

INTRA — ISLAND SHIPPING IN HA'APAI
- Issues Relating to Private Boat Operations

JOINT PUBLICATION OF THE CENTRAL
PLANNING DEPARTMENT AND THE
STATISTICS DEPARTMENT OF THE
KINGDOM OF TONGA.

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1982.

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ACKNOWLEDGEMENTS

The survey on which this study is based, was made possible with financial assistance from Central Planning Department.

Mr James Barton of the Statistics Department, assisted in the design of the survey questionnaire. Invaluable assistance in the actual fieldwork was provided by Mr Tevita Vaipuna of the Central Planning Department.

We would also like to record our gratitude to the Honourable Ve'ehala, Governor of Ha'apai, for allowing one of his staff, Sione Afeaki, to very ably assist throughout the field work.

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SUMMARY

The need to improve intra-island shipping services in the Ha'apai region has become evident. An ad-hoc survey relating to existing boat operations in Ha'apai, was carried out by Central Planning Department during February 1982. This study is based on the results of this survey.

1. Passenger and Cargo movements

- Results indicate that the bulk of intra-island passenger and cargo flows are either to or from Lifuka (approx. 75% of all cargo movements and 74% of all passenger movements respectively).
- Conservative estimates of the intra-island flow of cargo to and from Pangai were established at around 1,000 tons/annum.
- A high correlation between the size of passenger flow and cargo movement to Pangai and the number of boats stationed on each island of trip initiation was established. The more boats stationed on an island the higher the volume of cargo and passenger movements.
- The geographic location of islands has a great bearing on the direction of cargo and passenger movements. A strong tendency for passenger and cargo movements from the Nomuka and Ha'afeva districts to favour the Tongatapu direction was established. This has been reinforced by the fact that:
 - a) Copra purchased at the Ha'afeva and Nomuka copra stations is shipped directly to Tongatapu.
 - b) "Falekoloas" located on all islands excluding Ha'ano, Mo'unga'one and Lofanga, obtain their wholesale supplies from Nuku'alofa.

Similarly there is a strong tendency for cargo and passenger movements from the Northern sub group of Ha'apai to favour the Lifuka direction.

- Route coverage (of boats surveyed) is extremely low (Boats tend to stick to 1 or 2 particular routes) and confined mainly to routes linking with Pangai.

2. Views of boat owners

- Nineteen out of twenty-two boat owners had favourable views towards the possible introduction of an intra-island vessel.
- Some felt that present services were not meeting cargo and passenger flow demands and present services were unreliable.
- It was suggested that a boat with freezer or cold storage facilities be introduced to stimulate growth of the fishing industry.

3. The provision of intra-island shipping services in the Ha'apai Group is inadequate. While demand for cargo and passenger movement is not being met, boats surveyed were often found not to be running at full capacity. The dimensions of the problem extend to such things as the fact that boats are also used for fishing, boatowners are fulfilling both economic and social functions and boats tend to be confined to a very limited number of routes in specific areas. Direct intervention by Government into intra-island shipping in Ha'apai is called for to improve:

- efficiency and management of boat operations
- regularity and reliability of services
- safety aspects of services.

This study recommends the following:

- That a new vessel be introduced. This should have a cargo capacity of around 15-20 tons and a passenger capacity of at least 50. This vessel would be used mainly to cater for the Ha'afeva, Nomuka, Pangai routes.
- In addition to this a smaller boat is needed with a cargo capacity of 10 tons and a passenger capacity of 30. This boat would cater for the Pangai, 'Uiha, Ha'ano and Mo'unga'one routes.

Justification for the above proposal rests at least in part on the implications of the following observations:

- Given the strong concentration of passenger and cargo movements in the Northern sub-group of Ha'apai towards the Pangai direction, a smaller vessel with very flexible schedule, is needed to make these shorter lengthened journeys.
- A larger vessel permanently stationed in Ha'apai, is needed to cater for the longer journeys associated with routes such as Pangai - Fotuha'a - Tofua - Ha'afeva - Pangai, similarly for Pangai - Ha'afeva - Nomuka - Pangai.

This larger vessel should also have appropriate cold storage facilities for storage of fish. It would also cater for the larger cargo requirements associated with any agricultural production and other industries e.g. transporting of timber to sawmills in Pangai, in the Ha'apai group. It is expected that production from the agricultural and fisheries sectors in the long run will increase. A larger vessel with a cargo capacity of at least 15 tons is thus required.

- As a second priority, the larger vessel will also be able to make any trips 'if' required to Tongatapu. Given the strong tendency for cargo and passenger movements from Ha'afeva and Nomuka towards Tongatapu, it is expected at least in the short run, that the volume of cargo and passenger movement in this direction will remain high. In the long run however this tendency may be reduced with the introduction of a larger vessel capable of carrying required cargo and passenger volumes within the Ha'apai Group.
- Following Cyclone Isaac, one would expect the movement of cargo from Pangai to outer islands to increase significantly given the flow of construction materials and equipment to outer islands for reconstruction purposes. The recommended larger boat would provide invaluable services in this regard.

4. The study indicated that management of private boat operations was in certain aspects inefficient. Some hesitation should exist about issuing full management responsibility and authority for any new vessel proposed to a subset of these boatowners per se. Appropriate government influence in this regard, needs to be established on a continual basis. This could perhaps be most effectively achieved through the government shipping agency, the Shipping Corporation of Polynesia.

1. INTRODUCTION

It has been a long established view that intra-island shipping services in the Ha'apai Group require substantial improvement. A number of studies focusing upon Ha'apai, have earmarked the fulfillment of this need as a must for any successful attempt to alleviate major constraints to development in this region.

With the existence of possible outside sources of aid, the likelihood of Government intervention in this regard is high. Therefore it was desirable that a rigorous analysis of certain issues relating to aspects of boat operations in the Ha'apai Group be undertaken, particularly in the event of Government deciding what it should commit in this regard. This study is a contribution towards any effort to meet this requirement.

Located 62 miles north of Tongatapu, the Ha'apai Island Group consists of 17 inhabited and 34 uninhabited islands, scattered over 2733 sq.ml. of sea. The Group had a population size of 10,792 in 1976 (17% of the Kingdoms population for that year). "Agriculture, Forestry and Fisheries" is the principal industry group in the region, accounting for 66% of the contribution of the Ha'apai Group to the Kingdom's G.D.P. in 1979/80. Agriculture is the most dominant component in this group.

While 'intra-island' shipping in Ha'apai is run by the private sector, some form of government involvement at the 'inter-island level exists. Relative to the past, the inter-island shipping service is now more reliable (particularly following the introduction of the Olovaha vessel). To exploit maximum benefit from this improvement, intra-island shipping services must be upgraded substantially.

In relation to the utilization of their boats, private boatowners in Ha'apai, are fulfilling both social and economic functions. The objectives of these functions may well be in-compatible under certain circumstances.

