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THE KINGDOM OF TONGA
PROJECT FINDING SURVEY REPORT
ON
TOURISM AND FISHERIES SECTORS

MAY 1979

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO, JAPAN

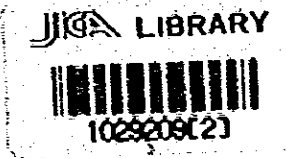


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1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for ensuring transparency and accountability in financial operations. This section also highlights the role of internal controls in preventing fraud and errors.

2. The second part of the document focuses on the implementation of robust risk management strategies. It outlines various risk assessment techniques and provides guidance on how to identify, measure, and mitigate potential risks. The text stresses the need for a proactive approach to risk management to protect the organization's assets and reputation.

3. The third part of the document addresses the importance of effective communication and reporting. It discusses the need for clear and concise communication channels and the role of regular reporting in keeping stakeholders informed. This section also touches upon the importance of maintaining accurate financial statements and the role of auditors in verifying the accuracy of these reports.

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PREFACE

In response to the request by the Government of the Kingdom of Tonga, the Government of Japan decided to conduct a preliminary survey for formulating a plan designed to develop water resources and tourism with a view to promoting the socio-economic development of the Kingdom.

The survey was carried out by the Japan International Cooperation Agency, the executing organ of Japan's international cooperation, from 17th to the 31st of March, 1979 in the Kingdom. Based on the field survey and the discussion held with the officials concerned of the Kingdom of Tonga, the survey team has formulated the present report.

I hope that this report will prove to be useful for further development of the Kingdom of Tonga and contribute to promoting friendship between the Kingdom and Japan.

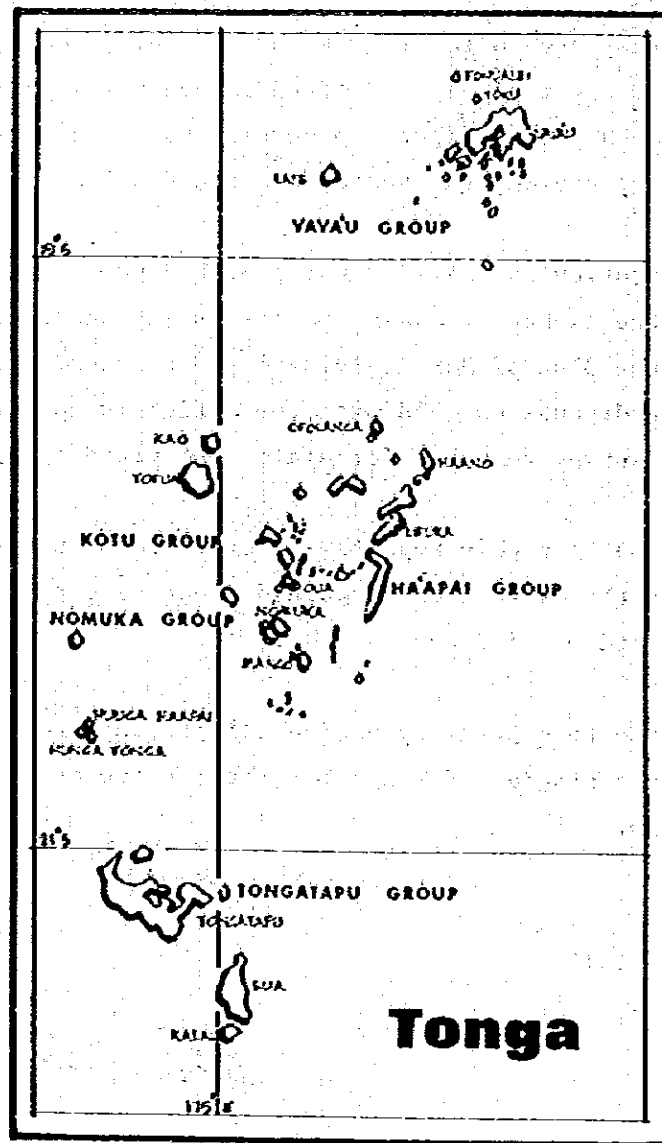
I wish to express my profound appreciation to the officials concerned of the Kingdom of Tonga for their close cooperation extended to the survey team.

