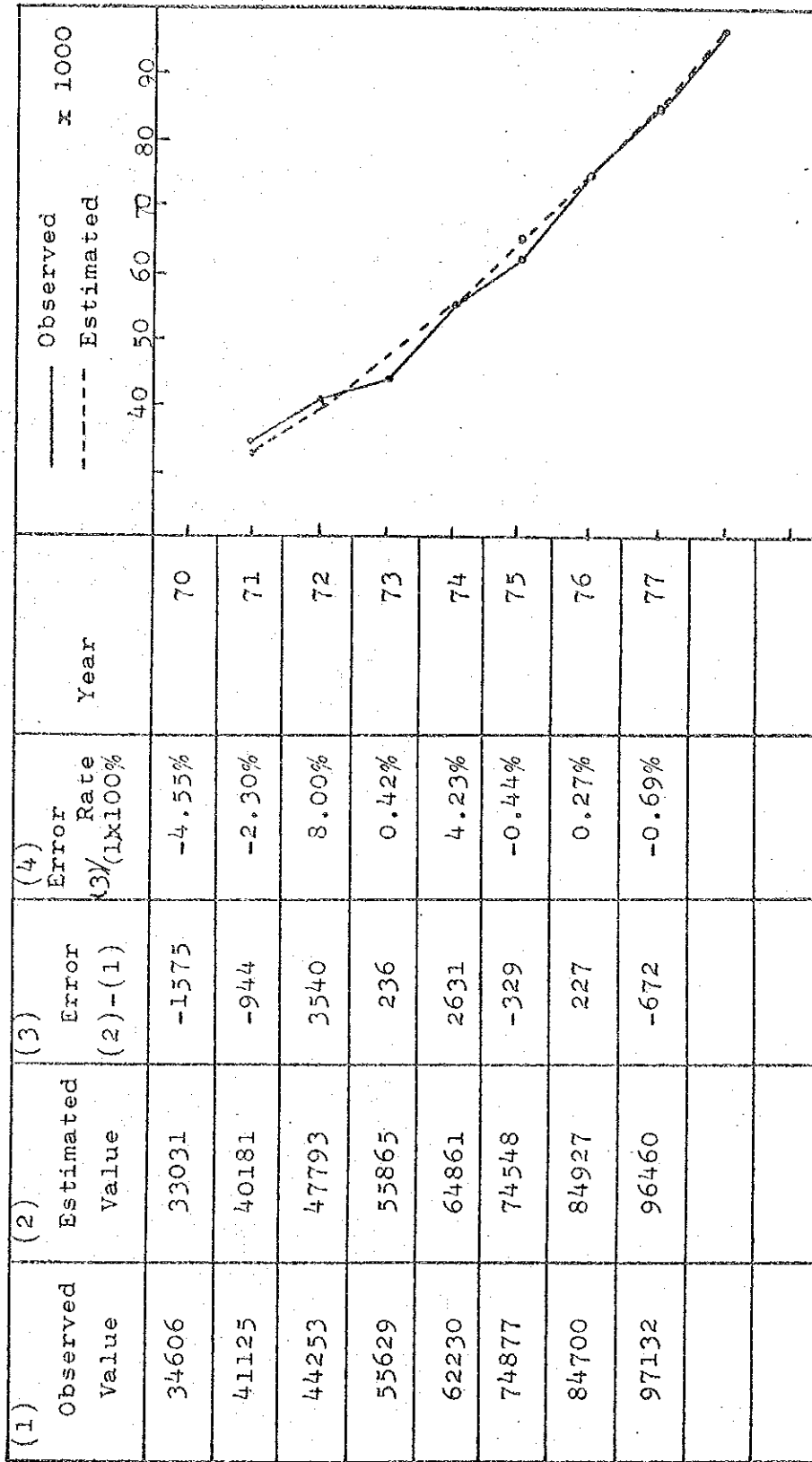
Fitness Test of Estimation Model: Sea Passengers



$$T_s = -24528 + 71.9266 \overline{P_u} + 10042 \overline{D_s} \quad \overline{R^2} = 0.98089$$

Fig 2 - 2 (f)

Fitness test of Estimation Model: Total Passengers



$$T^* = -56 + 0.23065 \overline{Pu} \quad R = 0.99681$$

(4) Employed Data

1) GDP and Urban Population

The GDP values employed for estimation were taken from statistical data published by the Statistics Bureau and modified for the inflation rate in 1970.

As for the urban population in the southern coastal area, the latest national census was taken in 1967. As the Statistics Bureau has estimated data on the recent urban populations, these data were utilized as basis and corrected by interpolation of time series data.

These GDP values and estimated urban populations are shown in Table 2-2 (a).

Tab 2 - 2 (a)

Data of GDP & City Population

YEAR	1) GDP Prices 1970 (Million Sh)	2) Population of Cities of Southern Coastal Area (1,000)					
		Sum	3) DSM	Kilindoni	Kilwa	Lindi	Mtwara
1967	7249	312	273	2.20	2.96	13.35	20.41
68	7625	335	295	2.28	3.01	13.70	21.00
69	7765	359	318	2.36	3.05	14.10	21.70
70	8215	386	344	2.44	3.10	14.50	22.30
71	8558	417	373	2.52	3.15	14.90	23.00
72	9134	450	405	2.61	3.19	15.30	23.70
73	9413	485	439	2.70	3.24	15.70	24.40
74	9648	524	477	2.79	3.29	16.10	25.10
75	10091	566	517	2.89	3.34	16.60	25.90
76	10616	611	561	2.99	3.39	17.00	26.70
77	*11253	661	609	3.09	3.45	17.50	27.50
78				3.20	3.50	18.00	28.30

1) Source: Bureau of Statistics, Factor Cost,
Figures for '77 : Estimation

2) Obtained by interpolation from estimated population of '67
and recent year, according to Bureau of Statistics

3) For '67, '70 and '75 DSM, "World Population Statistics '77" was
referred to.

2) Data on Air Passengers

As for data on air passengers, there are yearly data on the boarding and unboarding passengers published by the Statistics Bureau. However, no OD pattern is shown for these data.

The "Report of Survey for Highway Project in Tanzanian South Coast" (JICA, 1977) contains the pattern of passengers in the southern district in 1973 and 1974. Accordingly, the numbers of passengers between various cities were worked out by proportional division from the data of the Statistics Bureau as the basis and applying the ratios of OD patterns of 1973 and 1974. The data on air passengers thus obtained are shown in Table 2-2 (b).

Tab 2 - 2 (b)

Observed Data on Air Passengers

	Southern Coastal Area						
	Sum	2) DSM	1) Mafia	1) Kilwa	1) Lindi	1) Mtwara	
1967							
68			3059	912	5043	-	
69			3330	697	-	3925	
70	15292	15253	3670	787	4766	6108	
71	17370	17329	5628	839	4988	5956	
72	18576	18534	6195	853	4945	6625	
73	22080	22035	7502	925	3607	10091	
74	22371	22312	7750	1200	5371	8109	
75	24113	24068	6304	1097	5210	11547	
76	26810	26713	6789	1981	3883	14254	
77							

1) Source: Numbers of boarding and unboarding passengers at air ports (except transit passengers), Bureau of Statistics.

2) Sum of estimation of leaving and arriving passengers at DSM Air Port from among those to / from Mafia, Kilwa, Lindi and Mtwara Air Ports, based on OD pattern of '73 and '74 ("Report of Survey for Coastal Link Road Project for Tanzanian Southern Coastal Area "JICA, '77)

Remarks: DSM : Dar es Salaam

3) Data on Bus Passengers

As there were no systematic data on the bus passengers in the southern coastal area, the data estimation was made according to the following process.

The bus transportation is operated under business licenses which must be renewed every two years. The list of these licenses is shown in Table 2-2 (c) and the southern coastal area can practically be regarded as the district under the monopoly of Tee-tee-co (Ushirika Tee-tee-co Co., Ltd.), because there is no other new licensee in 1976. Accordingly, based on the results of operation of Tee-tee-co in 1976 — Refer to Table 2-2 (d) — the number of trips of bus passengers in the southern coastal area in the same year was estimated by means of the actual number of services and the average number of passengers on board of a single bus.

Further, the time series data for the period 1972 - 76 were computed out on the basis of the data on the actual passenger fare income. These data are shown in Table 2-2 (e). Though these data were not sufficiently reliable as the basis for the model estimation, the authors were obliged to use these because no other reliable data were obtainable.

Tab 2 - 2 (c)

Bus Operation Licences in Southern Coastal Area

* Year	Licensee	No. of bus	No. of Seats	Block of route
1974 - 75	H. S.	1	25	DSM - Njinjo
	N. A. S. M.	1	20	DSM - Kibiti
	F. M. H.	1	55	DSM - Kilwa
	M. S. M.	1	50	DSM - Ikwiriri
	J. A. S.	1	37	"
	I. S.	1	54	DSM - Mtwara
	Willey Motor Services	2	110	DSM - Lindi - Masasi
	Total	8	351	
1975 - 76	A. M. M.	1	45	DSM - Kilwa
	P. A.	4	232	DSM - Kilwa, Njinjo
	A. H. & A. S.	1	50	DSM - Lindi
	R. S. P. & D. N.	1	65	DSM - Newala - Lindi
	Nachinywea Trading Co.	2	17	DSM - Lindi
	Ushirika Teeteeco. Co. Ltd.	19	1085	All Southern Region
	Total	28	1495	

Source: NTC internal Data

*Validity of licence is 2 years. Renewal is not made except those of Teeteeco.

Remarks: DSM: Dar es Salaam

Table 2 - 2 (d)

Data on Bus Operation of Teeteeco (1976)

Item	Block	Mtwara Lindi Songea	Songea DSM	Mtwara Lindi DSM	Masasi Lindi DSM
Distance	(miles)	445	637	385	413
Fare	(Shs)	56.40	79.45	54.95	57.40
Average available passenger capacity		58	85	58	58
Planned number of services (Round-trips)		106	106	130	53
Actual number of services (Round-trips)		187	155	55	24
Runned milage (1000 miles)		166.4	197.5	42.35	19.82
Average number of passengers		46	62	71	54
Ratio of fullness		80%	106%	123%	93%

Source: Project Report on Teeteeco, NTC.

Tab 2 - 2 (e)

Data relating to Bus Passengers

YEAR	1) Passenger Transport income of Teeteeco 1000 Shs	2) Passengers carried by Teeteeco Trips	3) Total No. of Busses
1967			2737
68			2604
69			3123
70			3612
71			3769
72	3397	* 13950	4089
73	3886	* 15958	
74	4109	* 16874	
75	3108	* 12763	
76	6902	28343	
77			

1) Source: NTC : Project Report

2) Source: UN Africa Economic Review, 1977

4) Data on Ships Passengers

As for the data on ship passengers, there are the data based on the Tanzania Harbour Authority (THA) and published by the Statistics Bureau and the data based on the results of operation of TCSL. The data relates to the period 1968 - 76 and contains no OD pattern, while TCSL operation data contains OD pattern, though the latter relates to a short period 1974 - 77.

As the THA data were official statistical data relating to a longer period, they were utilized as the basic data and corrected as stated below by using the TCSL data.

- a) From among the THA data, the number of passengers at Mtwara port was regarded as the number of trips from or to the southern coastal area. The data for 1977 were worked out through multiplying the value of TCSL operation results by the unfit ratio between the past data of THA and TCSL.
- b) For the ports of Dar es Salaam, Mtwara, Kilwa and Lindi, the data were corrected by multiplying coefficient determined for individual years so that the TCSL passenger data at Mtwara for each year from 1974 to 77 might coincide with the THA statistical data. For the years 1972 and 1973, the numbers of passengers at other ports were estimated on the basis of OD pattern of TCSL and the numbers of passengers at Mtwara Port.
- c) The total number of ship passengers in the southern area was obtained as the sum of numbers of passengers for respective ports.

For the period 1969 - 71, the passenger-cum-cargo vessels of TCSL were not in service and the actual data

on passengers at Mtwara Port are much different, and, accordingly, the data on passengers at Dar es Salaam according to THA was connected at the point 1972 to the time series data obtained by b) above and, next, the data on passengers at Mafia, Kilwa and Lindi were estimated in the same manner as b) to obtain the total number in the South as the sum of these numbers of passengers.

The data obtained by these corrections and the transportation pattern of TCSL are shown in Table 2-2 (f) and Table 2-2 (g) respectively.

The transportation capacity index of TCSL contained in the explanation variable in the model equation was selected as follows:

- a) Until 1971: 0
No passenger-cum-cargo vessel was in service.
- b) 1972 : 0.5
M/V Mtwara entered service at the middle of the year.
- c) 1973 - 1974: 1.0
M/V Mtwara was in continuous service.
- d) 1975 : 2.0
M/V Lindi entered service at the beginning of the year.
- e) 1976 : 1.0
M/V Lindi lay in dock very long. Cargo was given priority over passengers, which caused deterioration of service and efficiency of passenger transport and, as its result, considerable decline of capacity.

Tab 2 - 2 (f)

Actual Data on Sea Passengers in Southern Area

YEAR	5) Sea Passengers in Southern Area						6) TCSL Transportation Data
	Sum	3) DSM	4) Mafia	2) Kilwa	2) Ljindi	1) Mtwara	
1967							
68							
69	* 3557	.	.	.	.	507	
70	* 4287	.	.	.	.	864	
71	* 6714	.	.	.	.	931	
72	11727	*10983	* 2089	* 1247	* 2695	6439	* 14210
73	17591	*16475	* 3134	* 1870	* 4043	9659	* 15703
74	22985	21175	4987	3635	4381	11792	21814
75	38001	36027	5757	3917	8638	21663	31255
76	29549	27875	4308	2659	6811	17445	26904
77	33095	30946	5520	3206	8926	* 17596	25138

- 1) Source: EAHC Bureau of Statistics), '77...Estimation
- 2) '74 - '77 : Correction of TCSL transportation data in accordance with THA basis.
 '72 - '73 : Estimation using ratios for Lindi/Mtwara and Kilwa/Mtwara in OD Pattern of TCSL (average '74 - '77)
- 3) '74 - '77 : Correction of TCSL transportation data in accordance with THA basis.
 '72 - '73 : Estimation using ratios for DSM/ (various ports) in OD pattern of TCSL
- 4) '74 - '77 : Correction of TCSL transportation data in accordance with THA basis
 '72 - '73 : Estimation using ratio of Mafia/DSM in OD pattern of TCSL
- 5) '72 - '77 : Calculated from total of various ports
 '69 - '71 : Calculated from summation of value obtained by connection of DSM port data as per THA on the basis of 3) for '72 and values for other ports estimated in accordance with 2) and 4) on the basis of value of Mtwara.
- 6) Source : TCSL Internal Data, Estimation for '72 - '73

Tab 2 - 2 (g)

OD Pattern of Sea Passengers in Southern Area

	Mtwara	Lindi	Kilwa	Mafia	DSM
D M S	1) 7947	2818	1369	3738	15872
	2) 17024	6191	2373	3674	29262
	3) 13729	5406	1703	2782	23620
	4) 12283	6211	1764	3226	23484
	5) 50983	20626	7209	13420	<92238>
Mafia	580	159	738	5215	
	461	414	127	4676	
	514	354	0	3650	
	405	558	0	4189	
	1960	1485	865	<17730>	
Kilwa	311	306	2724		
	225	456	3181		
	539	11	2253		
	663	3	2430		
	1738	776	<10588>		
Lindi	1	3284			
	1	7062			
	0	5771			
	2	6774			
	4	<22891>			
Mtwara	8839				
	17711				
	14782				
	13353				
	<54685>				
			1) 1974		
			2) 75		
			3) 76		
			4) 77		
			5) Sum '74-'77		

Source: Summed up from TCSL data

2-2-2 METHODS OF COMPUTATION OF PASSENGER NUMBERS AND BAGGAGE
QUANTITIES FOR DIFFERENT PORTS, SEASONS AND CLASSES

(1) Computation of Passenger Numbers for Different Ports

The numbers of passengers at different ports were computed out by distributing the yearly total of ship passengers in the South obtained by model estimation according to the past OD pattern of TCSL. The OD pattern of TCSL is shown in Table 2-2 (g).