In view of the above, a survey was carried out in February 1982 to clarify issues relating to various aspects of Ha'apai intra-island shipping.

The contribution of this study was made on the basis of the results of this ad. hoc survey.

Following Cyclone Isaac (march 1982), which devastated Tonga affecting Ha'apai most severely, the need for significant improvement in intra-island shipping services has become urgent. This improvement is a necessary pre-requisite to the successful implementation of most rehabilitation programmes to be undertaken in the Ha'apai Group.

2. METHODOLOGY

Given the need to clarify a number of issues relating to the current situation of intra-island shipping in Ha'apai, a survey was carried out to collect the appropriate information from a pre-defined population of boatowners in the region. The survey was undertaken in February 1982 and involved travelling to the islands of Lofanga, Kotu, Ha'afeva, Nomuka, Mango, 'O'ua, 'Uiha, Lifuka, Foa, Ha'ano and Mo'unga'one. Basically the survey approach was through interviewing boatowners using a pre-designed questionnaire (See Appendix 1)

An attempt was made to undertake a complete census of the boat population with boat length ≥ 20 feet, within Ha'apai. This criterion for defining the boat population surveyed was considered appropriate given the minimal significance of smaller boats (<20 feet in length) with regard to passenger and cargo movements between the major centres of the various districts, within Ha'apai. In any case, time and financial constraints expelled any chance of conducting a complete census of all boat units in the group.

Information collected in the survey questionnaire (see Appendix 1) included details relating to technical aspects of boats, operating expenditure and income earned from boat operation, boat cargo and passenger movements and the views of the boatowners relating to intra-island shipping.

To ensure that maximum information relating to cargo movements was obtained, effort was channelled into collecting appropriate data on cargo flows to retail establishments ("falekoloas") and to/from copra purchasing stations, within the Ha'apai Group. This involved extensive interviews with "Falekoloa" owners and managers of copra stations.

The reference period adopted in this survey was largely confined to the month, December 1981. This period was considered optimal since the effect of possible sources of error ("non-randomized") such as memory lapse by boat owners, would be relatively minimal. The confinement of the reference period adopted to largely one month was favoured in view of the objective of the project. It was felt that average monthly figures would be more useful than average annual estimates given the likely existence of factors such as seasonality in demand for passenger and cargo movements.

3. RESULTS AND DISCUSSION

3.1 Technical Details of Boats

As stated in Section 2 the size of the boat population surveyed was 22. Selected information relating to this boat population is given in Table 1.

Table 1 : Technical and other Details Relating to the Boat Population Surveyed

Details	Average (per boat)	Range (for boat population)	Total
Length of boat	31 feet	23-40 feet	
No. of crew excluding captain needed to operate boat	2	1-5	39
No. of passengers boat able to safely carry	22	12-40	495
Quantity of cargo boat able to safely carry	4-6 tons	0.5-19.0 tons	99.5 tons

Type of Motive Power

	<u>Sail only</u>	<u>Diesel Engine</u>	<u>Sail plus diesel engine</u>
No. of boats	12	6	4

Type of Construction Material

	<u>Local</u>	<u>Foreign</u>	<u>Local Plus Foreign</u>
No. of boats	3	8	11

No. of Boats According to Island Stationed at

Fangai	Lofanga	Ha'afeva	Nomuka	Mango	Fotuha'a	Fonoi	'O'ua	'Uiha
2	1	2	3	1	1	1	2	1
Ha'ano	Mo'unga'one							
4	4							

No. of Boats According Years of Construction and Acquisition

Year Boat Constructed

1945-55	1956-65	1966-75	1976-81	Unknown
3	5	6	4	4

Year Boat Acquired

1945-55	1956-65	1966-75	1976-81
3	3	6	10

Table 1 highlights the plausibility of the following deductions:

- on average the boat population per se does not provide relatively high opportunity employment-wise;
- the proposition that advocates the utilization of three small vessels which "would each have a cargo capacity of 5-8 tons and carry about 35 passengers" (Eyre, 1982), is in this regard equivalent to one which favours vessels of sizes similar to the 'just above average sized boat' in the boat population surveyed;
- since 55% of the boat population surveyed utilizes "sail only" type of motive power, the degree of vulnerability for the boat population and its working schedule (e.g. frequency and regularity of trips), to factors such as weather is high;
- since 54.8% of the boat population surveyed was acquired in or prior to 1975 and at least 63.6% of this boat population was built prior 1975, the age of the existing boat stock of the Ha'apai Group is relatively old. A corollary of this is that associated maintenance costs are high, if not very high.

3.2 Passenger and Cargo Movements within the Ha'apai Group

For reasons presented in Section 2 collection of information regarding passenger and cargo movements was confined to the reference period December 1981. These results have been summarized and presented in this section. Estimates on an 'average monthly' basis of equivalent results for at least a subset of the results obtained for December 1981, are also provided.

Figures for December 1981 (Table 2) and estimates on a monthly basis (Table 3), both confirm that the bulk of cargo and passenger flows are either to or from Lifuka.

Table 2 : General Trends in Cargo and Passenger Movements within Ha'apai for December 1981

	No. of Passengers	%	Quantity of Cargo (tons)	%
To Lifuka	1 033	51.2	74.4	38.7
From Lifuka	460	22.8	77.6	37.1
To and From other Islands (excluding Lifuka)	524	26.0	48.3	24.2
TOTAL	2 017	100.0	200.3	100.0

Table 3 : General Trends in Cargo and Passenger Movements within Ha'apai on a monthly basis (estimated)

	No. of Passengers	%	Quantity of Cargo (tons)	%
To Lifuka	985	50.1	71.0	38.8
From Lifuka	424	21.6	71.5	39.0
To and From Other Islands (excluding Lifuka)	578	28.3	40.6	22.2
TOTAL	1 967	100.0	183.1	100.0

It is important to note that despite the general trends for both December 1981 (actual - see Table 2) and on a monthly basis (estimated - see Table 3) being consistent, the existence of seasonality has rendered the December 1981 figures on the higher side.