May, 1979



Shinsaku Hogen
President
Japan International Cooperation Agency

Map of Tonga



SUMMARY AND CONCLUSION

1. Tourism and Airport Development

The Tonga Tourism Development 10-Year Plan places an emphasis on the improvement of Tonga's external accessibility, particularly on the extension of Air New Zealand's service into Tonga and on the reduction of Auckland-Tonga air fare. In conjunction, Fua'amotu Airport facilities will have to be up-graded. As long as Australians and New Zealanders are conceived of as prospective visitors to Tonga, improvement to the extent of enabling full operations of B-73's will be adequate. When a certain number of package tour visitors will be guaranteed from the United States (via Honolulu) and Japan, however, a runway extension to accommodate DC-8 class aircrafts will become necessary.

In any event, a practical plan should be urgently formulated and implemented for the development of selling points of Tonga's tourist industry.

2. Fisheries

According to a survey by the United Nations' Food and Agriculture Organization (FAO), Tonga's annual fisheries yield could be expected to increase by 2,160 tons. Assuming that 30% of this has already been realized, achievement of the remaining 70% will result in a yield increase from the current performance level of 1,631 tons per year to an estimated 3,136 tons per year. This potential production level, when reached, will exceed a forecast demand level of 2,700 tons per year by approximately 440 tons. In order that such a potential level be attained, FAO has recommended that outer reef fishing and skipjack fishing be developed, utilizing from 42- to 52-foot fishing boats.

Based on their independent surveys, FAO and Fisheries Officer

Wilkinson of the Government of Tonga emphasized on the economic feasibility of outer reef fishing without suggesting any practical approach to the development.

3. Implementation

The Government of Tonga has formulated a long-term plan for the development of both tourism and fisheries, based on which a Fourth 5-Year Development Plan is currently being drawn. Therefore, Japan's assistance is unnecessary at this stage but will be useful in the stage of organizing projects under such a plan.

Essential to the implementation of such projects will be to precisely define and strengthen the functions of implementing bodies. For instance, Tonga Visitors Bureau may be reorganized into a Tourism Development Public Corporation and be given authority to operate the International Dateline Hotel in order that the Corporation may generate from such operation funds to finance various projects. The feasible and the unfeasible should be clearly distinguished from each other under pragmatic thinking. This is true also with fisheries. In any area, it is vitally important that foreign assistance and self-help efforts of Tonga will be incorporated into a most effective system of project implementation, if the Tongan economy is to accomplish the desired take-off.

1. Introduction

The technical cooperation survey team to the Kingdom of Tonga was organized with the members listed below.

Leader : Mr. Akio Tanaka Deputy Director,
Development Cooperation Division,
Economic Cooperation Bureau,
Ministry of Foreign Affairs

Constituent Members:

Mr. Koichiro Okazaki Acting Head,
Planning Section,
Planning Department,
Japan International Cooperation
Agency

Mr. Hajime Tanaka International Studies Department,
Nomura Research Institute

Local Participant:

Mr. Hidero Yaji First Secretary,
Japanese Embassy in New Zealand

The Team's itinerary was as follows:

March 17	Departed Tokyo International Airport
March 18	Arrived Auckland
March 19	Departed Auckland, arrived Tongatapu
March 24	Departed Tongatapu (Yaji and H. Tanaka) Arrived Wellington
March 25	(A. Tanaka and Okazaki) Arrived Tokyo
March 28	(H. Tanaka) Departed Wellington, arrived Canberra
March 30	(H. Tanaka) Departed Canberra
March 31	(H. Tanaka) Arrived Tokyo

The Kingdom of Tonga Government was most cooperative in facilitating the survey. In response to very open questions asked by Team member H. Tanaka, Ministry of Foreign Affairs officials of the Government of New Zealand offered the government thinking and/or their personal views with equal frankness. Researchers on South Pacific at the Victoria University and the Australian National University identified points which had been overlooked by the Survey Team.

In all, the Survey Team enjoyed the assistance and cooperation of so many people, to whom deep gratitude is offered in lieu of the mention of individuals.

2. Background

Tonga is a small independent kingdom located in the South Pacific. The South Pacific economies are generally not only in the stage of development but also are characterized by their smallness of scale and geographical isolation from each other. Tonga's economic scale can be understood by its population of only 90,072 (December 1976 census*). These small and scattered economies can hardly be expected capable of accomplishing autonomous development.