(2) Computation of Passenger Numbers for Different Seasons

The number of passengers in different seasons were computed out in a similar manner as (1) above by distributing the yearly total of ship passengers according to the seasonal pattern for quarters of TCSL. The seasonal pattern of TCSL is shown in Table 2-2 (h).

Tab 2 - 2 (h)

Seasonal Pattern of Sea Passengers in Southern Area

(%)

	1974	1975	1976	1977	
I	21.6	24.7	27.2	33.0	28
II	27.1	32.7	30.1	33.5	30
III	32.2	24.3	20.4	16.1	23
IV	19.1	18.3	22.3	17.4	19
Total	100.0	100.0	100.0	100.0	100

I Jan. - Mar.

II Apr. - June

III July - Sept.

IV Oct. - Dec.

(3) Computation of Passenger Numbers of Different Classes

As for the numbers of passengers of different classes, no reliable data necessary for their positive computation could be obtained. Judging from the fact that the cabins of the vessel under operation become full in the early stage, the existing ratio of cabin accommodation of 12% plus 3% of higher class, including cabins for foreign passengers, can form the basis for design.

(4) Computation of Baggage Quantity

No material data on the quantity of baggages could be obtained and it was necessary to examine the quantity of personal baggages by questionnaire. As is clear from this survey, the number of baggages for person is not so much different among different traffic facilities, and lies on the level of 2 to 3 on an average. The weight of baggages per persons is somewhat different among various traffic facilities. The maximum weight of baggages per person was about 30 kg in the case of ship passengers. In future, 3 baggages weighing 40 kg in total per person is to be taken as the standard including a suitable margin. The total quantity of baggages is to be the product of this standard personal quantity multiplied by the number of passengers.

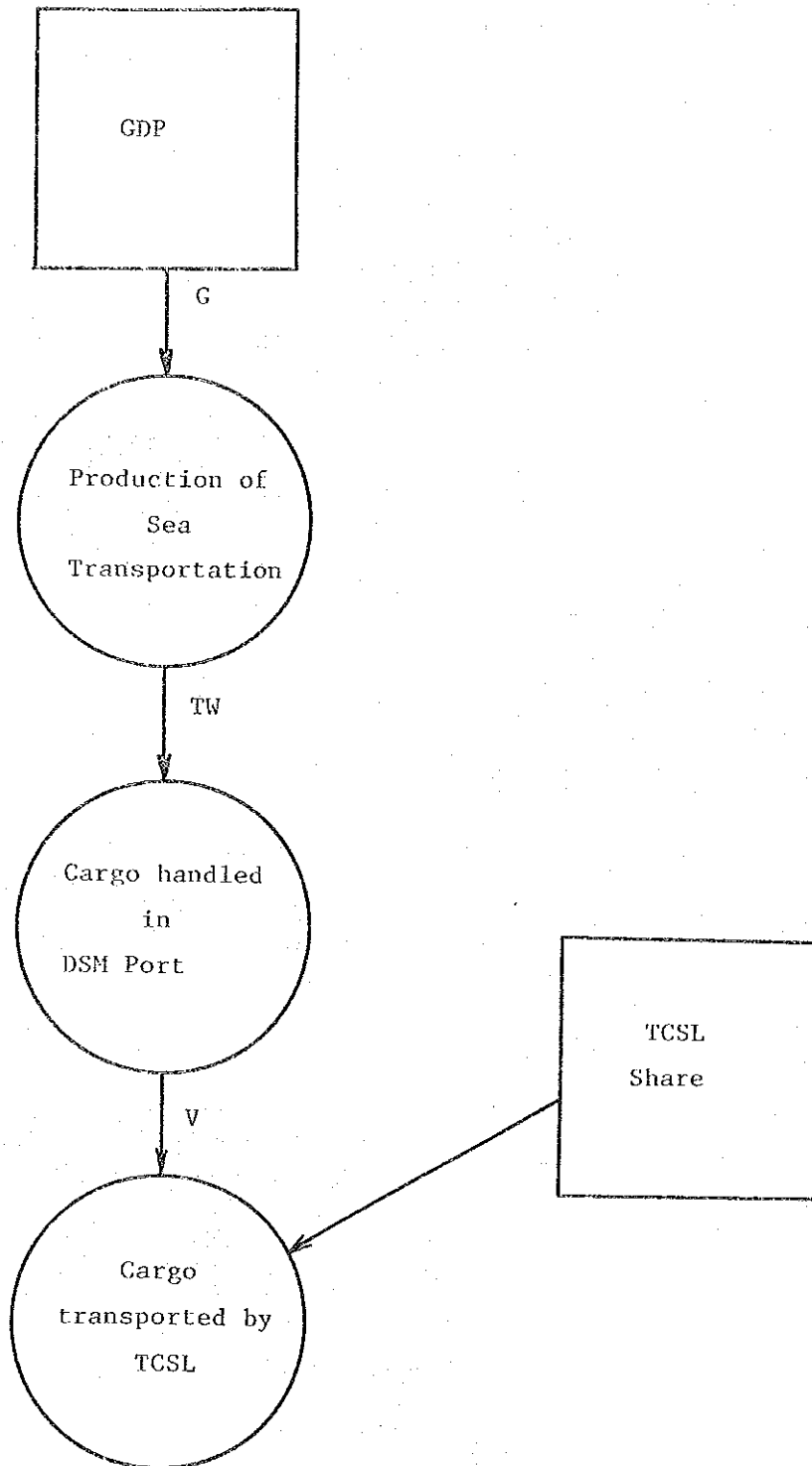
2-2-3 ESTIMATION MODEL FOR SEABORNE CARGO

(1) Model Flow

The flow of the estimation model for quantity of seaborne cargo consists of simple macro equations as shown in Fig. 2-2 (g).

Fig. 2-2 (i)

Flow of Estimation model for Seaborne Cargo



Taking the GDP as the exogenous value, calculations are made to estimate various data in the order of the production of the marine transport enterprises, the quantity of cargo handled in Dar es Salaam port and the quantity of cargo transported by TCSL.

(2) Model Equation

a) Production of Tanzanian Sea Transport Enterprises

$$T_w = - 109 + 0.028358 \bar{G}$$

$$R = 0.9922$$

\bar{G} : Gross domestic production of Tanzania

b) Quantity of Cargo Handled in Dar es Salaam Port

$$V = - 694 + 25.730 T_w$$

$$R = 0.9974$$

c) Quantity of Cargo Transported by TCSL

$$C = V \times \gamma$$

γ : Rate of share of TCSL in the total quantity of cargo handled in Dar es Salaam port.

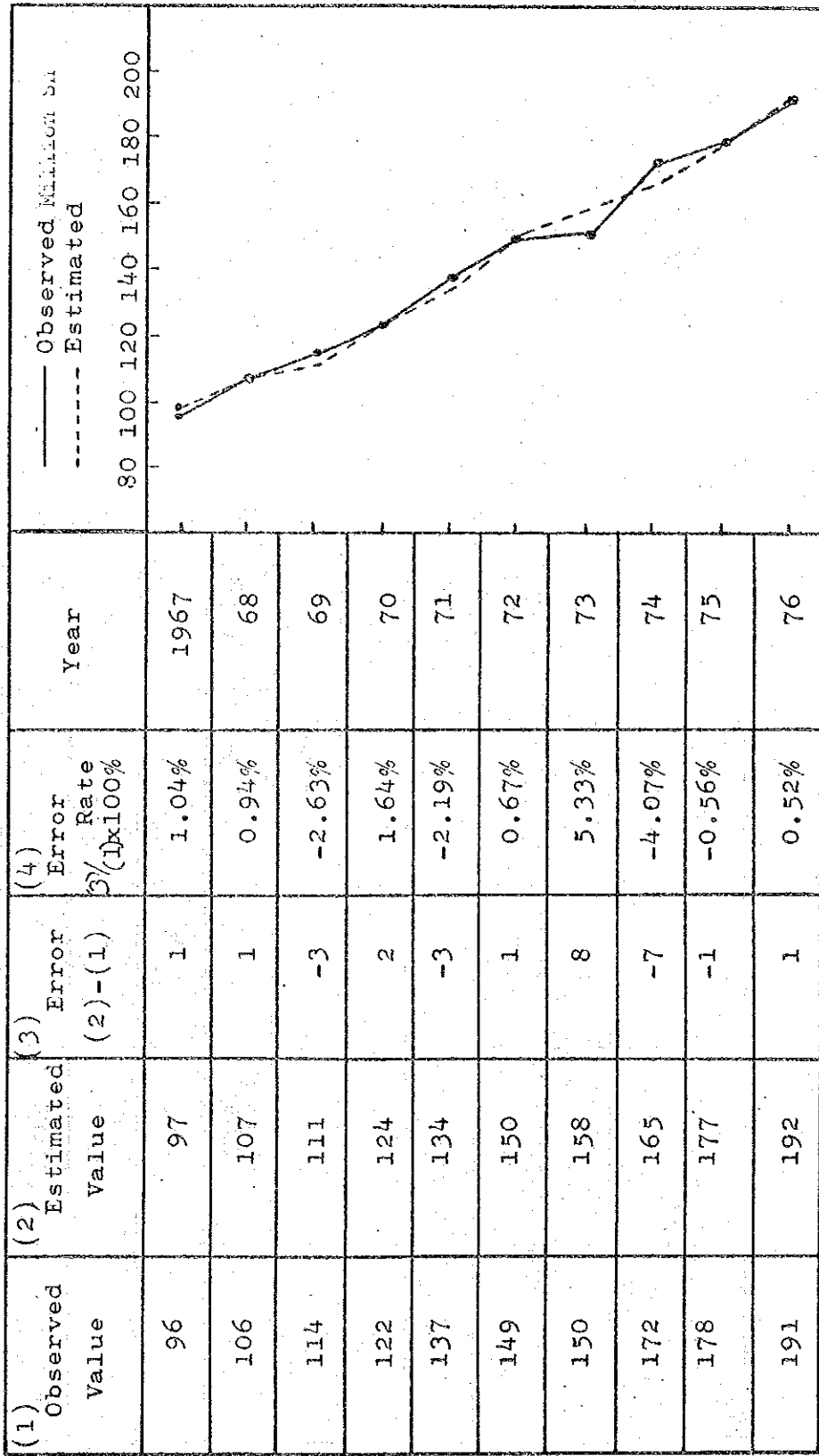
(Average of the period 1974 - 74 : 0.030165)

(3) Fitness test of Model Equation

For testing the fitness of the model equation, the results of tests of the actual data and estimated values are shown in Figs. 2-2 (h) and (i). As are clear from these figures, the results of tests are satisfactory.

Fig 2 - 2 (h)

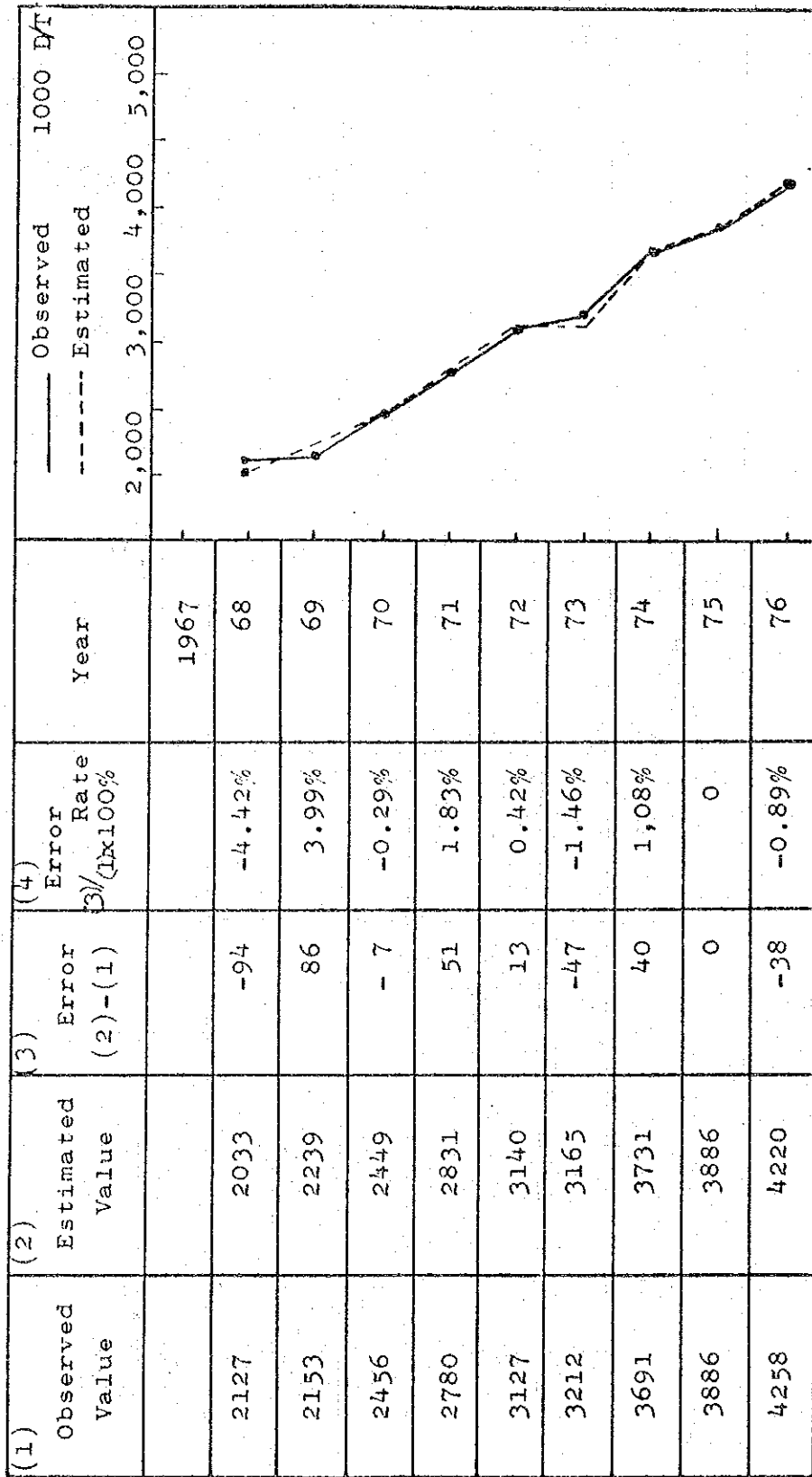
Fitness Test of Estimation Model: Production of Sea Transportation Enterprises



$T_w = -109 + 0.028358 \bar{G}$ $R = 0.9922$

Fig 2 - 2 (i)

Fitness Test of Estimation Model : Cargo Handled in DSM Port



$$V = -694 + 25.730 TW \quad R = 0.9974$$

(4) Data Employed

The data employed for estimations are the production of sea transportation enterprises, the quantity of cargo handled in Dar es Salaam port according to THA and the quantity of cargo transported by TCSL. These data are shown in Table 2-2 (i).