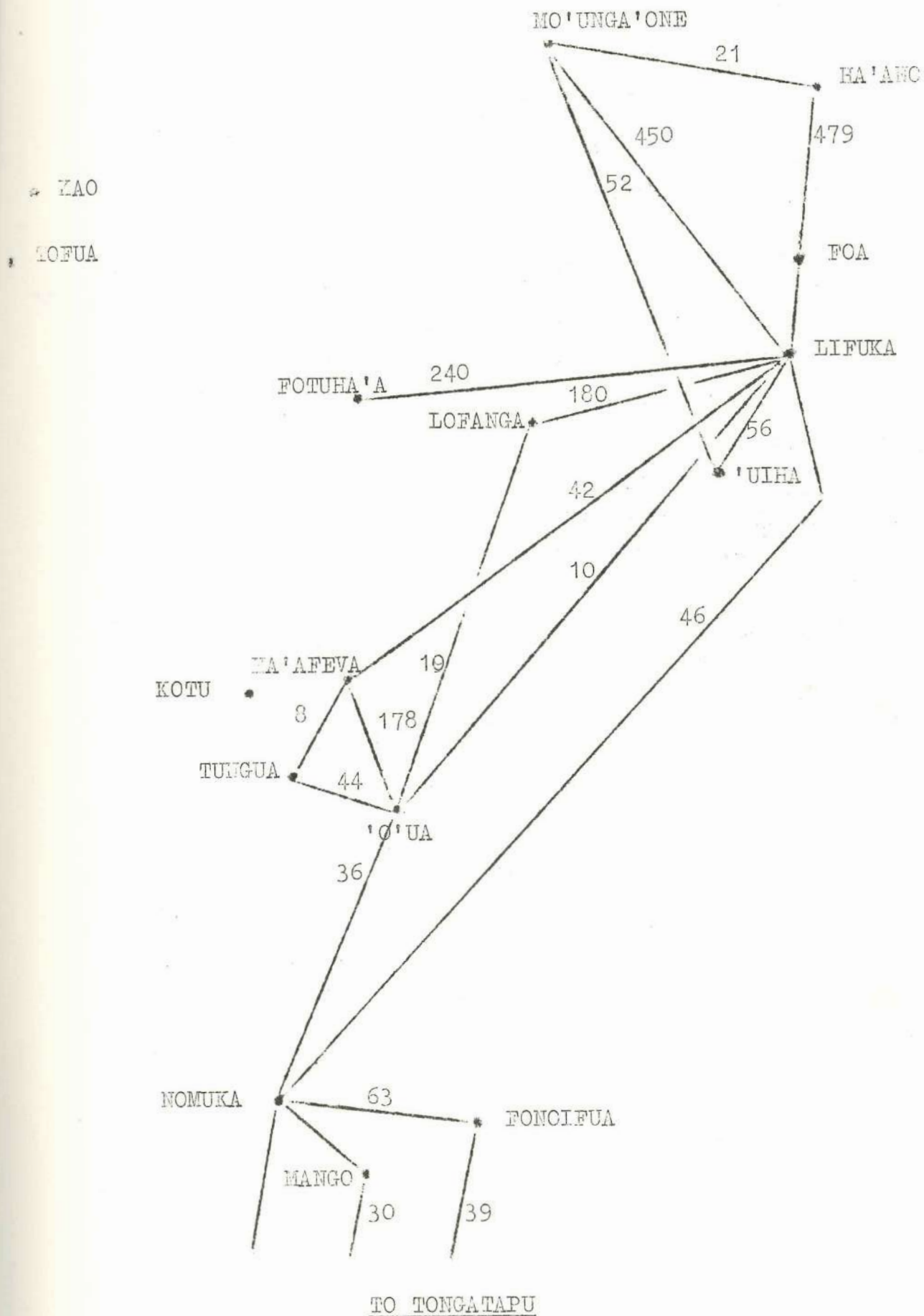
Detailed results of cargo and passenger movements for December 1981 are given in Appendix 2. Since 75.9% of all cargo movements and 74% of all passenger movements were to and from Lifuka, cargo and passenger flows relating to Lifuka are presented in more detail (see Table 4).

Table 4 : Return Passenger Trips and Cargo Movements to and from Pangai for December 1981

	<u>FROM PANGAI</u>		<u>TO PANGAI</u>	
	No. of Passengers	Quantity of Cargo (tons)	No. of Passengers	Quantity of Cargo (tons)
<u>NORTH</u>				
Ha'ano	10	1.0	469	16.4
Mo'unga'one	-	0.6	450	51.6
<u>MIDDLE</u>				
Lofanga	180	36.0	-	-
Fotuha'a	240	36.0	-	-
<u>SOUTH</u>				
'Uiha	20	2.4	36	3.0
Ha'afeva	10	1.6	32	1.0
Fonoi	-	-	-	2.1
'O'ua	-	-	10	1.0
Nomuka	-	-	46	-

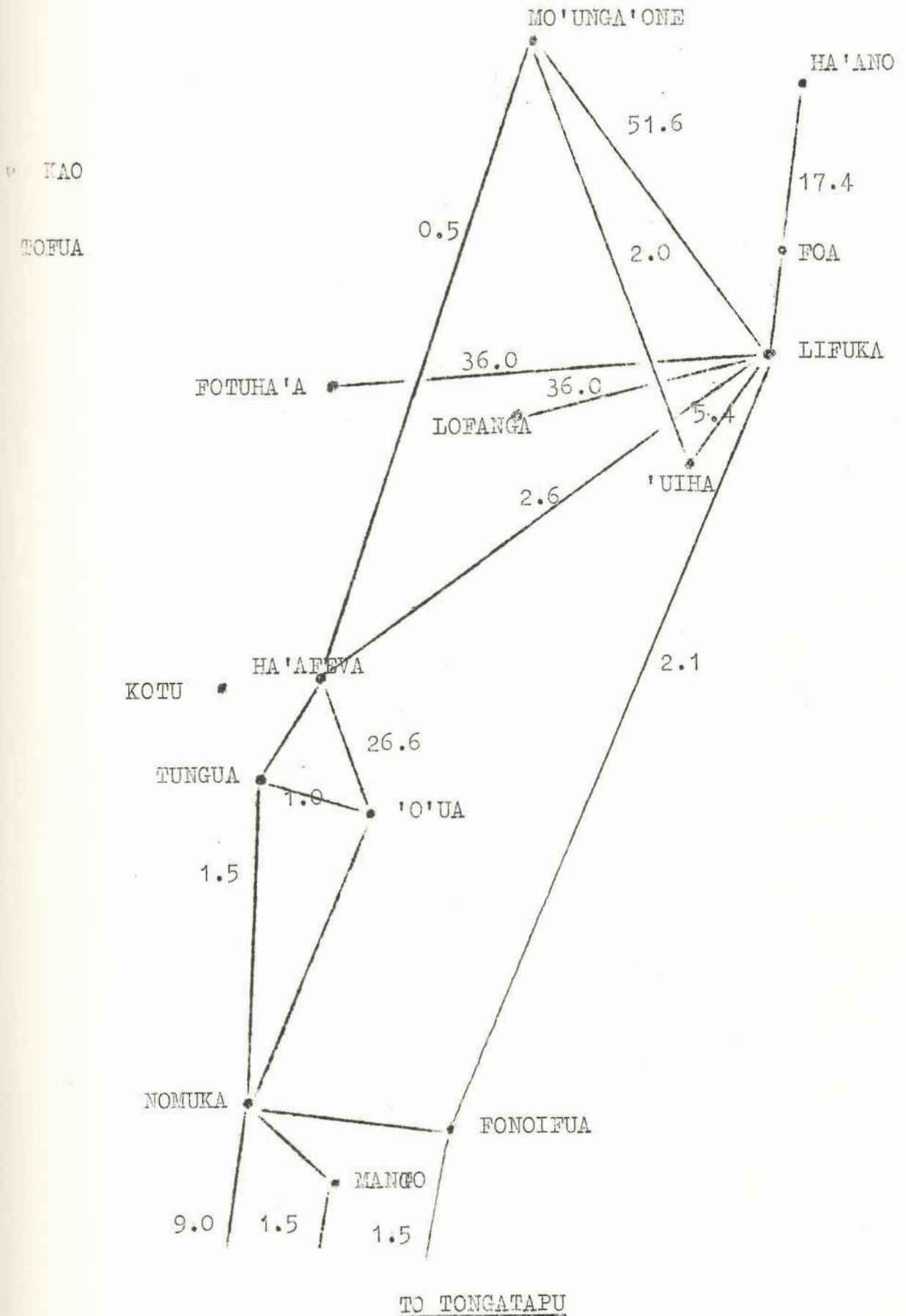
In view of the results in Table 4 and those in Table 1 relating to boat distribution by island of station, the existence of high correlations between the size of the passenger flow and cargo movement to Pangai and the number of boats stationed in the island of trip initiation, are well established (observed Pearson Correlation Co-efficients are 0.86 and 0.71 respectively). In some perspective it is more desirable to view total cargo and passenger flows in their more disaggregated forms according to routes. Results towards this end for December 1981 are presented in Figures 1 and 2.