Tonga's per capita gross domestic products (GDP) is low as T\$197 in 1974 and T\$252 (in current price) in 1975. In a subsistence economy such as Tonga, however, the people are leading much richer living than suggested by such economic indicators as average per capita income. The application is little meaningful of usual methods of economic analysis to an insular economy which consists of a self-supply sector and a market sector of unknown composition ratios. Therefore, the following will remain mere mention of highlight facts about the Tongan economy.

Chief export item of Tonga is copra, whose export was cut by half in terms of value in 1976 due to the stagnation of market (but in the case of desiccated coconut, export volume increases compensated for stagnant prices). The second export item is banana, whose export (in value) has followed a trend of gradual decline** due to a blight (See Table 1).

Despite the fact that the Kingdom of Tonga is a country of the primary industry, food, beverages, and tobacco constitute the category of major import items, whose import values are two or three times those of the second import items in the category of machinery and transportation equipment. Another point of note is that import quantity of mineral fuels has been increasing rapidly (See Table 1). The foreign trade structure of

* Judy Todor (ed), Pacific Islands Year Book, 11th Edition, Sidney and Melbourne Publishing Co. Pty Ltd. Sidney, 1977, p. 399.

** See Ministry of Foreign Affairs, New Zealand, Tonga Aid Mission: Report, July 1978, p. 4 for the effects of assistance on the revitalization of banana trees and the replanting of coconut trees.

Tonga has resulted in a chronic trade deficit (See Table 2). Offset factors against the trade deficit are tourism income, advanced nations' grants-in-aid, and remittances by overseas Tongans (See Table 3).

The mono-cultural trade structure and the unproportionately large self-supply sector restrain the size of financial resource available for the operation of the national economy. In addition, much of the government revenue depends on trade tax, as usually the case with developing economies. Thus, the Tonga's economy has but an unstable footing.

The cost of projects under the Third 5-Year Development Plan and fund commitments therefor at the time of initial project implementation are summarized as follows:

Total project cost	T\$29,319,622
Committed:	
By the United Kingdom	T\$864,040
By New Zealand	T\$2,053,000
By Australia	T\$78,600
By Asian Development Bank	T\$1,300,000
By FAO/UNDP	T\$362,334
Local cost	T\$2,906,178
	T\$7,564,152

Thus, the overall implementability rate of these development projects in terms of fund availability was about 25%. In comparison, the initial three-year (up to 1977) execution rate (in terms of monetary value) of these projects was even worse at only 19%, at which pace the final execution rate would be only about 32%. Even if delay in fund disbursement is taken into consideration, the full accomplishment of the projects would be nearly impossible without substantial increases in foreign grants in the future.

Future deterioration in the Tonga's international balance of payment is clearly indicated by the fact that autonomous development is difficult for small scale and scattered economies, the fact that mineral fuels

importation is rapidly growing even though chances for export expansion are small, and the fact that less can be expected of remittances by overseas Tongans in view that stricter regulatory controls on alien labour are being enforced in foreign countries. In this view, tourism and fisheries industries discussed below will be vitally important, along with agriculture, to the improvement of Tonga's international balance of payment.

3. Tourism*

3-1 Tourism in the South Pacific

The greatest difficulty in the development of tourism industry in the South Pacific lies in the distance from any origin of tourists. Distance to Fiji from various tourist origins** is shown on Table 6 together with economy class one-way air fare (as of January 1979). The comparison offered on the table clearly shows that the major sources of visitors to the South Pacific are Australia, New Zealand, and the United States (via Hawaii).

Table 7 presents the numbers of immigrants and emigrants to and from Fiji (through Nadi), American Samoa (through Pago Pago), New Caledonia (through Noumea), New Hebrides (through Port Vila), and Tahiti (through Papeete). (As for Tonga, an occupancy rate of 65% has been assumed based on flight schedules and a transit rate of 36% has been assumed for Auckland route***)

In an attempt to gain basic understandings of tourism in the South Pacific, visitors to Fiji (more information is available on visitors to Fiji than on visitors to other South Pacific destinations) will be examined.

Visitors to Fiji have been classified by their origin on Table 8. The somewhat obsolete data do indicate that Australia, New Zealand, and the United States were the major origins of the visitors, as can be imagined from traffic flow.

* Discussion in this section will be limited to visitors via air transportation in view of their impact on tourism income.

** Distance to Tonga can be obtained by adding 170 miles (flight time one hour and forty minutes) to the distance shown on Table 6.