Data Relating Seaborne Cargo

YEAR	1) Produc- tion of Sea Transporta- tion Enterprise	2) Cargo Handled in DSM Port	3) TCSL Transporta- tion
	Million Sh	(1000 D/T)	(1000 P/T)
1967	96	.	.
68	106	2127	.
69	114	2153	.
70	122	2456	.
71	137	2780	.
72	149	3127	.
73	150	3212	.
74	172	3691	133
75	178	3886	111
76	191	4258	113
77			157

(1) Source: Bureau of Statistics

(2) Source: THA

(3) Source: TCSL Internal Data

2-2-4 COMPUTATION OF DEMAND FOR PASSENGER TRANSPORT IN ZANZIBAR

The means of passenger transport connecting Zanzibar and the main land of Tanzania are aircrafts and ships. But, data sufficient for applying the model approach could not be obtained by the present study. The obtained data are shown in Table 2-2 (j). The data relating to sea transportation are only those for 1970 and 1976 and, in addition, the data for these two different years have different bases. Accordingly, these data cannot be utilized for prediction of the number of ship passengers. In this case, the sum of numbers of air and ship passengers in the year of 1976 was regarded as the passenger transport demand between Zanzibar and the main land, and, based on these data and assuming same rates of growth as those of numbers of ship passengers in the southern coastal area, the passenger transport demand in Zanzibar in future was estimated.

Future passenger transport demand in Zanzibar

$$= 183274 \times (\text{rate of growth of ship passengers in southern coastal area})$$

183274 : No. of passengers in 1976

Data on Passenger Transport, Zanzibar

YEAR	Sum	1) Air		2) Sea	
		Passengers	Passengers	Passengers	Passengers
1967					
68					
69					
70	.			73230	
71	.	34365		.	
72	.	39231		.	
73	.	50053		.	
74	.	57951		.	
75	.	85642		.	
76	183274	152832		30442	

(1) Source: Bureau of Statistics

(2) Results of hearing from Port Manager, '70
Nasaco Data, '76

2-3 RESULTS OF DEMAND ESTIMATION

2-3-1 SELECTION OF GIVEN CONDITIONS

For estimation of demand by means of macro models, it is necessary to select the future values of exogenous variables as the given conditions. The processes and contents of selection of such given conditions are explained hereinafter.

(1) Period for Estimation

Assuming that a new ship or new ships will be put into service, the period for estimation is to be taken as five years ranging from 1980 to 1985, as this first period is most important. For the period after 1985, a model is to be made assuming that the general tendency during these five years will remain unchanged.

(2) Processes and Contents of Selection of Given Conditions

The contents of selection of given conditions (exogenous variables) in estimating demand are as shown in Table 2-3 (a), and were determined as explained below.

1) Population of Dar es Salaam

The estimated population (1977) of the city of Dar es Salaam at present (1977) is about 609,000. The yearly growth of population is estimated by the Statistics Bureau at 8.5% and the population will become 777,000 in 1980 and 1,170,000 in 1985.

2) Population of Cities in Southern Coastal Area

The sum of population of five cities, Kilindoni, Kilwa, Lindi, Mtwara and Dar es Salaam is estimated at 661,000 at present. According to the data of Statistics Bureau, the average yearly growth of these cities in the South except Dar es Salaam is estimated at 5.0% and the same sum of populations will become 835,000 and 1,245,000 in 1980 and 1985 respectively.

Table 2 - 3 (a)

Selection of Given Conditions & Cases
for Demand Estimation

Given Conditions	Contents	Current Condition (1977)	Estimated Values		Remarks
			1980	1985	
1)	Population of DSM city (1000)	609	777	1170	Average yearly growth: 8.5%
2)	Population of Southern coastal cities (1000)	661	835	1245	Average yearly growth: 5.0% (except DSM)
3)	GDP Prices '70 (Million Sh)	11253	13402	17936	Average yearly growth: 6.0%
4)	TCSL Transportation capacity (index)	1.0	3.0	3.0	

- 1) Figures of average yearly growth are based on estimation of Bureau of Statistics.
- 2) Total of populations of 5 cities - DSM, Kilindoni, Kilwa, Lindi and Mtwara. Average yearly growths for these cities are based on estimation of Bureau of Statistics.
- 3) Average yearly growth is based on opinion of Tanzanian Government offices.
- 4) The transportation capacity of TCSL is anticipated to increase to about 3 times of the present one by the introduction of the new ship.

3) Gross Domestic Production (GDP)

The present GDP of Tanzania is estimated at 11,253 billion (1970 prices). According to the estimation of the Government, the average yearly economic growth will be 6.0% and the GDP will become 13,402 billion and 17,936 billion in 1980 and 1985 respectively.

4) Transportation Capacity Index of TCSL

Accurately speaking, the increase of passenger carrying capacity of TCSL due to the new ship or ships can be obtained with:

(Number of services per year) x (Number of seats)
as the parameter.

However, it will be a proper estimation that the transportation capacity of TCSL will be increased to about 3 times of the present one by the introduction of the new ship.

2-3-2 RESULTS OF ESTIMATION

The results of estimation of demand for years 1980 and 1985 are as shown in Table 2-3 (b).

Table 2-3 (b)
Yearly Demand for Passenger Transport

Year \ Item	No. of trips of <u>total</u> passengers in Southern Coastal Area	No. of trips of <u>sea</u> passengers in Southern Coastal Area *
1977	96500	33100
1980	136600	58300
1985	231200	91200
Average yearly growth '80 - '85	11.1 %	9.3 %

* To assume introduction of the new ship in 1980.

No. of Trips of Sea Passengers between Various Ports

	Mtwara	Lindi	Kilwa	Mafia	DMS
DSM	1) 30003	12138	4242	7898	54282
	2) 46832	18947	6622	12327	84728
	3) 0.51464	0.20820	0.07277	0.13547	0.93108
Mafia	1153	874	509	10434	
	1800	1364	795	16286	
	0.01978	0.01499	0.00873	0.17897	
Kilwa	1023	457	6231		
	1596	713	9726		
	0.01754	0.00783	0.10689		
Lindi	2	13471			
	4	21027			
	0.00004	0.23107			
Mtwara	32182				
	50233				
	0.55201				

1) 1980

2) 1985

3) Standard pattern of average 1974 - 77

Tab 2 - 3 (d)

No. of Trips of Sea Passengers in Various Seasons

		1980	1985
I	Jan. - Mar. 28%	16324	25536
II	Apr. - June 30%	17490	27360
III	July - Sep. 23%	13409	20976
IV	Oct. - Dec. 19%	11077	17328
Total		58300	91200

Tab 2 - 3 (e)

No. of Trips of Sea Passengers of Various Classes

Class		Year	1980	1985
Upper Class	15%		8745	13680
Ordinary Class	85%		49555	77520
Total		100%	58300	91200

* Present rate of cabin class passengers = 12% + Foreign Passengers 3%

Table 2 - 3 (f)

Quantity of Baggages of Sea Passengers

Item \ Year		1980	1985
No. of pieces (1000 pcs)	3 pcs./ person	174.9	273.6
Weight (1000 kg)	40 kg/ person	2332	3641

Seaborne Cargo

Table 2 - 3 (g)

Year \ Item	Cargo handled in DSM Port (1000 DWT)	TCSL Transport Quantity (1000 P/T)
1977	4709	157
1980	6279	189
1985	9598	289
Average yearly growth '80 - '85	8.9 %	

Table 2 - 3 (h)

Passenger Transport Demand at Zanzibar

(1000 persons)

1977	1980	1985	Average yearly growth '80 - '85
187.3	259.4	439.1	11.1

2-4 PASSENGERS' DISPOSITION ON DEMAND FOR SEA TRANSPORT

In order to understand the actual conditions of passenger transport in the Southern Coastal Area and the passengers' disposition on the demand for sea transport, a simple survey through questionnaires was made for a portion of ship, bus and air passengers. The outline of the results of these survey is stated below for the purpose of supplementing the results of the aforementioned results of demand estimation and confirming the conditions to be taken into consideration in designing and building the new vessel.

2-4-1 PROCEDURE OF SURVEY THROUGH QUESTIONNAIRES

The procedure of this survey, including its subject, method, etc., are as shown in Table 2-4 (a).

2-4-2 ITEMS OF QUESTIONS

The items of questions are as follows:

- Q - 1 Destination (single choice)
1) Mafia 2) Kilwa 3) Lindi 4) Mtwara
5) Songea (Bus passengers only)
- Q - 2 Number of travels per year (free answering)
- Q - 3 Purpose of present travel (single choice)
1) Duty 2) Private affairs
- Q - 4 Principal traffic facilities to be used (plural choice)
1) Aircraft 2) Ship 3) Bus
- Q - 5 Reason for selecting the traffic facility concerned
(plural choice)
1) Cost 2) Time 3) Reliability
- Q - 6 Discontents about traffic facilities (plural choice)
1) Crowdedness 2) Irregularity in service
2) Difficulty in access 4) Uncomfortableness
- Q - 7a Number of baggages (free answering)
- Q - 7b Weight of baggages (free answering)
- Q - 8 Traffic facilities which could not be used due to excessive
crowdedness (plural choice)
1) Aircraft 2) Ship 3) Bus
- Q - 9 Whether you have abandoned travel due to excessive
crowdedness (single choice)
1) Yes 2) No
- Q - 10 Days needed for reservation of ticket for the present travel
(free answering)

Table 2 - 4 (a)

Procedure of Survey through Questionnaire			
	Sea Passengers	Bus Passengers	Air Passengers
Date	June 7, 1978 (Wed.)	June 6, 1978 (Tue.)	June 4, 1978 (Sun)
Hour	10:30 - 12:30	7:00 - 8:00	11:00 - 12:00
Place	DSM Ticketing office, TCSL	DSM Bus terminal Teeteeco	DSM Airport
Questionee	120 passengers booked for M/V Mtwara scheduled for next week service	58 passengers of bus leaving at 8:00 for Songea	46 passengers of air craft leaving at 12:00 for Lindi
Method of questionnaire	Interview by sur- vey staff	Ditto	Ditto
Survey staff	4 students of local College of Traffic	5 students of local College of Traffic	4 members of survey mission and 2 local assistances
Ratio of answering	about 100% except attendants and accompanying chil- ren	Ditto	Ditto

Q - 11 Reasons for selection of travel by ship (plural choice)

- 1) Speed
- 2) Low cost
- 3) Regularity in service
- 4) Comfortableness
- 5) Freedom in selection of time

Q - 12 Wish to utilize new ship

- 1) Wishing
- 2) Not wishing

2-4-3 ANSWERS TO QUESTIONNAIRES

(1) Destinations Table 2-4 (b)

Mtwara, Lindi and Kilwa are most frequent. From among bus passengers, half passengers are going to Songea because the bus runs via Songea and others to Mtwara and Lindi. All air passengers are going to Lindi because its destination is Lindi.

(2) Number of Travels per Year Table 2-4 (c)

Many passengers make one or two travels. In the average number of travels, ship passengers make 7 travels per year. This number is incomparably larger than others.

(3) Purpose of Travel Table 2-4 (d)

Private affairs occupy 2/3 of the purposes of travel of ship and bus passengers, while 2/3 of air passengers make travel for duty.

(4) Principal Traffic Facilities Table 2-4 (e)

Most of ship passengers answered "ship", bus passengers "bus" and air passengers "aircraft". Passengers who are willing to utilize two or more kinds of traffic facilities are not so many.

(5) Reason for Selecting the Traffic Facility Concerned

Table 2-4 (f)

The answer "reliability" was followed by "time".

People who answered "cost" was not so many.

(6) Discontent about Traffic Facilities Table 2-4 (g)

Many ship passengers pointed out "irregularity in service" and "crowdedness", while many bus passengers "difficulty in access". Few air passengers expressed their discontent about the aircraft.

(7) Baggages Tables 2-4 (b) and (i)

The number of personal baggages per person ranges 2 to 3 and the average weight is 12 Kgs for air passengers, 26 Kgs. for bus passengers and 32 Kgs. for ship passengers.

(8) Experience of Encountering "FULL" Table 2-4 (j)

As for the traffic facilities which could not be used due to excessive crowdedness, many ship and air passengers answered "ship" and bus passengers "bus". From these results, it is clear that ships and busses are considerably crowded.

(9) Abandonment of Travels Table 2-4 (k)

Many ship and air passengers have experiences of abandoning travels due to crowdedness.

(10) Days Needed for Reservation Table 2-4 (l)

On an average, the number of days needed for reservation was 17 days for ship passengers, 5 days for bus passengers and 4 days for air passengers. The duration for reservation of ship tickets is abnormally long.

(11) Reasons for Selection of Travel by Ship Table 2-4 (m)

As for the reasons for choice of sea travel, many passengers answered "cheapness", "comfortableness", "regularity in service" and "freedom in selection of time". The "speed" is not an important factor.

(12) Wish to Utilize New Ship Table 2-4 (n)

Most passengers have wish to utilize the new ship. Particularly, many ship passengers answered that they would wish to utilize the new ship even if the fares would be somewhat raised.