Figure 1 : Passenger Trips according to Routes Within the Ha'apai Group for December 1981 *



* Figure cited for each respective route is the sum of all passenger trips under taken either way for December 1981.

Figure 2 : Cargo Movements (in tons) According to Route
Within the Ha'apai Group for December 1981 *



* Figure sited for each respective route is the sum of all cargo (in tons) transported either way during December 1981.

Because the constraint on the definition of the boat population surveyed was a function of boat size (boat $\geq$ 20 feet qualified), it appears plausible to argue that the realized "sizes" of the various flows according to route shown in Figures 1 and 2 are conservative. The validity of this argument rests on the observations that total cargo and passenger movements:

1. within closely related islands (e.g. Kotu-Tungua-'O'ua-Ha'afeva group) are serviced to a significant extent by a fleet of smaller sized boats (< 20 feet in length); and
2. between district centres (e.g. Nomuka-Ha'afeva-Pangai chain) are partly affected by services of inter-island vessels (e.g. 'Ata and Olovaha).

Given the existing sea transport infrastructure, it is evident from Figure 2 that the geographic location of islands has a great bearing on the direction of cargo movement. Cargo moving from the Ha'afeva-Nomuka districts appears to be biased towards the Tongatapu direction. A similar tendency of bias exists towards Lifuka for the northern sub-group of Ha'apai.

In view of the paramount importance of copra with regard to the monetary sector of Ha'apai's agricultural industry and its impact on the pattern and magnitude of cargo flows within Ha'apai, information on copra purchases (as presented in Table 5) was collected.

Table 5 : Quantity (tons) of Copra Purchased by Station at the Ha'apai Group

Station	Total Copra Quantity Purchased			Estimate of Total Copra Quantity Purchased Dec. 1981 (tons)	Estimate of Average Total Copra Quantity Purchased Per Month for 1981 (tons)
	1979	1980 (tons)	1981		
Pangai	415	659	306	6.7	25.4
Pukotala	296	276	203	4.5	16.8
Fotua (Foa)	413	530	307	6.8	25.5
'Uiha	313	550	421	9.3	34.9
Ha'afeva	265	420	373	8.2	31.0
Nomuka	289	401	260	5.7*	21.6
TOTAL	1991	2836	1870	41.2	155.2
Total excluding Pangai, Foa, Ha'afeva and Nomuka	609	753	624	13.8	51.7

* Actual Total quantity purchased.

From Table 5 the following is evident:

- (1) Level of copra production in the Ha'apai Group for 1981 was significantly lower than its 1980 counterpart. Consequently the average estimate of copra purchased per month for 1981 is most likely on the low side relative to potential production level per month.
- (2) Since the copra purchases in Pangai, Foa, Ha'afeva and Nomuka are shipped straight to Nuku'alofa, a significant portion (up to 66.7%) of the total monthly copra flow requires minimal demand (e.g. Fonoi - Nomuka copra movement) for services of an intra-island vessel.
- (3) In view of 2 above, the estimate of total quantity of copra purchased per month for 1981 which required shipment to Pangai was 51.7 tons. This is 72.5% of the estimated total cargo (71.3 tons), transported to Pangai on an average monthly basis for 1981.

- (4) Total copra purchased in December 1981 was relatively very low - about 27% of the estimated average total copra purchased per month for the same year. This provides some indication of the seasonal nature of copra production in the Ha'apai Group. However confirmation of this aspect was difficult to establish due to unavailability of data on the same basis for earlier years.

The industry group "Wholesale and Retail Trade, Restaurants and Hotels" accounts for about 10% of the value added contribution of Ha'apai to the total GDP of the Kingdom (UNCTCD Project TCN/78/001 (1981)). Table 6 provides information regarding this industry group for Ha'apai (excluding Lifuka, Foa, Fonofua, Fotuha'a, Tofua and Tungua). As restaurants and hotels are non-existent outside Lifuka and Foa, information in Table 6 refers to retail establishments (Falekoloas).

Table 6 : Selected Information Pertaining to 'Falekoloas'
Within Ha'apai excluding those at Lifuka, Foa,
Fonoifua, Fotuha'a, Tofua and Tungua

Location	No. of Falekoloas	Source of Supplies				Conservative estimate of the average quantity of wholesale goods purchased per month for all falekoloas in a given location (TONS)
		Pangai	Nuku'alofa	Pangai/ Nuk.		
Lofanga	2	1	1			1.4
Kotu	1		1			0.5
Ha'afeva	2		2			8.2
Nomuka	5		5			10.4
Mango	3		3			1.0
'O'ua	2		2			1.0
'Uiha 1/	2			2		6.1
Ha'ano 2/	2	1		1		1.2
Mo'unga'one	1	1				0.2
TOTAL	20	3	14	3		30.0
Total for all islands except Lifuka and Foa						39.5

- 1/ Two 'falekoloas' were surveyed out of a total of five
2/ Two 'falekoloas' were surveyed out of a total of three

Of the Falekoloa population surveyed 70% (14) recorded "Nuku'alofa" as their source of supplies. Only falekoloas on the islands of Ha'ano, Mo'unga'one and Lofanga stated "Pangai" per se as their source of supplies (see Table 6). To a great degree, this pattern is consistent with the general trend in cargo movements within the Ha'apai Group as shown in Figure 2.

About 73% of the average total quantity (30 tons) of wholesale goods have been shipped to the surveyed falekoloa population from Nuku'alofa. It is therefore reasonable to deduce that the level of demand for intra-island movement of falekoloa cargo is low.