*** Australian Development Assistance Bureau, Kingdom of Tonga Fua'amotu Airport, August 1977, p. 6.

Tourists who originated from Australia, New Zealand, and the United States during the year of 1970 have been classified on Table 9 by their destination in the Pacific Region.

The report on Tourism Development Programme for Fiji (which is the source of Table 9 data) analyzed visitors flow and pointed out that the major driving forces to have caused the change of American visitors' destination from Southeast Asia to the South Pacific were direct air services and the lower excursion fares*.

The report also reported the findings of interview of American travel agents and concluded that, although the number of visitors to Fiji appeared large, 90%** of them were stopovers en route to Australia or New Zealand and, therefore, tours to South Pacific destinations, per se, would be unfeasible***.

If the claim is right that Fiji is but a stopover point on way from the United States to New Zealand or Australia, it would be impractical to try to divert the tourists from Fiji to spend two or three days in Tonga, subject to confirmation through a feasibility study.

In view of the apparent proximity between the behaviors of visitors from Australia and visitors from New Zealand, the characteristics of Australian tourists will be reviewed for the purpose of this study. Their major destinations are New Zealand, Singapore, and Hong Kong. This can be attributed to the political ties, language compatibility and their congeniality to each other****. This is encouraging to the future of tourism in Tonga. However, Australian travel agents interviewed stated their expectations for yearly 25% increases in Australian overseas travellers,

* UNDP, IBRD, Government of Fiji, Tourism Development Programme for Fiji, 1973, p. 35.

** UNDP, IBRD, FOG, op. cit., p. 36.

*** This conclusion must be reviewed in the light of the current situation.

**** UNDP, IBRD, FOG, op. cit., p. 33.

provided that the growth rate and the shares of their destinations will be substantially affected by the charter flight policy of Quantas Airline.

The Pacific Division Director of the New Zealand's Ministry of Foreign Affairs points out* that, although the number of Japanese visitors to the South Pacific has so far been limited, success in attracting them to the region will be an important key to tourism development in the region in the future, in view that hotels have been established in New Caledonia and Fiji under Japanese investment are faring well serving Japanese tourists. Japan Air Lines' charter flight implementation schedule for 1979 envisages charter flights to new destinations, namely, 19 charter flights to Tahiti, 17 to New Zealand, and 20 to Fiji during April through September, all originating from Okinawa and stopping over at Honolulu. Aircrafts will be DC-8-55's and DC-8-62's.

Now, let us examine Japanese tourists deeming them as the representative of potential visitors to the South Pacific.

Japan Air Lines has undertaken a survey under the title of "Micronesian Tourism and Air Transportation," which, among other things, states to the effect that:

"To go from Japan to Fiji--which has been receiving attention as a tourist spot in recent years--one must either go down to Sidney or go eastward to Honolulu to catch a US-Australia route flight. The transportation of a quantity of Japanese tourists to Fiji by either of these courses is beyond hope in view of the entailing time and fare. If a route can be opened via Guam as a stopover, Japan-Fiji travel distance will be shortened as shown by the table below. Extension of such a route to Auckland will result in a favourable route profitability by serving both straight Japan-Fiji and Japan-New Zealand transportation demands--which will be low in initial periods--with the established Japan-Guam and Fiji-New Zealand transportation demands, besides the overall flying distance is shorter than the existing route**.

* Statement during interview by Team Member H. Tanaka.

** Japan Air Lines, Micronesian Tourism and Air Transportation, Jan., 1973, Himeo., pp. 56 - 58.

Route	Distance (Nautical Miles)
NRT = GUM = SYD = NAN	5,942
NRT = GUM = NAN	4,044
NRT = GUM = SYD = AKL	5,391
NRT = GUM = NAN = AKL	5,208

In the absence of a survey over Japanese tourists in the South Pacific, the findings of in-flight surveys over passengers en route to Guam carried out by the Nomura Research Institute in August and October 1977* will be summarized in the following.

- Surveys revealed that 41.5% of the air passengers already had the experience of an overseas travel (in Hawaii in the cases of half of the 41.5%) and that the repeat rate was 12.7%, which disproved the common belief that Guam was the first foreign destination for Japanese travellers but without sufficient attraction for a second visit.
- An overwhelming majority of the surveyed passengers were on a package tour.
- "Geographical closeness from Japan" was mentioned as the attraction of Guam by the largest number of passengers, followed by "the reasonable amount of expenses involved."
- The greatest attraction of Guam was "beautiful sea and shore" and the second, "southern nature unseen in Japan." "Pleasure of experiencing a foreign culture" (which is the major attraction of overseas travel elsewhere) was rated low in the case of Guam.
- "Inadequate means of transportation" was the object of substantial discontent. In addition, non-availability of adequate tourist

* Department of Commerce, Government of Guam, A Feasibility Study for a Convention Center in Guam, June 1978, pp. 11 - 14.

information and poor security were raised as important derogative factors.