Table 2 - 4 (b)

Q-1

Destination (Single Choice)

Choice branch Traffic facility	1 Mafia	2 Kilwa	3 Lindi	4 Mtwara	5 Songea	Unknown or others	Sum of answerers
Ship (%)	8 (11.4)	19 (27.2)	18 (25.7)	25 (35.7)			70 (100.0)
Bus (%)	-	-	5 (12.8)	13 (33.3)	21 (53.9)	-	39 (100.0)
Aircraft (%)	-	-	33 (94.3)			2 (5.7)	35 (100.0)

Table 2 - 4 (c)

Q - 2

Number of Travels per year

Choice branch Traffic facility	1	2	3	4	Unknown or others	Average number	Sum of Answerers
Ship (%)	27 (83.6)	20 (28.6)	10 (14.3)	12 (17.1)	1 (1.4)	7.1	70
Bus (%)	27 (69.2)	9 (23.1)	2 (5.1)	-	1 (2.6)	1.3	39 (100.0)
Aircraft (%)	7 (20.0)	15 (42.9)	9 (25.7)	2 (5.7)	2 (5.7)	3.7	3.5 (100.0)

Table 2 - 4 (d)

Q-3

Purpose of Present Travel (Single Choice)

Choice branch	1 Duty	2 Private	Unknown or others				Sum of answerers
Ship (%)	27 (38.6)	43 (61.4)	-				70 (100.0)
Bus (%)	6 (15.4)	33 (84.6)	-				39 (100.0)
Aircraft	25 (71.4)	10 (28.6)					35 (100.0)

Table 2 - 4 (e)

Q-4

Principal Traffic Facilities to be used
(Plural choice)

Choice Traffic branch facility	1 Aircraft	2 Ship	3 Bus	Unknown or others			Sum of answerers
Ship (%)	3 (4.3)	50 (71.4)	23 (32.9)	3 (4.3)			70
Bus (%)	2 (5.1)	6 (15.4)	33 (84.6)	3 (7.7)			39
Aircraft (%)	27 (77.1)	12 (34.3)	4 (11.4)	2 (5.7)			35

Table 2 - 4 (f)

Q-5

Reason for Selecting the Traffic Facility Concerned
(Plural choice)

Choice branch	1 Cost	2 Time	3 Reliability	Unknown or others			Sum of answerers
Ship (%)	17 (24.3)	29 (41.4)	47 (67.1)	11 (15.7)			70
Bus (%)	4 (10.3)	11 (28.2)	23 (59.0)	5 (12.8)			39
Aircraft (%)	11 (31.4)	19 (54.3)	21 (60.0)	2 (5.7)			35

Table 2 - 4 (g)

Q-6

Discontents about Traffic Facilities
(Plural choice)

Choice branch	1 Crowded- ness	2 Irregu- larity in service	3 Difficul- ty in access	4 Uncomfor- tability	5 none or others		Sum of answerers
Ship (%)	37 (52.9)	51 (72.9)	16 (22.9)	34 (48.6)	1 (1.4)		70
Bus (%)	13 (33.3)	12 (30.8)	26 (66.7)	9 (23.1)	2 (5.1)		39
Aircraft (%)	13 (37.1)	12 (34.3)	2 (5.7)	9 (25.7)	12 (34.3)		35

Table 2 - 4 (h)

Q-7a

Number of Baggages

Choice branch Traffic facility	1 1 pc.	2 2 pcs.	3 3-4 pcs.	4 5 pcs. or more	Unknown or others	Mean	Sum of answerers
Ship (%)	31 (44.3)	18 (25.7)	11 (15.7)	-	10 * (14.3)	1.9	70 (100.0)
Bus (%)	10 (25.6)	11 (28.2)	10 (25.6)	4 (10.3)	4 (10.3)	2.4	39 (100.0)
Aircraft (%)	9 (25.7)	11 (31.4)	12 (34.3)	1 (2.9)	2 (5.7)	2.2	35 (100.0)

* Large masses of cargo are not included in 1 - 4 above.

Table 2 - 4 (i)

Q-7b

Weight of Baggages

Choice branch Traffic facility	1 up to 10 kg	2 11-20 kg	3 21-40 kg	4 more than 40 kg	Unknown or others	Average Weight	Sum of answerers
Ship (%)	22 (31.4)	17 (24.3)	9 (12.9)	10 (14.3)	12 (17.1)	31.5	70 (100.0)
Bus (%)	10 (25.7)	11 (28.2)	7 (17.9)	7 (17.9)	4 (10.3)	26.0	39 (100.0)
Aircraft (%)	18 (51.5)	11 (31.4)	2 (5.7)	-	4 (11.4)	12.4	35 (100.0)

Table 2 - 4 (j)

Q-8

Traffic Facilities which could not be used due to Excessive Crowdedness (Plural choice)

Choice branch Traffic facility	1 Aircraft Unavaila- ble	2 Ship unavai- lable	3 Bus Unavaila- ble	None or Unknown			Sum of answerers
Ship (%)	1 (1.4)	55 (78.6)	10 (14.3)	-			70
Bus (%)	-	5 (12.8)	33 (84.6)	2 (5.1)			39
Aircraft (%)	14 (40.0)	23 (65.7)	6 (17.1)	2 (5.7)			

Table 2 - 4 (k)

Q-9

Whether you have Abandoned Travel due to Excessive Crowdedness (Single choice)

Choice branch	1 Yes	2 No	Unknown or others				Sum of answerers
Ship (%)	57 (81.4)	11 (15.7)	2 (2.9)				70 (100.0)
Bus (%)	12 (30.8)	25 (64.1)	2 (5.1)				39 (100.0)
Aircraft (%)	24 (68.6)	8 (22.8)	3 (8.6)				35 (100.0)

Table 2 - 4 (l)

Q-10

Days Needed for Reservation of Ticket
for the Present Travel

Choice branch Traffic facility	1 1 day or less	2 2-4 days	3 5-10 days	4 11 days or more	Unknown or others	Average days	Sum of answerers
Ship (%)	2 (2.9)	1 (1.4)	24 (34.3)	40 (57.1)	3	17.4	70 (100.0)
Bus (%)	5 (12.8)	19 (48.7)	12 (30.8)	2 (5.1)	1 (2.6)	5.2	39 (100.0)
Aircraft (%)	4 (11.4)	22 (62.9)	6 (17.1)	3 (8.6)	-	4.1	35 (100.0)

Table 2 - 4 (m)

Q-11

Reason for Selection of Travel by Ship
(Plural choice)

Choice branch	1 Speed	2 Low cost	3 Regulari- ty in service	4 Comforta- bleness	5 Freedom in selec- tion of time	Unknown or others	Sum of answerers
Ship (%)	27 (38.6)	39 (55.7)	30 (42.9)	35 (70.0)	32 (45.7)	2 (2.9)	70
Bus (%)	8 (20.5)	22 (56.4)	7 (17.9)	2 (5.1)	9 (23.1)	1 (2.6)	39
Aircraft (%)	12 (34.3)	8 (22.9)	14 (40.0)	13 (37.1)	22 (62.9)	7 (20.0)	35

Table 2 - 4 (n)

Q-12

Wish to Utilize New Ship

Choice branch Traffic facility	1 Wishing	2 not wishing	Unknown or others				Sum of answerers
Ship (%)	69 (98.6)	-	1 (1.4)				70 (100.0)
Bus (%)	37 (94.9)	2 (5.1)	-				39 (100.0)
Aircraft (%)	30 (85.7)	2 (5.7)	3 (8.6)				35 (100.0)

3. STUDY AND EVALUATION OF ALTERNATIVE SHIP PROPOSALS

3-1 PROCESS OF PREPARING ALTERNATIVE SHIP PROPOSALS

The optimum type and number of new ships to be operated by TCSL are to be determined on the basis of the aforementioned results of demand estimation. The outline of this determining process is explained in the following pages.

First, the transportation demand in the Southern Coastal Area is estimated and, based on this, several proposals on the fundamentals of design — the passenger and cargo carrying capacity, the speed and the number of ships to be employed — are to be prepared with due consideration to the following important factors:

- Expected coefficient of utilization,
- Distances between calling ports in the Southern Coastal Area,
- Relation between speed and yearly number of services,
- Conditions of calling ports.

Next, pre-basic designs including various calculations of performances are made for these alternative proposals taking into account the results of demand estimation and other necessary data. Then, these designs are to be examined for building cost, transportation cost, operation cost and payability and, in addition, for probable difficulties which might be encountered when these proposed ships are put in service in Tanzanian coast. The results of all these studies are summarized and compared for the final evaluation of designs so that the optimum type and number of new ships can be determined.

3-2 ALTERNATIVE SHIP PROPOSALS COMPLYING WITH DEMAND

3-2-1 ASSUMPTION OF DEMAND

The yearly demand of passenger transportation in the Southern Coastal Area is shown in Table 2-3 (b). The new ship is assumed to be put into service in 1980 and the total number of passengers to be transported per year is assumed at 91,200.

3-2-2 COEFFICIENT OF UTILIZATION

The coefficient of utilization of the new ship is assumed at 85% for passengers and at 60% for cargo on the yearly average. When the life of the ship is assumed to be 20 years, the change of relation between the demand and transportation capacity will be inevitable in the course of this life. However, the above mentioned values of coefficient can be considered appropriate, because the existing passenger-cum-cargo vessels can partly meet the demand of passenger transport in the first 6 - 7 years.

3-2-3 ACCOMMODATION CAPACITY OF NEW VESSEL COMPLYING WITH DEMAND

The relation between the number of voyages (up and down) necessary for transporting 91,200 passengers per year in the Southern Coastal Area (Dar es Salaam - Mtwara) and the corresponding accommodation capacity of the vessel is shown in the following table.

$$\text{Accommodation capacity} = \frac{\text{Number of passengers}}{\text{Coeff. of utilization} \div \text{Number of voyages} \div 2}$$

Number of voyages (up & down)	Accommodation capacity
60	894
80	671
100	536
120	447
140	383
160	335
180	298

3-2-4 RELATION BETWEEN SPEED AND NUMBER OF VOYAGES

The practicable yearly number of voyages between Dar es Salaam and Mtwara depends upon the ship's speed.

Assuming the number of work-months at 11 months per year.

The relation between the ship's cruising speed and the yearly number of round trips is obtained as shown in the following table.

Cruising speed in knots	Days necessary for 2 round trips	Number of round trips per year
10 - 12	8	84
13 - 15	7	96
16 - 18	6 *	112
19 - 21	5 *	134
22 - 25	4	167

The above table assumes that the intermediate ports (Mafia, Kilwa and Lindi) between Dar es Salaam and Mtwara will be called at least once on both ways while the ship makes 2 round trips. The schedules marked thus * in the above table are not practicable for several reasons such as restriction of entry and departure in the nighttime.

3-2-5 PRACTICABLE COMBINATIONS OF PASSENGER CAPACITIES AND SERVICE SCHEDULES

The fundamental terms derived from the above-mentioned assumptions and results of calculation for PRACTICABLE designs complying with the present project are as indicated in the following table.

	Proposal 1	Proposal 2	Proposal 3
Passenger capacity	about 400	about 320	about 320
Cruising speed in knots	about 13.5	about 22	about 11
Yearly number of round trips	about 72	167	84
Number of ships	1	1	2

The present project assumes that the ship (or ships) are to be designed mainly for passenger transportation and, accordingly, the cargo capacity will be limited to such a possible maximum as may not practically interfere with passenger transportation.

3-3 ALTERNATIVE SHIP PROPOSALS AND THEIR STUDIES

3-3-1 BASIC DESIGNS OF ALTERNATIVE SHIP PROPOSALS

Basic designs of the three alternative ship proposals were made to meet the above-mentioned fundamental terms with due consideration for the number of trips of each class and the quantity of baggages. Also the design contents of the passenger-cum-cargo boats in service at present and M/V Mapinduzi were referred to. The outline specifications and general arrangement plans these proposals are shown in the Appendices 2, 3 and 4.

3-3-2 STUDIES OF ALTERNATIVE SHIP PROPOSALS

(1) Building Cost

The building costs of proposed ships based on their outline specifications are as follows:

Proposal 1	¥815,000,000 (29,000,000 shilling) (1 ship)
Proposal 2	¥1,155,000,000 (41,000,000 shilling) (1 ship)
Proposal 3	¥1,100,000,000 (39,000,000 shilling) (2 ships)

Remarks:

- 1) Building costs are based on "F.O.B."
- 2) Conversion rate: 1 sh. = ¥28

The Proposal 1 is a passenger-cum-cargo vessel of a "standard" type having cargo carrying facilities of suitable capacity.

The Proposal 2 is a high-speed boat having accommodation facilities nearly similar to those of Proposal 1. Moreover, this type needs reduction of hull weight and light alloy and high-tensile steel are widely introduced into the hull structure and the engine power must be extraordinarily large. Further, such a boat needs much more manpower for construction and, accordingly, the building cost is much higher.

The Proposal 3 has a nature similar to Proposal 1, but the smallness of the ship results in a comparatively high building cost.

(2) Cost for Bringing Home the Ship

Assuming that the new ship (or ships) will be built in Japan, the outline plan for bringing her home to Tanzania is as shown in the following table.

	Proposal 1	Proposal 2	Proposal 3
Total days needed	44	38	48
Number of calls on the way home	5	5	5
Crew on board	13	13	13 x 2
Total cost (Approx.)	¥40,000,000	¥75,000,000	¥65,000,000
Major items of cost (Approx.)			
Fuel & Lube oils	¥8,000,000	¥25,000,000	¥8,000,000
Food	¥700,000	¥500,000	¥1,500,000
Personnel expenditure	¥8,500,000	¥7,500,000	¥18,000,000

Remarks:

- 1) The above-mentioned "Total days" include day for preparation, supply, delivery and return home of crew.
- 2) As there are only five available calling ports on the way to Tanzania, same number of calling ports is indicated

in the above table. However, the Proposal 2 has smaller fuel tank capacity and needs some additional cost for conversion for adding temporary fuel tanks.

- 3) The crew were determined as minimum required with reference to the Japanese regulation for the person to be on board for the sailing route concerned.

(3) Operation Cost

The operation cost was calculated with reference to the engine power, number of crew, yearly number of services, etc. The details of operation cost are explained in the chapter "Financial Analysis", and the important items are compared in the following table:

	Proposal 1	Proposal 2	Proposal 3
Total engine power	2,000	9,870	800 x 2 ships
Cruising speed	13.5	22	12
Hours of run, Dar es Salaam to Mtwara	about 20	13	23
Number of crew	35	31	25
Yearly cost of operation	about 5,000,000	10,584,000	7,175,000
Yearly fuel cost	about 1,400,000	6,036,000	2,856,000
Yearly personnel cost	1,600,000	1,420,000	2,272,000

Remarks:

The time of run between Dar es Salaam and Mtwara does not include time of mooring in ports.

(4) Maintenance

For maintaining a satisfactory regular service of the ship, it is indispensable to place her in a dock once a year and, further, temporary maintenance and running repair works afloat will be needed between docking. In this connection, the construction and equipment of the aforementioned proposed ships must be studied in relation to their maintenance. The important factors in this relation are as follows.

1) Proposal 1

All the hull structure, outfitting, machinery and equipment are to be designed according to the "normal" or "ordinary" standards and, accordingly, will involve no particular problem in the technical aspect. Further, if the operator has a sufficient quantity of spare parts and, at least, the minimum quantity and kinds of repairing materials and tools and can keep proper care of these, then, there will arise no particular problem of maintenance and its time will rather be shortened.