3.2.1 General Comments on Cargo Movements

Results of this study provide no evidence for the existence of any significant difference between the average rate of cargo movements (tons/month) to Lifuka as compared with that observed for the reverse route. This is contrary to views advocated by some earlier reports. In particular, Eyre (1982) estimated these flow rates to and from Pangai at 1 000 tons/annum and 2 000 tons/annum respectively. This current study establishes both these same flows at around 1 000 tons/annum each. The estimates provided by these 2 separate studies (see Table 7) are comparable with regard to the average flow rate in the "to Pangai" direction (only a difference of 144 tons/annum - 14% of the flow rate proposed by Eyre). The significant difference between the results of the two studies lies in the estimated cargo flow rate for the "from Pangai" direction (see Table 7).

Table 7 : 1981 Cargo Flows (tons/annum)

	<u>Estimate</u>	
	Current Study ¹	Eyres Report ²
'From Pangai to other Ha'apai Islands	858	2 000
From other Ha'apai islands "to Pangai"	856	1 000

1. Includes only, cargo movements of the boat population surveyed.
2. Includes cargo movements for all boats operating in the Ha'apai Group (the establishment of this point by Eyre (1982) was not explicit).

Given the assumed difference in boat population coverage of the 2 studies, even if "appropriate" upward adjustments are made to the rates of the current study (to account for boats not included in survey), the estimate provided by Eyre for the "from Pangai" cargo flow would probably still be on the high side.

Regarding overall cargo movement "to Pangai" the following estimates were derived:

Total cargo transported "to Pangai" on average monthly basis for 1981 (see <u>Table 3</u>)	71.3 tons
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Total quantity of copra purchased <u>per</u> month requiring shipment "to Pangai" for 1981 (see <u>Table 5</u>)	<u>51.7 tons</u>
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Difference	19.6 tons
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The residual of 19.6 tons is a conservative monthly estimate of the total agricultural produce, excluding copra, shipped from outer islands to Lifuka for 1981.

Regarding movement of cargo 'from Pangai' to other Ha'apai islands, one can hypothesize that the composition of this flow is largely construction materials and equipment.

3.3 Economic Aspects of Boat Operations

3.3.1. Financial Details Relating to Boat Operation and their associated Implications

Selected information relating to boat owner operating expenditure, income earned and boat replacement cost for the boat population surveyed, is given in Table 8

Table 8 : Statistics on Operating Expenditure, Income Earned and Replacement Costs relating to the Boat Population Surveyed (for the year ended December 1981).

	Total (\$) (for boat population surveyed) (1981)	Average (\$) per boat (monetary part only)* (1981)	Range (\$) (monetary part only)
<u>Operating</u>			
<u>Expenditure</u>			
(a) Repairs and maintenance	10,419 (+ in kind payments)	474	0-2,000
(b) Others	30,092 (+ in kind payments)	1,368	48-6,888
Total	40,511	1,842	48-2,000
<u>Cash Income</u> <u>earned by</u> <u>boat owner</u>			
	41,849 (+ in kind payments)	1,902	16-20,000
<u>Replacement</u> <u>cost of boat</u>			
	139,600	1,346	400-30,000

* No attempt was made to impute in monetary terms the various types of 'in kind payment' involved in meeting various expenditure items.

The following observations/inferences can be made from Table 8.

1. The associated variances of the expenditure and income items relating to the operation of the boat population surveyed, are high. This is evident in part from the relatively high ranges realized in conjunction with the items given in Table 8.
2. A considerable amount of transactions involved in - kind payments and income. Since no attempt was made to impute the value of these flows in monetary terms, assessment of the relative profitability on an average per boat basis, is extremely difficult. When considering the monetary component only, there exists evidence that the average amount of profit generated per boat is nominal (\$60/month). This finding is based on the assumption that this is the only source of income for the associated household.
3. Based on estimates provided by boatowners, the total replacement cost (i.e. monetary value) for the boat population surveyed, is around \$140,000. This relatively 'low' value reflects (among other things), the employment of relatively unsophisticated structure and motive mechanisms. Boats were often very simply designed and 55% of the boat population surveyed utilized "sail only" motive power. In addition, this 'low' monetary value is a reflection on the relatively old age of the existing boat stock (see Section 3.1).
4. Given that the existing boat stock is relatively old, it is not surprising that the average 1981 cost for repairs and maintenance per boat is high (\$474). Out of the total operating expenditure incurred for 1981 by the whole boat population surveyed, 34.6% was for repairs and maintenance to boats.

Information was obtained on the source of boat financing for any boats in the population surveyed which were less than 5 years old. Out of the 9 boats which met this criteria, 67% (6) of the boatowners associated with them, required some form of financial assistance to acquire their boats. This assistance usually took the form of a loan from the Tonga Development Bank or a grant from the Central Planning Departments' Small Project Fund.

Only 3 boatowners were able to fully finance their boats from their own savings. The ability of the people of Ha'apai to significantly improve the existing boat stock from their own financial sources must be questioned. This supports the need for government intervention in the provision of shipping services within Ha'apai.

From the survey data obtained, there was a strong indication that boats surveyed were not being utilized to full capacity (in terms of cargo and passenger volumes moved as compared to the actual capacity of boats for each of these components). This assertion cannot be rigidly established due to lack of data (in relation to 'estimating' underutilization, it was difficult to derive from available data a quantitative indicator relating to the optimal combination between cargo and passenger allocations of the total capacity of a given boat). This aspect of boat operations must be viewed in relation to such factors as:

- the fact that boatowners surveyed were fulfilling both social and economic functions in their boat operations. Social objectives may not always be consistent with economic and commercial objectives - such as running an efficient boat operation.
- The majority of boatowners surveyed (68%), also used their boats for fishing but stated that this was not the main use of the boat. It is reasonable to assume that much of this fishing is for daily consumption needs of the family and friends of the boatowner.
- On some of the more isolated islands there may be an urgent need to make a trip to Pangai for eg., to obtain food supplies or medical assistance. This type of trip will not necessarily involve boats carrying cargo and passengers at their full capacities.

3.3.2. Passenger Fare and Cargo Rates with some Implications on Route Coverage.

Average fare and cargo price rates for the boat population surveyed according to route are presented in Table 9.

Table 9: Average Passenger Fare and Cargo Price Rate for the Boat Population Surveyed According to Route

(P or T\$ Passenger; C or T\$/ton of cargo)

TO FROM	Nuk- 'alo- fa	Pa- ngai	Ha- 'ano	'Uiha	Lo- fanga	Mo- 'unga 'one	Ha'a feva	'O'ua	Tu- ngua	No- muka
Pa- P ngai	5.50		0.25	0.40	0.70	Free		1.00		2.00
C	17.00		2.50	2.50	8.30	17.70		20.00*		13.30
Ha- P 'ano		0.25								
C		2.50								
'Ui P ha		0.40								
C		2.50								
Lo- P fanga	4.00	0.70								
C	12.00	8.30								
Mo- P 'unga 'one		Free								
C		17.70								
Ha'a- P feva	Not Available							0.50		1.20
C								20.00*		7.00
P 'O'ua		1.00					0.50		0.50	
C		20.00					20.00		20.00	
Tu- P ngua								0.50		
C								* 20.00		
No- P muka	3.00	2.00					1.20			
C	9.50	13.00					7.00			
Lo- P fanga	2.50									
C	8.30									

C* Subject to fluctuations in the current value of cargo (particularly copra).

The results of the current survey, in regard to cargo and passenger price rates, support the observations established by earlier reports that such rates are flexible and often on non-cash basis. This concept of flexibility is assumed in this study to apply strongly to type of fare payment (quid pro quo) rather than to fare rates per se, since these rates are evidently applied on an advaloran or proportional basis according to route distance.

Boat owners interviewed were biased to stating passenger and cargo price rates associated with only routes ventured by their boats, at least in the most recent month. This bias was probably substantial since it would be expected that these boatowners would only be familiar with price rates associated with routes they frequent.

Cargo and passenger price rates are not subject to price control. In view of this results of Table 9 can be viewed, subject to same reservation, as an indicator of the size of route network covered by the boat population surveyed. At least with regard to this boat population, the different route coverage is low and confined mainly to routes linking with Pangai (see Table 9). This assertion is further strongly supported by reference to the actual number of different routes travelled during December 1981, by the boat population surveyed as summarized in Table 10.

Table 10: Number of Different Routes
Travelled by Boats surveyed during December 1981.

No. of different routes travelled during December 1981*	No. of Boats
0	2
1	7
2	4
3	4
4	2
5	2
6	1

* Includes "to Tongatapu" route.

As evident in Table 10, about 60% of the boat population surveyed had travelled at the most only two different routes during December 1981.

Given the great 'popularity' of routes linking with Pangai, the fare structure for boat travel between the outer islands and Pangai has been examined more closely (see Table 11).

Table 11:

Island (From Pangai to)	Average Passenger Fare to Pangai (\$)	Average Cargo Rate to Pangai (\$)	Distance Nautical miles from Pangai	Average Passenger fare per Nautical Mile	Average Cargo Fare per Nautical Mile
Ha'ano	0.25	2.50	10	0.025	0.250
Uiha	0.40	2.50	9	0.044	0.278
Lofanga	0.70	8.30	12	0.058	0.692
Ha'unga- 'one	N/A	17.70	14	-	1,264
Ha'afeva	N/A	N/A	24	-	-
Numuka	2.00	13.30	41	0.049	0.324
Mango	2.50	N/A	-	-	-
TOTAL				0.44	0.562

As evident from Table 11, the average passenger fare is 4.4 seniti per nautical mile regardless of island of trip initiation and or type of boat according to kind of motive power. Larcombe (1981) estimated this average rate at 3.4 seniti per nautical mile.

3.4. Boat Owner Views

To gain some idea of the problems and needs associated with boating operations in the boat population surveyed, views of boatowners on ways in which 'Government' could best assist them were obtained (see Table 12).

Table 12: Boat owners views on ways in which Government could assist in their boating operations

<u>View expressed by boatowner</u>	<u>Frequency</u>
Assistance in obtaining an inboard engine for boat	6
Assistance in obtaining a new sail for boat	5
Assistance in provision of radio communication for boat	5
Assistance in provision of spare parts and building materials for boat repair	4
Assistance in extending existing boat length	2
Reduce freight and passenger fare rates of all boats operating in Ha'apai Region	1
Build a wharf at Ha'afeva	1

Similarly boat owner views on the possible introduction of an intra-island vessel operated by Government in the Ha'apai Group were recorded. The views expressed by boatowners are summarized in Table 13.

Table 13: Summary of views expressed by Boatowners on the possible introduction of a Government operated Intra-Island vessel.

View	Frequency of views expressed
(a) <u>Favourable views</u>	
Would help alleviate shipping problems, particularly transportation of crops and people	6
Would help meet demand for shipping services not presently being satisfied	4
Good for Ha'apai Region	4
Due to isolation of Mo'unga'one such a boat is essential particularly in case of emergencies eg. medical treatment.	3
Would provide a much needed regular service	3
Would be able to compete and work with such a boat	2
Such a boat should have a freezer on board to stimulate growth of fishing industry	2
Would allow boatowner to use his boat for private rather than community use	1
(b) <u>Unfavourable views</u>	
Such a boat would compete with and take business away from private boatowners	3
Services of the boat would probably be restricted to certain routes	1

Out of 22 boatowners surveyed, 19 had favourable views towards introducing such a boat (see Table 13). The only unfavourable views came from boatowners stationed in Nomuka (3). This may be a reflection on Nomuka being more strongly associated, in some regards, with Tongatapu than with Pangai.

4. Implications of Cyclone Isaac - Situation post 3 March 1982

Cyclone Isaac has devastated the coconut industry of Ha'apai. Therefore while the industry is recovering, the demand for cargo movements 'from outer islands to Pangai' (which this study indicated was mainly copra products), will be severely reduced.

On the other hand, the reverse of this trend is expected to exist in the demand for cargo movements 'from Pangai to outer islands' (at least within the next 18 months). This assertion appears valid in view of the expected significant increase in the flow of construction materials and equipment to outer islands for reconstruction purposes.

It is of paramount importance to revive as soon as possible the cash economy of the Ha'apai Group. Therefore the access for farmers in outer-islands to appropriate markets to sell whatever is produced, should be guaranteed. Consequently, shipping infrastructure in particular must be significantly upgraded. It is envisaged that security of this significant improvement would impose a 'supply generating demand' effect in the transport-market-agriculture system and hence assists in breaking "the circle of cumulative causation whereby poor shipping limits agricultural production which in turn limits the viability of shipping services" (Larcombe, 1981). In the interim, there exists a viable source of income by way of 'processing' coconut stems. If this processing can be carried out in Pangai given that a coconut sawmill is now in existence there, then the flow rate of cargo movement from outer islands to Pangai, could be expected to 'pick up', at least in the short run.

The trend established in this study relating to the strong tendency for passenger and cargo movements from at least Nomuka and Ha'afeva districts, to favour the Tongatapu direction, will most likely continue and intensify. This is bound to occur if existing shipping infrastructure does not meet with substantial improvement immediately. In any event, the efficiency and success of the rehabilitation programme conducted by Government and the Ha'apai people will depend heavily on how much improvement can be immediately made in Ha'apai shipping infrastructure.