2) Proposal 2

As is stipulated in the attached specification, considerable portions of the hull structure are constructed of light alloy and high tensile steel and the boat has powerful high-speed engines. Therefore, certain conditions must be satisfied in preparation of materials and tools as well as in skillfulness when repair work is needed. Even when such particular conditions can be fulfilled, maintenance works will need longer time and higher cost because of the special natures of the ship. Further, in such a high-speed boat, drop of speed due to fouling or weight increase is large and the high-speed propellers will liable to cavitation erosions. Such items will afterwards cause maintenance problems.

3) Proposal 3

The Proposal 3 is supposed to be similar to Proposal 1 in maintenance aspect. As there are two sister-ships, there are merits such as common use of spare parts, alternative docking, etc., while the docking cost for two ships will be approximately twice as larger as Proposal 1. Therefore, the maintenance cost will be considerably larger than the Proposal 1.

(5) Seaworthiness

The ship of the present project is destined to passenger transport along the coast of Tanzania — the East African coast —, and her stability, seaworthiness and comfortableness must be examined with reference to this service area.

The estimated metacentric height of the ship of Proposal 1 is about 2.0 metres in the fully loaded condition and the period of rolling about 7 - 8 seconds. Though she has a comparatively shallow draught, her hull form is of so-called "displacement type" assuring satisfactory seaworthiness throughout the year.

The Proposal 2 is of so-called semi-skimming type having a metacentric height of about 1.9 metre in the fully loaded condition and a rolling period of about 5 - 6 seconds. This short rolling period will sacrifice the comfortableness and, further, the ship will liable to heavy slamming in strong wind and high waves and most of passengers will get seasick. In most cases, such semi-skimming boats are utilized in inland sea areas and satisfactory regular services will be rarely expectable.

Similar to Proposal 1, the vessel of Proposal 3 is

of "displacement type, while its metacentric height is about 1.6 metre in the fully loaded condition and the rolling period will be about 5.5 - 6 seconds. This rolling period is somewhat too short for a passenger boat destined to long voyages, while longer rolling periods will lower the stability and, accordingly, the safety. Further this Proposal has a much smaller hull than Proposal 1 and its seaworthiness is undoubtedly lower than the latter. It will be difficult to maintain satisfactory regular services even with two ships of such a small size.

3-3-3 OTHER TENTATIVE PROPOSALS

In addition to the Alternative Ship Proposals mentioned above, other types of vessels might be supposed to be able to comply with the present project - Roll-on/roll-off ship and recently developed high-speed boats such as catamaran boats, hydrofoil crafts, hovercrafts, etc.

The use of Roll-on/roll-off ship" assumes the completion of corresponding wharf facilities and, under the existing circumstances, cannot comply with the present project, though this type is expected to be introduced into the future projects.

As for various types of high-speed boats, their only merit is the "high speed" and their demerits in building costs, operating cost, maintenance and seaworthiness are much greater than those of Proposal 2 and, accordingly, they cannot comply with the present project.

3-3-4 EVALUATION OF ALTERNATIVE PROPOSALS

The new ship to be built under the present project is destined mainly to passenger transport between Dar es Salaam and Mtwara and her operator will be TCSL. The results of the afore-

mentioned studies on various items on the basis of this premise show that the Proposal 1 will realize a ship in the best compliance with all requirements and conditions.

Proposal 2 will not pay not only in respect of building and operation costs but will yield to Proposal 1 in seaworthiness. Consisting of two sister ships, Proposal 3 may have some merits in forming the sailing schedule and enabling docking without interruption of service. However, the building cost is comparatively high as compared with the passenger carrying capacity and the operation cost is too high for the possible income. Further, their seaworthiness is not so satisfactory for regular services as may be expected from Proposal 1.

Thus, Proposal 1 can be recommended as the most optimum one for the present project.

4. STUDIES ON SPECIFICATIONS, BUILDING AND SAILING HOME OF THE VESSEL TO BE BUILT

4-1 OUTLINE SPECIFICATIONS

The principal particulars of vessel recommended to be built under the present project are stated below. The outline specifications and general arrangement plan of this proposed vessel are included in the Appendix 2.

(1) Principal Dimensions

Length, overall	about 67.50 metres
Length between perpendiculars	61.00 metres
Breadth, moulded	11,00 metres
Depth, moulded	4.30 metres
Load draught, moulded, designed	3,00 metres

(2) Gross tonnage	about 1,000 tons
(3) Deadweight	about 410 tons
(4) Cargo Hold Capacity	about 450 cubic metres
(5) Speed, max., on trial	about 15.0 knots
" on service, 85% output, incl. 15% power margin	about 13.5 knots
(6) Endurance	about 1,300 nauticalmiles
(7) No. of crew	35 persons
(8) No. of passengers	506 persons
(9) Main engines	Diesel 1,000 PS x 2 sets
(10) No. of ships to be built	1 ship

4-2 ESTIMATION OF BUILDING COST

The building cost (F.O.B. basis) of the vessel of the above-mentioned outline specifications amounts about ¥815,000,000 (29,000,000 Shils). In addition, spare parts for three years operation will amount about ¥40,000,000 (1,400,000 Shils).

4-3 BUILDING SCHEDULE

The building schedule of this vessel will be as shown in the following diagram.

1st month	2nd month	3rd month	4th month	5th month	6th month	7th month	8th month	9th month
	o Commence- ment of pre-fabri- cation	o Keel- laying			o Launching			o trial Com- pletion
← Detail design & ordering of materials →								
			← Assembly on building berth →			← Outfitting →		

The above schedule covers the period from coming into force of the contract to the completion at the builder's wharf.

4-4 PLAN OF SAILING HOME

Assuming that the vessel will be built at a shipyard in Japan, the outline of plan of sailing home is as follows:

- 1) Total days required 44 days
(In addition to 24 running days, the period includes days for preparation, margin for refuge from stormy weather, days for intermediate calling ports for supply, returning home of personnel etc.)
- 2) Crew 13 persons
- 3) Intermediate calling ports 5 ports
(Naha, Manila, Singapore, Colombo and Seychelles)
- 4) Total distance about 7,400 nautical miles

derived from the aforementioned intent and the special feature of the vessel. In this connection, it is indispensable to select a shipbuilder having sufficient working facilities, capacity, ability of management and stability of business, and it is recommended to proceed in selection with full consultation with the above-mentioned consultant.

- 3) After being put into service, the vessel is to be operated regularly throughout the year with the exception of the period for docking which is expected to be about one month. In order to eliminate the necessity of elongating the period of docking, the vessel and its operator must have a stock of spare parts enough to make minor repair and maintenance works by the ship's hand or by the running repair workers.

In addition, an appropriate care and supply of such spares are indispensable for this purpose.

- 4) It is a normal practice in building a ship that a suitable number of officers and/or engineers of the ship concerned are dispatched to the building yard. Their principal tasks are normally the training for handling machinery on board. In the present case, it is recommended to dispatch at least half of members to be on board for learning technique of minor repairing, in addition to the above mentioned training.

4-5-2 STUDY OF SAILING HOME

- 1) The present project will be completed by transporting the completed vessel to Tanzania and finally delivering it to the Owner. In view of the various procedure in the course of its execution, however, it is advisable to build the vessel on F.O.B. basis and then entrust its transportation to the home land to a competent enterprise having sufficient experiences as this work needs a long time. It is recommended to get advices and, if necessary, assistances from the same technical consultant in relation to this matter.

- 2) The work of sailing home needs a long time and involves multifarious contents in addition to navigation to the home port. Therefore, this period of sailing home can be utilized as a precious time for training the crew. As the work of sailing home is undoubtedly executed on the contractor's responsibility, it is recommended to get the advices and/or assistances of the same consultant for realizing this training of crew on the way home.

5. OPERATION MANAGEMENT

For operating the vessel safely and efficiently to assure the economical effectiveness, it is indispensable to satisfy minimum necessary conditions, such as rationalization of operation management, perfection of harbour facilities and navigation aids, amelioration of crew's technique, etc., in addition to the superior performance of the vessel. For this purpose, the manners and technique of operation management are discussed in this chapter for the present case where the vessel explained in the previous chapter will be operated by the main operating organization TCSL.

5-1 OPERATION CONTROL

5-1-1 ORGANIZATION OF TCSL

In the field of sea transport along the Southern Coastal Area, TCSL is the only nation-wide enterprise and all other shipping enterprises in this district are ultra-small ones operating schooners for private uses. TCSL has the head-office in Dar es Salaam and its General Manager, as the highest responsible officer, controls the whole organization including the following departments tasked with various duties and services.

1) Traffic Department

The duties of the this department are the operation of sailing schedules, cargo canvassing and cargo and passenger handling, and it is in charge of all works relating to operation of its owned two passenger-cum-cargo vessels, M/V Mtwara (650 DWT, 150 passengers) and M/V Lindi (565 DWT, 150 passengers) and one cargo vessel, M/V Mwenge, several lake-service boats and, when necessary, some chartered schooners.

2) Technical Department

This department is charged with all duties relating to maintenance and supply, such as repair,

inspection, procurement and supply of spare parts, articles of inventory and consumable stores and supply of fuel oil, lubricating oil, fresh water, provisions, etc.

3) Personnel Administration Department

This department is charged with administration of personnel on land as well as on board, labour management and training of crew.

4) Accounting Department

This department is charged with financing and accounting of the whole corporation.

5) Branches

The corporation has branches in Dar es Salaam, Mafia (Kilindoni), Kilwa, Lindi, Mtwara and Tanga, which are charged with cargo canvassing, cargo loading and unloading, cargo and passenger handling and official procedures for entry and clearance.

An over-all survey of the above-mentioned organization and the contents of businesses has cleared that there were the following various problems which need solution, rectification or improvement in connection with the introduction of the new ship.

- (a) The introduction of the new ship will cause a great increase of passenger handling business, and the present system mainly aimed to cargo handling for vessels operated on the cargo boat schedule will not be able to operate the passenger transport smoothly. It will be necessary to establish a new managing system for controlling all businesses for the operation of the new periodical service vessel.
- (b) There are visible unbalances in disposition of land service personnel among branches. In order to accommodate the augmentation of passenger handling business due to introduction of the new regular service vessel, it is indispensable

to establish a new business system in its operating division. It is advisable to improve the disposition of personnel by correcting this unbalance and not increasing personnel.

5-1-2 OPERATION AND CONTROL OF THE VESSEL

The passenger-cum-cargo vessels belonging to TCSL are engaged mainly with cargo transport and, therefore, operated on the cargo boat schedule.

In general, a passenger-cum-cargo vessel having a deadweight tonnage exceeding the number of passengers cannot be payably operated as a regular service vessel having priority for passenger service and, from such a point of view, the present manner of operation of TCSL has an appropriateness.

This fact, however, means that all services for passengers are insufficient and that the passenger transportation capacity also is insufficient in spite of existence of overflowing demands, and this fact is the basic reason for the users' discontent.

The new vessel of the present project is a passenger-cum-cargo vessel principally destined to passenger transport and, accordingly, will necessitate a new system of management suitable for operation of regular-service vessels separate from the TCSL's present system having mainly destined to cargo transport. The actual contents of operation and control of this new system are explained below.

1) Sailing Schedule

Assuming that the vessel of Proposal 1 will be put into service, a proposal of its sailing schedule is shown in Table 5-1 (a) and Fig. 5-1 (a). In order to assure a perfectly regular service, this schedule was prepared on the basis of the performance of the vessel, conditions of calling ports, routes and their distances, etc., and with due consideration for the following several points. In the actual operation, a reasonable

sailing schedule should be worked out on the basis of this proposal and taking into account the sailing schedules of the existing vessels.

- (1) Considering the distance, cruising speed and the conditions of calling ports, it is not impossible to call all intermediate ports in every service and, therefore, the sailing schedule is to be so arranged as to consist of two round-trips covering all calling ports. Mafia and Kilwa, where passenger demand is comparatively small, are to be called once (up and down) and others called twice (up and down) in the course of the two round-trips.
- (2) The hours underway include the hours of stand-by for entry and clearance.
- (3) Every round-trip includes more than 24 hours' berthing at Dar es Salaam for resting of crew, supply of fuel oil, lubricating oil, fresh water, provisions, etc., small maintenance works and recovery of sailing schedule.
- (4) When Mafia is not called the vessel should pass the east side of Mafia Island.

2) Booking and Ticketing.

The present process of booking and ticketing at various terminals of TCSL are different from one another and, from the passengers' point of view, the service is far from satisfactory. For introduction of the new vessel, it will be indispensable to introduce a new system common to all terminals for the purpose of improving the service for passengers and the efficiency of management of TCSL and getting more passengers. The details of the new booking and ticketing system is explained in Appendix 5.

3) Cargo and Passenger Handling

As the new vessel is destined to regular services, the anchoring time at the calling ports must be most efficiently utilized. Though the cargo capacity of the new vessel is so determined that loading and unloading may be possible without interference with the sailing schedule and the vessel

has a powerful cargo handling system so arranged that loading and unloading of cargo can be made within a short time without interference with embarkation and disembarkation of passengers, special care should further be taken for efficiently bringing cargo to the wharf and preparation for loading.

Now, same spaces of wharves are used for passengers' booking, ticketing, waiting, embarkation and disembarkation and for cargo handling by means of trucks and fork lifts. At the time of introduction of the new vessel, the passengers will be greatly increased and, without remarkable improvement, smooth operation will become impossible due to danger and low efficiency. Accordingly, each terminal should, at least, have the minimum indispensable installations, such as spaces for passenger handling, partitions, etc.

4) Tele-Communication System

A SSB radio-communication system is in service among the TCSL head-office and branches. In addition, the Ports of Dar es Salaam, Tanga, Mtwara and Zanzibar have VHF radio-communication systems. These tele-communication systems, however, are not fully utilized at present. It will be necessary to introduce a certain standardized system of tele-communication for the control of operation of the ship including maintenance of safe and regular operation and smooth handling of cargo and passengers.

5-1-3 SHIP'S CREW

1) Crew of New Ship

Assuming that the new ship of Proposal 1 will be put into service, a model of complement necessary for passenger and cargo services is shown below:

Deck Department:

Master	1
Chief officer	1
2nd officer	1
3rd officer	1
Boatswain	1
Able seaman	3
Ordinary seaman	3

Engine Department:

Chief engineer	1
1st engineer	1
2nd engineer	1
3rd engineer	1
No.1 oiler	1
Oiler	3
Wiper	1

Steward Department:

Purser	1
Chief steward	1
Chief cook	1
2nd cook	1
Steward	3
Junior cook	1
Mess-man	2
Sweeper	2

Officers	9
Petty officers	3
Subordinate	20
Total	32

The duties of these members on board are stated in Appendix 5 .