Kane (1982) emphasized the inclusion in any economic rehabilitation strategy for Ha'apai, the provision of regular reliable shipping and the practice of some measure of preferential treatment for Ha'apai production (e.g. transport subsidies and price supports). Under the existing circumstances (post - "Isaac"), any hope for successful establishment of an effective and reliable intra-island shipping industry for the Ha'apai Group, calls for appropriate Government intervention and an explicit implementation, in this regard, of the concept of preferential treatment. The application of the latter measure must be made with regard to major aspects of the required Government contribution to the sea transport industry of Ha'apai, including the associated aspect of management.

5. RECOMMENDATIONS & CONCLUSION

On the basis of this ad-hoc study and in light of past studies on the topic, the following recommendations are made;

Direct Government intervention into intra-island shipping is needed to improve upon:

- (1) Efficiency and management aspects of boat operations;
- (2) Frequency, regularity and reliability of services;
and
- (3) Safety aspects of shipping services

The provision of intra-island shipping services in the Ha'apai Region is inadequate. While demand for cargo and passenger movements is not being satisfied, there exists some evidence that the concept of underutilization (in terms of maximum cargo and passenger capacities) applies to the present boat population. This can be accounted for by a host of factors (eg. boat operators fulfilling different objectives the significances of which could not be assessed on a common yardstick), however it seems evident that poor management is a dominant factor.

Boat operations appear to be on an ad-hoc rather than regular and consistent basis. Many of the boats have sail only motive power and are thus dependent upon weather conditions as to when they will sail. In this case regularity and trip frequency are determined to a large extent by weather conditions.

With regard to safety aspects of boat operations, for a variety of reasons there is a high risk associated with present intra-island shipping. Reasons include the fact that the existing boat stock is relatively old, weather and sea conditions are erratic and often very rough, and boats generally lack safety equipment (eg. radio communication equipment, life jackets). The combination of all these factors makes present intra-island shipping very unsafe.

Various alternative proposals have been put forward regarding any effort to improve intra-island shipping in Ha'apai. These include proposals for introducing:

- (1) One new big vessel similar in some respects to the Kao;
- (2) Three to five new vessels with cargo capacity of 5-8 tons and passenger capacity of 35;
- (3) Three new vessels with cargo capacity of 20 tons and passenger capacity of 30. These boats would be motor sailers of about 90 feet in length.

The results of this study seem to suggest that under the circumstances two new boats of differing capacities is the optimal choice. The bigger vessel should have cargo and passenger capacities of 15-20 tons and around 50 people, respectively. It would be desirable for this vessel, to operate with motive power of sail, and an auxillary motor engine in order to minimize fuel costs. Appropriate refrigeration facility for storing at least one tonne of fish should also exist.

The general capacity of the smaller boat should be in the vicinity of 10 tons of cargo and 30 passengers. Both boats should be equipped with appropriate and sufficient safety equipment.

Justification for the above prposal rests at least in part, on the implications of the following observations:

- (1) Given the strong concentration of passenger and cargo movements from the Northern sub-group of Ha'apai, towards the Pangai direction, a small vessel with very flexible schedule is needed to service these shorter routes.
- (2) A larger vessel permanently stationed in Ha'apai, is needed to cater for the transport demand associated with longer routes such as Pangai - Ha'afeva - Nomuka - Pangai and Pangai - Fotuha'a - Tofua - Ha'afeva - Pangai.
- (3) The need to stimulate further agricultural/fisheries production and related activities, calls for an approach (at least on an experimental basis in its' earlier phase), to widen the scope of different route coverage. Consequent to this need, Government intervention may be required to operate on the "less favourable" routes eg. Pangai - Fotuha'a - Tofua - Pangai.

Since these less favourable routes are generally a direct function of distance, consideration of safety aspects must be taken seriously. A boat of the size and facility similar to the one recommended is needed. The prospect of a marked increase in agricultural production generated from any improvement in intra-island shipping, would be to a large extent associated with islands located on the less favoured routes (e.g. Tofua, Tungua).

- (4) As a second priority, the larger vessel will also be able to make any trips 'if' required to Tongatapu. Given the strong tendency for cargo and passenger movements from Ha'afeva and Nomuka towards Tongatapu, in the short run, it is expected that the frequency of trips to Tongatapu will still be high. In the long run this tendency may be reduced with the introduction of a larger vessel operating on a regular and reliable basis and able to carry required cargo and passenger volumes within the Ha'apai Group.
- (5) Following Cyclone Isaac, the movement of cargo from Pangai to outer islands will probably increase substantially given the likelihood of a significant rise in the flow of construction materials and equipment for reconstruction purposes. The recommended larger boat would provide invaluable services in this regard.

As there was an indication that management of private boat operations was in some ways inefficient, hesitation should exist about issuing full management responsibility and authority for any new vessel proposed, to at least a subset of the boatowner population.

Appropriate Government influence in this regard, needs to be well established on a continuing basis. This could perhaps be effectively achieved through appropriate action and direction by the Government shipping agency, the Shipping Corporation of Polynesia.

The acquisition of these boats will probably be dependent upon outside sources of aid. If this aid is not available, the possibility of converting and upgrading the 'Kao' to both passenger and cargo use, and stationing it permanently in the Ha'apai Group, would not be an unfavourable compromise.

Decisions relating to details regarding specific areas, for instance the actual design of the boat proposed and their associated maximum capacities, would be best left to specialists in those fields.

6. APPENDIX 1. THE SURVEY QUESTIONNAIRE

Central Planning Department/Statistics Department
Nuku'alofa
TONGA

"Confidential to Government - For statistical and
planning purposes only"

HA'APAI BOAT OWNERS SURVEY

1. Name of Boat:
2. Name of Boat Owners:
Village/Island:
3. Year Boat Built (if known):
4. Year Boat Acquired by Present Owner:
5. Overall Length of Boat:
6. Construction Material:
7. Type of Motive Power:
8. No. of Passengers Boat able to safely carry:
9. Quantity of Cargo Boat able to safely carry (tons): ,.....
10. No. of crew (excluding Captain) needed to operate boat:
.....

A. Operating Expenditure for Year Ended 31 December 1981

- | | |
|--|-----------|
| a. Purchases of Fuel
(or Quantity gallons) | \$ |
| b. Repairs and Maintenance to Boat | \$; |
| c. Wages Paid to Crew
(or Value of In-Kind Payment) | \$ |
| d. Purchases of New Engine
or Equipment | \$ |
| e. Other Operating Expenditure | \$ |

B. Boat Use

a. Boats Based at Lifuka

How many trips were made by this boat in December 1981 on the following routes:

<u>Route</u>	<u>No. of Trips December 1981</u>	<u>Average No. of Passengers Carried per trip</u>	<u>Average Quantity of Cargo Carried per Trip (tons) and main cargo Types</u>
i. Lifuka-Ha'ano			
ii. Lifuka-'Uiha			
iii. Lifuka-Ha'afeva			
iv. Lifuka-Mo'unga'one			
v. Lifuka-Nomuka			
vi. Lifuka-Other Ha'apai Islands			

b. Boats Based at Ha'afeva

How many trips were made by this boat in December 1981 on the following routes:

<u>Route</u>	<u>No. of Trips December 1981</u>	<u>Average No. of Passengers Carried per trip</u>	<u>Average Quantity of cargo carried per Trip (tons) and main cargo Types</u>
i. Ha'afeva-Lifuka			
ii. Ha'afeva-Nomuka			
iii. Ha'afeva-Other Ha'apai Islands			

c. Boats Based at Nomuka

How many trips were made by this boat in December 1981 on the following routes:

<u>Route</u>	<u>No. of Trips December 1981</u>	<u>Average No. of Passengers Carried per trip</u>	<u>Average Quantity of cargo carried per Trip (tons) and main cargo Types</u>
i. Nomuka-Lifuka			
ii. Nomuka-Ha'afeva			
iii. Nomuka-Tongatapu			
iv. Nomuka-Other Ha'apai Islands			

Is the Boat also used for Fishing?