2) Training of Crew

In the normal practice, officers should have graduated mercantile marine schools, learned the practical technique as cadets on board and got qualifications, or have long served as ratings on board to learn the practical technique. In Tanzania, however, there are few chances of getting such an education and, accordingly, some quick training process will have to be studied for getting crew of the new ship.

A model of this schedule is explained below.

- (1) The master and chief engineer should be selected from among TCSL officers and engineers having long experiences and high techniques and, in addition, suitable foreign adviser or advisers will accompany on board to give practical guidances and instructions.
- (2) The chief and 2nd officers and 1st and 2nd engineers should be selected from among TCSL officers and engineers in accordance with their experiences and techniques.
- (3) The 3rd officer and engineer should be selected from among TCSL cadets having long experiences on board.
- (4) At least half of subordinates should have experiences on board other ships.
- (5) In the building period, all officers and petty officers should be dispatched to the shipyard for basic training for operation of machinery and equipment on board and the ship herself.
- (6) During sailing home to Tanzania, all these dispatched members should be on board the ship for training for operation of the ship and machinery and equipment on board. The officers and crew responsible for sailing home will serve as trainers.

5-1-4 MAINTENANCE

It is most indispensable to keep the vessel in the best condition for safe and economical operation and the principal purpose of maintenance is to realize the highest effectiveness at the lowest cost in relation to docking repairs, inspections and minor repairs, in addition to maintenance works to be performed as daily duties of the crew. Now, such small repair and maintenance works of TCSL vessels are carried out mostly by the ship's hands and this is a very effective and profitable manner of maintenance. If all small repair and maintenance works which can be taken in hand by the ship's crew are carried out by the ship's hand and, further, periodical inspections are appropriately conducted, it will be possible to prevent most troubles from occurring.

With the exception of Port of Dar es Salaam, running repair is almost impossible in all ports in the Tanzanian coast. Further, the ability of the running-repairers in Dar es Salaam are practically limited to iron works only and there are small docks capable of receiving schooners only and, accordingly, the ship must call foreign ports for docking repairs including cases where large repair works are needed. A suitable small dry dock or floating dock should be planned in future so that docking repair works may be possible in Tanzania.

In addition, supply of spare parts is very important in relation to maintenance and repair and, as they need long time for importing, it is necessary to take necessary measure for obtaining and keeping such spare parts in advance.

5-1-5 SUPPLY

As for the system of supply of spare parts and sotre articles most of these items are imported goods needing long time for importing and importing procedures and, therefore, stock a certain quantity of them and their early ordering should be studied because these

items are in direct relation to the operation of the ship. Supply of provisions, fresh water and general consumables seems to involve no particular problem. Supply of fuel oil is carried out by tank trucks and, accordingly, takes a long time. Supply of all these items is possible only in the Port of Dar es Salaam and it is impossible in other ports with the exception of Zanzibar where supply except fuel oil is possible.

The operation of the supply system in the Port of Dar es Salaam is carried out generally in a normal manner and occurrence of any serious problem is not anticipated even at the time of introduction of the new ship. However, the sailing schedule must be very carefully constructed because supply of goods is impossible in other ports. Further, spare parts should be ordered at the possible earliest stage and appropriate arrangement should be made to perform supply of a great quantity of food and fresh water.

5-2 ACTUAL STATES OF NAVIGATION AIDS AND PORTS

5-2-1 NAVIGATION AIDS

Navigation aids in the coasts, such as light houses, light beacons, light buoys and fareway buoys, are generally insufficient in number and, in addition, their maintenance is so inadequate that many lighting equipment are out of operation.

Navigation aids in and around the Ports of Dar es Salaam and Zanzibar are comparatively many in number and generally well maintained, while those in the south of Dar es Salaam are not sufficient in number nor satisfactory in maintenance. In and around the Ports of Mafia, Kilwa, Lindi and Mtwara, many navigation aids are out of action or have been missed or dislocated, and entry and departure in the night-time are very difficult or, more exactly, extremely dangerous. For this reason, entry into the Ports of Mafia, Kilwa and Lindi is forbidden in the night-time and entry into the Port of Mtwara is restricted (practically forbidden) from 22:00 to 06:00.

For the navigators, navigation aids out of action or those missed or dislocated will cause much larger anxiety than the fact that they are few in number.

Before introduction of the new ship, these navigation aids in trouble, missed or dislocated should have been repaired, recovered or relocated. When all navigation aids to be lit have been lit, navigation will be safe and entry and departure in the night-time will be possible even in the night-time, which will result in improvement of operational efficiency of the new ship and existing ships and a remarkable augmentation of their whole transportation capacity. In other words, restoration of the existing navigation aids is much more urgent than the additional installation of new ones, and such restored navigation aids should always be kept in good working conditions.

In addition, it is recommended to add radar reflectors to the important navigation aids along the running routes. These will be very useful for navigation by radar in the night-time or when visibility is poor.

5-2-2 PORT INFORMATIONS

"Port Informations" is a general naming of various necessary informations relating to entry into a port, such as entry route, marks for entry, conditions of anchorage and berths, water depth, harbour equipment, conditions and capacity of cargo handling, possibility of supply, restriction of entry and departure, etc.

These Port Informations are stated in details in the Appendix 5 and their general features are stated hereinafter.

1) Port of Dar es Salaam

This city is the capital of the United Republic of Tanzania

and is a good port having a long history as an international port. As for the wharf for exclusive use of TCSL, however, it has a small space sufficient for berthing only one vessel owned by the corporation. The cargo handling work is comparatively smooth at present, but the site of cargo handling and warehouses are crowded with passengers who have no particular waiting spaces and, therefore, very dangerous. As a heavier congestion may be expected after introduction of the new ship, new building of a passenger terminal or any comparable improvement will be a most urgent matter.

2) Port of Mtwara

This is the largest port in the Southern Coastal Area of this country playing an important role as the entry into the southern inland districts. The conditions of harbour equipment and routes are generally good except that entry and departure are forbidden from 22:00 to 06:00 because navigation aids along the entry routes and in the ports are not lit. After restoration of these navigation aids, this port will be a very good port.

3) Port of Lindi

Among various ports in the southern coast, this is a port having an importance next to Mtwara and handling a great quantity of cargo. However, this port has a weak point that berthing is possible in the high tide only because the water depth around the jetty is very small. The port will doubtlessly be improved if the jetty will be elongated and enlarged and the shallow places be dredged, but the cost and time for such work will be a big problem.

As the anchorage has a sufficient depth, it may be preferable to carry out embarkation and disembarkation at the anchorage. Most of navigation aids are not lit in this port and entry and departure from sunset to sunrise are forbidden.

4) Port of Mafia (Port of Kiliondoni)

This port is an open road and has nothing to be named harbour facilities. The greater problem is the shallowness of water causing inconvenience in embarkation and disembarkation of passengers, as stated in Appendix 5.

Considering the existing circumstances, it will be concluded that building of a causeway and introduction of a shallow draft boat for communication between the ship and this causeway may be the most urgent matters. These will be explained in details in Appendix 5.

5) Port of Kilwa

This is a good port having sufficient water depth. The courses are so deep and simple that entry and departure are easy. Light beacons are not in action at present and entry and departure in the night-time are forbidden, but they may be possible by radar navigation.

6) Port of Zanzibar

This is the only international port in the Zanzibar Island, and the port facilities and navigation aids are generally in good conditions. Any particular problem will be expected in relation to introduction of the new vessel.

7) Port of Tanga

This is the northernmost international trade port of the United Republic of Tanzania and has satisfactory port facilities. However, the wharves are exclusively for barge use because the water depth therearound is too small. All entering ships must lie at anchor for cargo handling. The new ship will likewise have to lie at anchor and the passengers will have to utilize sampans. Nevertheless, the port has necessary sampans and passenger terminals and, accordingly, will involve no particular problem.

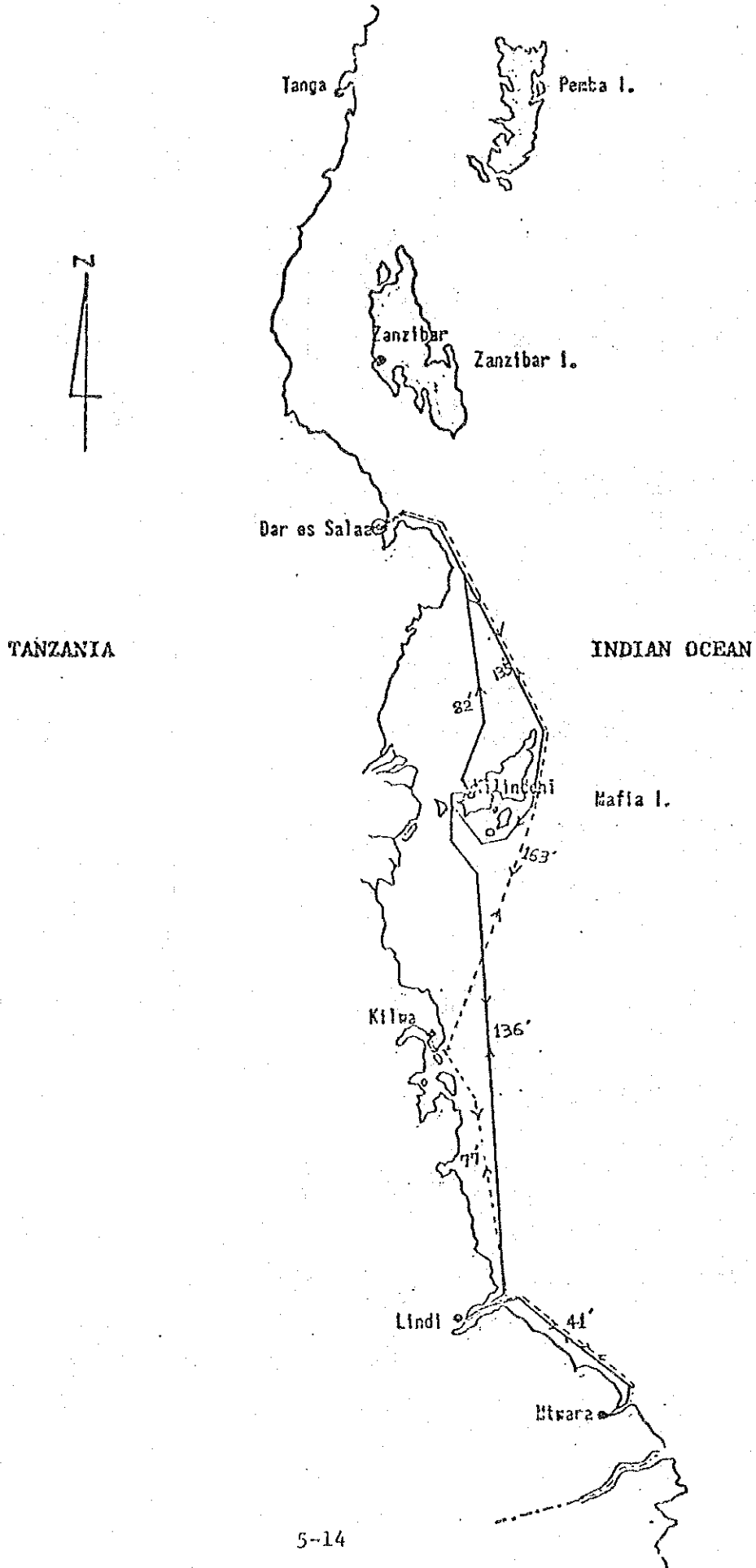
Tab 5-1 (a)

SAILING SCHEDULE

DAY	PORT OF CALL	ETA ETD	DISTANCE	HOURS UNDER- WAY	HOURS IN PORT	Remarks
1st	Dar es Sallam	0800	82'	6 ^h -30	3 ^h -00	↑ Voy. No.1 ↓
	Mafia	1430 1730				
2nd	Lindi	0700 1000	136'	13 ^h -30	3 ^h -00	
	Mtwara	1330 0800	41'	3 ^h -30	18 ^h -30	
3rd	Lindi	1100 1700	41'	3 ^h -00	6 ^h -00	
	Mafia	0700 1000	136'	14 ^h -00	3 ^h -00	
4th	Dar es Salaam	1600 1800	82'	6 ^h -00	26 ^h -00	
	Kilwa	0700 1000	163'	13 ^h -00	3 ^h -00	
5th	Lindi	1630 0900	77'	6 ^h -30	16 ^h -30	
	Mtwara	1230 1000	41'	3 ^h -30	21 ^h -30	
6th	Lindi	1300 0800	41'	3 ^h -00	19 ^h -00	
	Kilwa	1400 1730	77'	6 ^h -00	3 ^h -30	
7th	Dar es Salaam	0700	163'	13 ^h -30		
		0800 ↓ same as Voy. No.1				
8th	Total (10days)		1,080'	92 ^h -00	123.00	

SHIPPING ROUTE

Fig 5-1(a)



6. FINANCIAL ANALYSIS

6-1 FARE SCHEDULE

6-1-1 BASIC CONCEPT OF FARES

The fares should be determined at such levels as to assure safety and ample services for customers in passenger and cargo transportation and cover the expenses for operation. Further, these fares at proper levels in the national economy and also in comparison with other competitors.

6-1-2 PASSENGER FARES

The current passenger fares of southern coastal services of TCSL are shown in Table 6-1 (a)

Table 6-1 (a)
Current Passenger Fares (Shils)

	Dar es Salaam				
A	45	Mafia			
B	30				
C	15				
A	69	36	Kilwa		
B	46	24			
C	23	12			
A	99	66	33	Lindi	
B	66	44	22		
C	33	22	11		
A	108	75	48	18	Mtwara
B	72	50	32	12	
C	36	25	16	6	

Examinations from various angles have cleared that this current system of passenger fares would be far from covering the operating expenses and would inevitably need upward modification. (Refer to the FRR values and sensitivity analyses of the current fares, clause 6-5, FRR analysis).

The current fare between Dar es Salaam and Mtwara of bus - competitor of ships - is 72 Shillings for the coastwise route and, further, the new ship can afford much improved services in passenger transportation. Considering these conditions, it is advisable to raise the level of passenger fares within the widest range of possibility.

Four tentative modes of fare modification are shown below. The fare modification should be made according to one of these proposed modes or any mode combining the proposed ones with due consideration for the financial aspect of TCSL, the national economy and other relating conditions.

Fare Modification Proposal 1:

Rise of 20% at every 4th year.

Fare Modification Proposal 2:

Rise of 6% every year.

Fare Modification Proposal 3:

Rise of 50% in 1st year, additional rise of 50% after 10 years.

Fare Modification Proposal 4:

To be doubled

These modified fares should be subject to equity adjustment when the operating costs rise due to the rise of general prices.

6-1-3 CARGO FREIGHT

The current cargo freight is not low in comparison with the passenger fares and, therefore, needs no modification. If the operating costs rise due to the rise of general prices, the freight should like wise be subject to equity adjustment.

6-2 ESTIMATION OF INCOME

6-2-1 PASSENGER FARES

(1) Fundamentals of Calculations

Current Fares (Dar es Salaam to Mtwara)

Class	Fare	No. of Passengers	Total income of fare
A (Cabin)	108	30	3,240
B (Reclining seat)	72	60	4,320
C (Settee)	36	310	11,160
Total		400	18,720

(2) Coefficients of Fullness between Calling Ports

There are three calling ports between Dar es Salaam and Mtwara and the coefficients of fullness between these ports are estimated from the results of demand estimation as follows:

Dar es Salaam					
13.55%	Mafia				
7.28%	0.87%	Kilwa			
20.82%	1.50%	0.78%	Lindi		
51.46%	1.98%	1.75%	0%	Mtwara	

(3) Passenger Fare Income Based on Full-Passenger between Calling Ports

Assuming that the coefficients of fullness between calling ports are as shown in (2) above, the income due to passenger fares is estimated from (2) above and the basic fares shown in (1) above as follows:

		Rate of fare	Coef. of fullness	Income per Service (full pass.)
From/to	To/from Mafia	41.59%	13.55	1,055
Dar es Salaam	" Kilwa	64.13	7.28	874
	" Lindi	91.88	20.82	3,581
	" Mtwara	100.00	51.46	9,633
From/to	To/from Kilwa	33.42	0.87	54
Mafia	" Lindi	61.16	1.50	172
	" Mtwara	69.33	1.98	257
From/to	To/from Lindi	30.66	0.78	45
Kilwa	" Mtwara	44.35	1.75	145
Total				15,816

(4) Coefficient of Utilization

The estimated demand of passenger transport is shown in Table 2-3 (b). The coefficient of utilization of the new ship based on her passenger capacity is to be estimated at 85% on the yearly average.

(5) Estimated Income due to Passenger Fare

Based on these values, the yearly incomes due to passenger fare are estimated as follows:

Fare Modification Proposal 1:-

1st year to 4th year	2,161,000 Shs
5th year to 8th year	2,593,000
9th year to 12th year	3,112,000
13th year to 16th year	3,735,000
17th year to 20th year	4,481,000

Fare Modification Proposal 2:-

1st year	1,909,000 Shs
2nd year	2,024,000
⋮	⋮
20th year	5,776,000

Fare Modification Proposal 3:-

1st year to 10th year	2,702,000 Shs
11th year to 20th year	4,052,000

Fare Modification Proposal 4:-

1st year to 20th year	3,602,000 Shs
-----------------------	---------------

6-2-2 CARGO FREIGHT

Assuming the coefficient of utilization in cargo transportation at 60% of the cargo carrying capacity of the new ship, the income due to cargo freight is estimated as follows:

$$250 \text{ pay-ton} \times 200 \text{ Sh} \times 0.60 \times 134 = 4,020,000 \text{ Shs}$$

6-2-3 INCOME DUE TO SALES ON BOARD

The income due to selling food, drinks, etc. on board the ship is to be assumed at 2 Shs per passenger.

$$2 \text{ Shs} \times 400 \times 0.85 \times 134 = 91,000 \text{ Shs}$$

6-3 ESTIMATION OF COST

6-3-1 OPERATION COST

(1) Cost of Fuel Oil

The cost of fuel oil is to be calculated on the basis of the current unit price and the required yearly consumption, the latter being calculated on the following bases:

Main engines : Total running hours according to sailing schedule and the power corresponding to cruising speed.

Aux. engines : One set being continuously running at 85% rating.

(2) Port Charge

This is the charge needed for every calling of port, and is to be estimated on the basis of sailing schedule.

(3) Cost of Fresh Water

The consumption of fresh water is to be calculated on the bases of the yearly days of operation and the respective consumption rates for the crew, cabin class passengers and tourist class passengers. The yearly cost of fresh water is to be obtained as the product of this yearly consumption and the current price of fresh water delivered at wharf of Dar es Salaam.

(4) Other Charges

The total of charges other than those stated above is normally estimated at about 4% of the operation cost and this rate is to be used for estimation. This value is considered to be appropriate as compared with the experiences of TCSL.

6-3-2 SHIP'S CHARGE

(1) Personnel Expenses

These contain various additional allowances, cost of cloths, food cost, etc., in addition to wages, and are estimated on the basis of current expenses of TCSL.

(2) Cost of Inventory

It is to be assumed that the ship will have a sufficient quantity of articles of inventory at the time of delivery and will not need additional articles for a period of first three years. In and after the fourth year, new supplementary supply will be needed and its yearly cost is estimated at about 0.7% of the building cost, which nearly coincides with the experiences of TCSL.

(3) Cost of Lubricating Oil

The consumption of lubricating oil corresponds to that of fuel oil and, therefore, its cost is to be calculated in the same manner as that of fuel oil.

(4) Cost of Maintenance and Repair

The cost of maintenance and repair in the first year is assumed to be very small. This cost in and after the second year is to be calculated in relation to the tonnage. This cost contains the charge for docking. The cost of maintenance and repair accompanying the periodical survey required in every fourth year is assumed to be 50% higher than that of the ordinary year.

(5) Insurance

The insurance premium is assumed at 1.25% of the current book-value. As the premium rate is raised with years from eighth year of life on according to the normal practice, the rate is assumed to be unvaried.

6-3-3 MANAGEMENT COST, ETC.

The management cost, etc. include expenses for personnel (officials and employees), offices, welfare, traffic, communication, taxes, etc., and also advertising expenses if they are comparatively small. These charges are to be estimated on the basis of the experiences of TCSL.

6-4 BALANCE MODELS

The balance models of estimated yearly incomes and expenditures for the Alternative Ship Proposal 1 in Tables 6-4 (a), (b), (c) and (d) for the four modes of Fare Modification Proposal.

All these models assume that the life of project will be 20 years and no economical fluctuation will be expected because these calculations are basic ones.

Although the economical life of a ship cannot be measured according to simple principle, the life of passenger ship or passenger and cargo ship is generally longer than that of a cargo ship or a tanker. In the present project, the life can be properly estimated at 20 to 25 years when many past examples and the existing conditions in Tanzania are taken into account, and a life of project of 20 years is to be assumed in the present financial analysis.

6-5 FRR ANALYSIS

In this project, there is an investment at its beginning and, after the commencement of service, income and expenditure will occur in parallel and the difference of these will remain as the pure profit every year. There are several methods of comparing this pure profit with the invested capital for the purpose of judging the effectiveness of investment. In this case, the "INTERNAL RATE OF RETURN" (IRR) method, a method most widely used for such an analysis, is to be used for this purpose.

$$\sum_{i=1}^n \frac{B_i - C_i}{(1 + d)^i} = 0$$

Where B_i : Income in i -th year

C_i : Investment and cost in i -th year

d : Internal rate of return

BALANCE MODEL (Proposal 1 - 20 Years)

Tab. 6 - 4 (a)

YEAR	x 1000 \$																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Passenger fare	2161	2161	2161	2161	2593	2593	2593	2593	3112	3112	3112	3112	3735	3735	3735	3735	4181	4181	4181	4381	
Cargo freight	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020
Sales	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Gross Revenue	6181	6181	6181	6181	6704	6704	6704	6704	7223	7223	7223	7223	7846	7846	7846	7846	8592	8592	8592	8592	8592
Fuel oil	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
Port charges	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
Fresh water	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Others	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
Grew's exp.	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575
Ship's stores	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203
Lubricant	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Repair & Maintenance	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Insurance	363	311	326	308	290	272	251	236	226	216	206	196	186	176	166	156	146	136	126	116	106
Others	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Over head & Misc. exp.	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516
Gross Cost	4939	4980	4962	4963	4926	4908	4890	4872	4872	4872	4872	4872	4872	4872	4872	4872	4872	4872	4872	4872	4872
Pre-Depreciation Profit	1182	1201	1219	1087	1778	1796	1813	1832	2351	2351	2351	2201	2571	2571	2571	2824	3220	3720	3720	3720	50539
Depreciation	1735	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725
Interest	1859	983	992	880	828	776	723	673	621	569	518	466	414	362	311	259	207	155	101	52	
Balance	1578	1507	1338	1518	775	705	636	716	5	57	108	100	893	887	938	810	1788	1840	1891	1813	
Accumulated Acc.	1578	3085	1573	6011	6816	7521	8157	8873	8811	8811	8703	8593	7858	5271	6037	5193	3105	1563	326	5180	

BALANCE SHEET (Proposed 1 - 20 Years)

YEAR	x 1000 sh																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Passenger fare	3000	2921	2845	2771	2710	2655	2708	2871	3043	3225	3419	3624	3841	4072	4316	4573	4850	5141	5446	5774	
Cargo freight	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	
Sales	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	
Gross Revenue	8020	8135	8256	8383	8521	8666	8819	8987	9165	9356	9550	9755	9972	10201	10442	10695	10960	11237	11526	11827	155335
Fuel oil	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	
Port charges	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	
Fresh water	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Others	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	
Crew's exp.	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	
Ship's stores	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	
Lubricant	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	
Repair & Maintenance	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	
Insurance	363	311	326	308	300	272	254	236	226	216	206	196	186	176	166	156	146	136	126	116	
Others	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
Over head & Misc. exp.	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	
Gross Cost	4999	4900	4962	5095	5256	5438	5630	5832	6045	6268	6501	6754	7027	7310	7603	7906	8219	8542	8875	9218	98545
Pre-Depreciation Profit	1021	1135	1201	1281	1366	1456	1550	1648	1751	1859	1972	2090	2213	2341	2479	2627	2785	2953	3131	3319	56790
Depreciation	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	
Interest	1035	983	932	880	828	776	725	673	621	569	518	466	414	362	311	259	207	155	104	52	
Balance	1730	1553	1363	1211	958	713	521	338	70	170	315	522	811	1224	1519	1800	2157	2400	2568	6098	
Accumulated Acc.	1730	3283	4646	5857	6925	7870	8701	9429	10052	10572	11099	11632	12171	12716	13267	13824	14387	14956	15531	16112	11508

BALANCE MODEL (Proposal 1 - 20 Years)

YEAR	x 1000 BA																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Passenger fare	2702	2702	2702	2702	2702	2742	2702	2702	2702	2702	2702	4052	4052	4052	4052	4052	4052	4052	4052	4052	4052
Cargo freight	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020
Sales	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Gross Revenue	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	8163	8163	8163	8163	8163	8163	8163	8163	8163	8163
Fuel oil	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
Port charges	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
Fresh water	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Others	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
Crew's exp.	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575
Ship's stores	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203
Lubricant	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Repair & Maintenance	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Insurance	363	313	326	304	290	272	251	236	226	216	206	236	236	236	236	236	236	236	236	236	236
Others	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Over head & Misc. exp.	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516
Gross Cost	4998	4998	4998	4998	4998	4998	4998	4998	4998	4998	4998	5022	4872	4872	4872	4872	4872	4872	4872	4872	4872
Pre-Depreciation Profit	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
Depreciation	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725
Interest	1033	983	932	880	828	776	723	673	621	566	518	466	413	362	311	259	207	155	101	52	52
Balance	910	873	800	885	806	506	527	607	405	353	1048	950	1352	1201	1255	1157	1059	1311	1362	4311	4311
Accumulated Acc.	910	1801	2627	3513	4370	4775	5302	5809	6311	6857	7519	8249	9049	9917	10854	11869	12962	14134	15386	16719	18134

PAVAYON MODEL (Proposal 1, 20 Years)

Tab. 6 - 4 (d)

YEAR	x 1000 \$																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	
REVENUE																						
Passenger fare	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	7213
Cargo freight	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	8040
Sales	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	1820
Gross Revenue	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	15426
Operation exp.																						
Fuel oil	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	25600
Port charges	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	10400
Fresh water	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	420
Others	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	1540
Grew's exp.	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	31500
Ship's stores	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	4060
Lubricant	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	1820
Repair & Maintenance	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	6000
Insurance	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	7260
Others	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	1000
Over head & Misc. exp.	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	6320
Gross Cost	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998	39960
Pre-Depreciation Profit	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	2514	50280
Depreciation	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	34500
Interest	1035	983	932	880	828	776	725	673	621	569	518	466	414	362	311	259	207	155	104	52	1000	
Balance	16	25	91	11	231	301	373	283	193	517	598	500	702	551	805	707	408	981	1012	3984	10000	
Accumulated Acc.	16	21	71	87	231	626	998	1291	1786	2333	2931	3431	4133	4887	5692	6399	7308	8269	9281	10315	10000	

Tab. 6 - 4 (e) BALANCE MODEL (Proposal 1, 20 Years)

YEAR	Current																				Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Passenger fare	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	
Cargo freight	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	4320	
Sales	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	
Gross Revenue	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	
Fuel oil	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	
Port charges	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	
Fresh water	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Others	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	
Grew's exp.	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	
Ship's stores	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	
Lubricant	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	
Repair & Maintenance	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	
Insurance	363	311	336	308	290	272	254	236	236	236	236	236	236	236	236	236	236	236	236	236	
Others	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
Over head & Misc. exp.	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	
Gross Cost	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	4989	
Pre Depreciation Profit	1229	1229	1227	1125	1293	1311	1329	1347	1347	1347	1347	1347	1347	1347	1347	1347	1347	1347	1347	1347	
Depreciation	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	
Interest	1035	983	932	880	828	776	725	673	621	569	518	466	414	362	311	259	207	155	104	52	
Balance	1510	1069	1400	1480	1260	1190	1121	1291	989	917	856	794	732	670	609	547	485	423	361	299	
Accumulated Acc.	1510	3000	4400	5880	7110	8270	9071	10470	11417	12313	13207	14099	14839	15508	16115	16800	17433	17915	18315	18735	

x 1000 sh

The results of calculations are as follows:

(1) Fare Modification Proposal 1	-----	3.09%
(2) Fare Modification Proposal 2	-----	3.97%
(3) Fare Modification Proposal 3	-----	3.93%
(4) Fare Modification Proposal 4	-----	5.38%
(Ref. Current fare	-----	-1.53%)

6-6 SENSITIVITY ANALYSIS

Taking the above mentioned FRR as the standard cases, sensitivity analyses were made for some cases where some of basic factors have undergone variations. The results of these analyses are stated below:

(1) Case 1:

When both income and cost inflate by 6% every year.

(2) Case 2:

When the cost increases by 6% every year and the income is raised by 20% at every 4th year.

(3) Case 3:

When the income decreases by 10%

(4) Case 4:

When the cost increases by 10%

(5) Case 5:

When the cost of fuel increases by 10%

(6) Case 6:

When the purchasing cost of ship increases by 5%

(7) Case 7:

When the purchasing cost of ship decreases by 5%

(8) Case 8:

When the life of project is taken as 15 years.

(9) Case 9:

When the life of project is taken as 25 years.