Yes/No

Is this its main use?

Yes/No

C. Income from Boat Operation in 1981

a. Estimate of cash income for 1981 from

i. carriage of passengers \$

ii. ... carriage of cargo \$

iii. charters/hire of boat \$

b. Does the Boat owner have a scale of fares for passenger and freight carriages? Yes/No

If Yes, record details

.....

.....

.....

.....

D. Replacement Cost of Boat

a. What is the present replacement cash value of the boat?

b. If the boat is new (less than 5 years old) how did the owner finance it?

Own Savings \$

Remittances from \$

Relatives Abroad \$

Development Bank Loan \$

Other (specify) \$

E. Boat Owner's Comments

Owner's views on possible introduction of a Boat Operated
by Government in the Ha'apai Group.

[illegible]

F. Boat Owner's Comments

- b. Owner's views on ways in which government could assist in the boating operation.

.....
.....
.....
.....
.....

G. Cargo Type and Volume Handled in December 1981

Type of cargo handled	Quantity or Volume of	Source of purchase	Source of sales (delivery to)
Copra			
Crops			
Livestock			
Fish			
Building Materials			
Trading store goods			
Other			

- H. Seasonal variation in Boat Use in terms of no. of trips no. of passengers carried on av. per trip, and quantity of cargo carried, throughout 1981.

	<u>No. of Trips</u>	<u>Average no. of passengers carried per trip</u>	<u>Average Quantity of cargo carried per trip</u>
January-April			
May-August			
Sept.-Dec.			

Name of Person Interviewed:
Village/Island:
Date of Interview:
Signature of Interviewer:

APPENDIX 2

CARGO AND PASSENGER MOVEMENTS WITHIN HA'APAI FOR DECEMBER 1981

Route	No. of return (Dec. 1981)	Av.no.of passengers carried per trip	Total no.of passengers ca carried (Dec.1981)	Av. quantity of cargo carried (Dec. 1981) (tons)	Total quantity of cargo carried (December 1981) (tons)
PIPUKA TO					
- Mo'unga'one	2	-	-	0.3	0.6
- Ha'ano	1	10	10	1.0	1.0
- 'Uiha	1	10	10	1.0	1.0
- 'Uiha	1	2	2	-	-
- 'Uiha	1	8	8	0.5	0.5
- 'Uiha	3	-	-	0.3	0.9
- Fotuha'a	8	30	240	4.5	36.0
- Lofanga	18	10	180	2.0	36.0
- Ha'afeva	1	10	10	1.0	1.0
- Ha'afeva	2	-	-	0.3	0.6
- TOTAL	38		460		77.6

Route	No. of return trips (December 1981)	Average of passengers carried per trip (Dec.1981)	Total no. of passengers carried (Dec. 1981)	Average quantity of cargo carried per trip (Dec.1981) (tons)	Total quantity of cargo carried (December 1981) (tons)
<u>HA'AFEVA TO</u>					
- Lifuka	3	8	24	-	-
- Fufuka	2	4	8	0.5	1.0
- 'O'ua	2	4	8	0.5	1.0
- Tungua	1	8	8	-	-
- Other Ha'apai Island	1	13	13	0.5	0.5
TOTAL	9		53		2.5
<u>NOMUKA TO</u>					
- Tongatapu	3	-	-	3	9.0
- Tungua	1	-	-	1.5	1.5
- Lifuka	2	23	46	-	-
TOTAL	6		46		10.5

Route	No. of return trips (Dec. 1981)	Av. no of passengers carried per trip (Dec. 1981)	Total no. of passengers carried (Dec. 1981)	Av. quantity of cargo carried per trip (Dec. 1981) (tons)	Total quantity of cargo carried (Dec. 1981) (tons)
Mango-Tongatapu	3	10	30	0.5	1.5
<u>FONCIFIUA TO</u>					
- Lifuka	7	-	-	0.3	2.1
- Tongatapu	3	13	39	0.5	1.5
- Nomuka	3	21	63	-	-
'Uiha-Lifuka	3	12	36	1	3.0
<u>HA'ANO TO</u>					
- Lifuka	11	19	209	0.4	4.4
- Lifuka	1	30	30	-	-
- Lifuka	20	8	160	0.5	10.0
- Lifuka	4	15	60	0.5	2.0
TOTAL	36		459		16.4

Route	No. of return trips (Dec. 1981)	Av. no. of passengers carried per trip (Dec. 1981)	Total no. of passengers carried (Dec. 1981)	Av. quantity of cargo carried per trip (Dec. 1981) (tons)	Total quantity of cargo carried (Dec. 1981) (tons)
<u>'O'UA TO</u>					
- Fa'afeva	20	5	100	1.6	20.6
- Ha'afeva	14	5	70	0.4	5.6
- Lifuka	1	10	40	1.0	1.0
- Lifuka	1	-	-	-	-
- Nomuka	2	18	36	-	-
- Lofanga	1	10	10	-	-
- Tungua	6	5	30	-	-
- Tungua	2	7	14	0.5	1.6
- Lekelele	5	5	25	0.2	1.0
TOTAL	52		295		28.6

Route	No. of return trips (Dec. 1981)	Av. no. of passengers carried per trip(Dec.1981)	Total no. of passengers carried per (Dec.1981)	Av.quantity of cargo carried per trip (Dec.1981) (tons)	Total quantity of cargo carried (Dec.1981)(tons)
<u>MC'UNGA'ONE TO</u>					
- Ha'ano	2	10	20	-	-
- Ha'ano	1	1	1	-	-
- 'Uiha	4	13	52	0.5	2.0
- Lifuka	15	12	180	1.0	15.0
- Lifuka	15	12	180	2.0	30.0
- Lifuka	6	15	90	1.0	6.0
- 'Uiha	1	-	-	-	-
- Ha'afeva	1	-	-	0.5	0.5
- Other Islands	2	3	6	0.5	1.0
TOTAL	47		529		54.3

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