Table 6-6 (a)
Results of Sensitivity Analyses

	Fare Modification Proposal				Current fare
	1	2	3	4	
Standard	3.09%	3.97%	3.93%	5.38%	- 1.53%
Case 1	8.57	9.44	9.31	10.75	3.22
Case 2	2.16	3.85	2.92	4.01	-18.34
Case 3	0.29	1.40	1.00	2.09	- 5.41
Case 4	1.23	2.27	2.03	3.33	- 4.51
Case 5	2.62	3.54	3.46	4.87	- 2.25
Case 6	2.76	3.64	3.56	4.93	- 1.81
Case 7	3.44	4.32	4.32	5.86	- 1.22
Case 8	- 0.50	0.13	0.98	3.17	- 4.55
Case 9	4.87	6.36	5.35	6.50	0.14

6-7 FINANCIAL EVALUATION

Financial Rates of Return for the standard case and sensitivity analysis of this Project are already mentioned in 6-6, and judging from these results, we may safely say that the project can be justified provided:

- 1) Long term low rate of interest fund can be available.
- 2) Reasonable fare rate raise can be possible.

But in any case, the profitability may not be expected so high.

In addition, the implementation of the Project is expected to visualize the hidden demand for transportation of local passenger and, a subsequently vitalize the economical activity of local southern coastal area.

Such by-product of the Project will, further, lead to various social and economical benefits which can not be evaluated by the financial aspect of enterprises only, but we can expect such items as local wage level increase as well as their higher cultural standard together with their advanced welfare.

7. ECONOMICAL EVALUATION

7-1 . METHOD OF ECONOMICAL EVALUATION

The fundamental purpose of the economical evaluation is to measure the economical cost and benefit from the point of view of national economy and form a judgement upon whether the pure benefit of the project concerned would be at least equivalent to what may be obtained from other chance of limit investment. Accordingly, it is very often probable that the economical cost and benefit may be different from the cost and income of the enterprise executing the project.

The cost and benefit in the economical evaluation are in substance, calculated on the basis of the shadow price.

7-1-1 ECONOMICAL COST

The terms of adjustment for obtaining the shadow prices of economical cost are as follows:

(1) Foreign Exchange Rates

In most cases, the official foreign exchange rates of developing countries do not accurately reflect the actual values of foreign exchanges and need certain adjustments. In this study, however, the official rate is to be used without any such adjustment because the shadow rates of foreign exchanges in Tanzania are not clear.

(2) Taxes

Indirect taxes such as sales tax, or the customs duty, are a kind of transfer and do not form an economical cost to the country, and, therefore, all taxes should be removed. In this study, the important items of cost, such as procurement of the new ship, fuel oil, ship's inventory, are exempted from taxation and, further, the portions for taxation are very small in other items of cost. Therefore, no adjustment for taxation will be necessary.

(3) Wages

In countries where the rate of unemployment is at a high level and the imperfect employment expands widely, it is often probable that the cost of labourers may be lower than the wages actually payed. In this study, no particular adjustment is needed because the wages of ship's crew of TCSL are not so much different from those of seamen in Tanzania.

7-1-2 ECONOMICAL BENEFIT

The measurement of economical benefit of a traffic project is much more difficult than that of economical cost for the following reasons.

- There are no market prices for the comfortability, convenience, contraction of time, etc. and these cannot be expressed by the units of currencies.
- The effectiveness of investment extends over a long time and a great number of people and, accordingly, a very long forecast is needed.
- In order that indirect benefit such as impact to the economical activities can be realized, investments in fields other than the traffic are often needed.

In this analysis, the economical benefit is to be calculated in a simple manner using the shadow price of traffic service with due consideration for the following factors.

(1) Difficulty in Realizing Other Alternative Systems of Traffic

At the present stage, the mass transportation systems available for the general public in the Southern Coastal Area are busses and ships, and both of these are in constant insufficiency of capacity and need rapid improvement. Though the air transport system has some room in reserve, it cannot be a traffic means for the multitude because of

high cost and, further, private cars cannot come into wide use because of the low level of national income. Though the bus transport is the only means of traffic that can be compared with marine transport, a study on the bus transport clears that, due to the bad road conditions, the regular operation of busses will be possible only after amelioration or new construction of highways, which will need a massive investment and a long time. Therefore, the transportation by busses cannot be an appropriate alternative system of traffic at the present stage. Summarizing these studies, it will be concluded that the only possible measure to be taken for improving the passenger transport in the Southern district in a short time is the introduction of a ship.

(2) Introduction of Shadow Prices

The shadow price is the equivalent to be payed by the user to the traffic service and, theoretically, can be measured by the demand function of the user to the transportation service.

In the real case, however, the particularization of the demand function is difficult and, as far as the passenger fares are concerned, it is assumed, for simplification, that those of busses, which are considered to be in competition with ships, are nearly same as the shadow prices.

First, the mean of bus fares between Dar es Salaam and Mtwara via the coastal link road and the inland route via Songea is to be calculated. Then, assuming that an additional cost for access of 5% will be needed for sea transport as compared with bus transport, a value equal to the above-mentioned mean price reduced by 5% is to be regarded as the shadow price of transport by the new ship between Dar es Salaam and Mtwara.

Dar es Salaam - Mtwara (coastal link road)	72 Sh
Dar es Salaam - Songea - Mtwara (inland route)	203 Sh
	137.5 Sh
Mean	

$$137.5 \times 0.95 = 130.6 \text{ Sh}$$

As for the cargo freight, the current TCSL freight (200 Sh/ pay-ton) is to be regarded as the shadow price, because the cartage of trucks, which are in competition with ships, is not clear.

(3) Case Analysis

The economical aspect of the present project is to be analysed and evaluated by introduction of the aforementioned shadow prices, and, for this purpose, the economical rates of return are to be calculated for the standard case (all benefits and costs being same as those expected) and the following several different cases.

- Case 1 : Standard case (Life of project of 20 years)
- Case 2 : When economical benefit decreases by 10%
- Case 3 : When economical cost increases by 10%
- Case 4 : When the life of ship is taken as 15 years.
- Case 5: When the life of ship is taken as 25 years.

7-2 RESULTS OF CALCULATION OF ECONOMICAL RATES OF RETURN

The results of calculation of the internal economical rates of return for the above cases are as follows:

(1) Case 1 (Standard case)	-----	12.33%
(2) Case 2	-----	8.91%
(3) Case 3	-----	10.57%
(4) Case 4	-----	10.86%
(5) Case 5	-----	12.96 %

7-3 EVALUATION OF ECONOMICAL ANALYSIS

The standard of economical evaluation is based on the opportunity cost of capital, which, in the present case, is to be assumed at 12%. The results of the above calculation can be evaluated as being ACCEPTABLE because the value for the standard case exceeds this standard.

8. RECOMMENDATIONS

The main bodies of execution and operation of the present project have already been stated in this Report.

In execution the present project there are several matters to be studied not only by NTC and TCSL but also by the Government of Tanzania and, in order that it may be executed in a satisfactory form, adequate considerations must be given to all such matters. Most of these matters have already been discussed or described in details in this Report, and important items of them are summarized hereinafter.

- 1) The vessel to be built under the present project should be a passenger-cum-cargo vessel of about 1,000 G.T., capable of carrying about 400 passengers and about 250 pay-tons of cargo at a cruising speed of about 13.5 knots. The Outline Specification and the General Arrangement plan of the proposed vessel are included in appendix 2.
- 2) The term of redemption of the capital fund for execution of the project should be 20 years or longer, and its interest should be as low as possible.
- 3) The passenger fares should be modified upwards with due considerations for the financial aspect, the national economy, the bus fares, etc. These modified fares should further be subject to equity adjustment taking into account the rise of general prices.
- 4) It is advisable that the finance concerned with the new vessel may not be charged with financial burdens due to other departments of TCSL.
- 5) In building the new vessel of the present project, it is recommended to appoint a technical consultant to consult about the building work, sailing home and training of crew.
- 6) The new vessel should be operated as a regular service vessel should have a priority in the use of wharves at the calling ports.
- 7) For the improvement of service for passengers, it is recommended to rationalize the booking and ticketing system, ameliorate the notices and improve the waiting spaces and the embarking and disembarking systems.

- 8) Most of officers and petty officers to be on board should be dispatched to the shipyard for a properly long period before the completion and, then, they should be on board the vessel on the way home to Tanzania, for the purpose of getting at least the minimum indispensable knowledges and training for operation of the vessel and machinery.
- 9) The navigation aids in and around the calling ports, such as beacons, light floats, etc., which are out of action or have been missed or dislocated, should be restored as soon as possible to permit arrival and departure in the night-time so that the operational efficiency of the new ship and existing ships can be remarkably improved. In addition, new installation of radar reflectors is very recommendable.
- 10) In the Port of Kilindoni in Mafia Island should have a simple causeway and a shallow draft boat for landing of the passengers.

THE PUBLIC CORPORATIONS ACT. 1969

(No. 17 OF 1969)

APPENDIX 1

ORDER

Made Under Sections 3, 5 and 11

THE NATIONAL TRANSPORT CORPORATION (ESTABLISHMENT)

ORDER, 1969

1. This Order may be cited as the National Transport Corporation (Establishment) Order, 1969.
2. In this Order, unless the context otherwise requires
"the Act" means the Public Corporations Act, 1969;
"Board" means the Board of Directors provided for in paragraph 5;
"the Corporation" means the National Transport Corporation established by paragraph 3;
"inland waterway" means any lake or river;
"Minister" means the Minister for the time being responsible for transport.
3. There is hereby established a public corporation to be known as the National Transport Corporation.
4. The functions of the Corporation shall be-
 - a) to provide the development of means of carrying goods and persons or both goods and persons by land, sea, inland waterway or air;
 - b) to conduct or engage in the business of carrying for hire or reward persons or goods, or both persons and goods, by land, sea, inland waterway or air;
 - c) to conduct or engage in any other business which, in the opinion of the Board, appertains to, or is expedient or convenient for enabling the Corporation to conduct or engage in, any of the businesses specified in sub-paragraph (b);

- d) to establish branches and to carry on business within the United Republic or elsewhere;
 - e) to acquire by agreement and hold interests in any business specified in this paragraph which is being conducted by any person or in which any person is engaged;
 - f) to manage the business and affairs pertaining to any business of any person which, or an interest in which, has been transferred to, or accrued by, the Corporation under the provisions of the Act or this Order;
 - g) to do all such acts and things as are, in the opinion of the Board, necessary, expedient or convenient to enable the Corporation to carry on any business specified in this paragraph according to good business practice, to uphold and support the credit of the Corporation, to obtain and justify public confidence, and to avert or minimize any loss to the Corporation;
 - h) to do any thing or enter into any transaction which, in the opinion of the Board, is calculated to facilitate the proper and efficient carrying on of the activities of the Corporation and the proper performance of its functions as specified in this paragraph.
5. (1) The management of the Corporation is hereby vested in a Board of Directors.
- (2) The Board shall consist of-
- (a) a Chairman who shall be appointed by the President;
 - (b) such other members being not less than five nor more than nine as the Minister may appoint, one of whom he shall nominate as its vice-chairman.
- (3) There shall be a general manager of the Corporation who shall be appointed by the President.
- (4) The Board may from time to time appoint on such terms and conditions as it thinks fit such officers and servants of the Corporation as may be necessary for conducting the business of the Corporation.

- (5) The Chairman and other members of the Board shall be entitled to such allowances and at such rates as the Minister may from time to time prescribe.
 - (6) The Minister may make regulations with respect to-
 - (a) the appointment of and the tenure and vacation of office by the members of the Board;
 - (b) the quorum, proceedings and meeting of the Board and determinations of the Board.
 - (7) Subject to the provisions of any regulation made under sub-paragraph (6) the Board shall have power to regulate their own procedure.
 - (6) All salaries, fees and other allowances whatsoever payable to the Chairman, a member of the Board, the General manager and other officers and servants of the Corporation, shall be paid out of the funds of the Corporation.
- 7.
- (1) The Seal of the Corporation shall be affixed by the Chairman, the Vice-Chairman or the general manager and witnessed by one other member of the Board.
 - (2) All contracts, guarantees, agreements, bonds, authorities, mortgages, charges, bills of exchange, promissory notes, bank drafts, letters of credit, securities and other instruments whatsoever to which the Corporation is a party, shall be executed on behalf of the Corporation-
 - (a) by the general manager and a member of the Board; or
 - (b) by such other person or persons as may be authorized by the Board in that behalf:

Provided that the general manager may, in writing, delegate his function under this sub-paragraph to any officer of the Corporation.

8. Subject to the provisions of any regulations relating to quorum made under sub-paragraph (6) of paragraph 5, the Board may act notwithstanding any vacancy in the membership thereof and no act or proceeding of the Board shall be invalid by reasons only of some defect in the appointment of a member or a person who purports to be a member, or, where such Regulations provide for the appointment of such alternate member or a person who purports to be such alternate member.

9. The Corporation may from time to time borrow such sums of money as it may require to meet any of its obligations or for the purposes of its business.
10. (1) The powers conferred on the President by section 6 of the Act are, in relation to the Board, hereby delegated to the Minister.
- (2) The Minister is hereby designated as the Minister for the purposes of the provisions of subsection (3) or section 7 of the Act which relates to the accounts of the Corporation.

Dar es Salaam,
19th September, 1969

J.K. NYERERE,
President

G. T. 1,000 TONS PASSENGER CUM CARGO VESSEL

OUTLINE SPECIFICATION

PART 1. HULL

1. GENERAL DESCRIPTION

The vessel shall be a twin-screw, diesel-propelled, passenger-cum-cargo boat intended for transportation of passengers and general cargo in regular service along the coast of Tanzania.

The vessel shall have a complete continuous freeboard deck, named "Main Deck", a short forecastle, a long poop, a deckhouse in two tiers on the poop deck, a raked stem and a cruiser stern. The passenger spaces shall be arranged on the poop deck forward for the cabin class, under the poop deck forward for the reclining seat tourist class and under the poop deck aft and under the main deck aft for the economy class, respectively, as shown on the General Arrangement plan. Two cargo holds shall be arranged under the main deck forward, each having a cargo hatch served by a derrick boom operated by three electro-hydraulic winches on the single swing-boom system.

The vessel shall be subdivided so that flooding into any one compartment may not cause submergence of the margin line, assuming that the permeabilities of flooded compartments be same as those prescribed in the International Convention for the Safety of Life at Sea, 1960.

The vessel shall be designed, constructed and fitted out under the special survey by and to the classification requirements of the Nippon Kaiji Kyokai for obtaining the class notations, NS* (Coasting service) and MNS* and also in compliance with the Japanese Law for the Safety of Ships and its related regulations.

2. PRINCIPAL DIMENSIONS

Length, overall	about	67.50 metres
Length between perpendiculars		61.00 metres
Breadth, moulded		11.00 metres
Depth, moulded		4.30 metres
Load draught, moulded, designed		3.00 metres
'Tween-deck heights :		
Main deck to forecastle deck		2.10 metres
Main deck to poop deck		2.40 metres