- Japanese visitors go to Guam to enjoy days without labour in general, rather than in search for something different or for some activity.

3-2 Tonga Tourism Development 10-Year Plan

A development plan which is believed to underlie the Fourth 5-Year Plan has been formulated by the British Ministry of Overseas Development*. This plan will be summarized and commented.

The Plan proposes eight action programmes in seven action areas with a total investment of from five to nine million Tonga dollars (3/4 to be invested by the Government) during the period of five years to come, for the purpose of increasing the number of visitors to Tonga from the present level of 11,000 per year to 33,000 by 1985.

The important of the eight action programmes are**:

- Improvement of external accessibility
- Expansion of tourist accommodation
- Diversification of tourist facilities
- Strengthening of marketing and information services

The seven action areas are:

- The waterfront and commercial area of Nuku'alofa***

* Roger Lascelles, Baber Muntaz and Michael Safier, Tonga, A Development Plan for Tourism 1978 - 87, Bartlett School of Architecture and Planning, University College London, Aug., 1978.

** R. Lascelles, et. al., op. cit., p. 37.

*** Areas observed by JICA Team during the survey of March 19-27, 1979.

- The islands and reefs stretching north-north-east of Tongatapu Island
- Selected beach sites on Tongatapu*
- The forest ridge and cliffs of Eua
- The town of Pangai and nearby beaches on Lifuku Island
- The harbour front and commercial areas of Neiafu
- Selected beaches and islands on the Vava'u Group*

The action programmes/areas grid points to actions to be taken in three phases, namely, immediate future, 1979-1982, and 1982-1985, as shown by Table 10.

Crucial problems that must be solved for the development of Tonga tourism are:

- Limited direct services to main markets**
- Poor connections between trunk carriers and regional carriers serving Tonga**
- The high level of air fares on trunk and regional carriers serving Tonga and neighbouring islands**
- The absence of national carrier or other decisive facility of external access
- The lack of a unique tourist attraction which would place Tonga in a better position than neighbouring islands (hence, a competitive market).

The following will be key policy items for the overcoming of the above problems and achieving the ultimate objective of realizing substantial gain in tourism income:

* Areas observed by JICA Team during the survey of March 19-27, 1979.

** R. Lascelles, et. al., op., cit., p. 26.

Current Level of Visitors

Greater tourists spendings (more tax-free shops, amusement facilities)

Longer length of stay (amusement facilities, intra-Tonga tours)

For Increased Number of Visitors

Attraction of more visitors from the existing sources (greater serviceability of flights on the Fiji-New Zealand-Australia route, lower air fare)

Attraction of visitors from new sources (Package tours from the United States and Japan)

As it is clear from the above classification of key policies, the development of an adequate external accessibility is very important along with the accomplishment of longer lengths of stay and greater spendings. One of the purposes of this Study is to evaluate the need of a feasibility study on the expansion of the airport. The improvement of accessibility will be discussed in the following Chapter.

4. Tourism and Air Transportation

Tonga, A Development Plan for Tourism 1978-1987 enumerates* the following as matters requiring immediate attention:

- The inducement of Air New Zealand to fly a regular Auckland-Tongatapu service.
- The achievement of direct air links between Noumea, Nadi and Fau'amotu and between Apia and Vava'u.
- The securing of comparable fares from Auckland as between Tonga and Fiji, and a through fare quotation from Sydney
- The obtaining of inclusive tour package rates from major market areas
- The implementation of phase one and two of the latest Fua'amotu airport development study, and the upgrading of Vava'u airfield to accommodate HS-748 flights without restriction
- The improvement of port facilities at Neiafu and the implementation of the already sanctioned project for extending
- A detailed consideration and first stage implementation of an appropriate form of national airline, built on the immediate requirements of regional and local tourist traffic.

The above is a complete list, but without the mention of what should be Tonga's tool of negotiation and of a practical means for Tonga to acquire such a tool. It is essential that the air lines and the countries concerned be sounded off for their thinking and the probability of their cooperation fully evaluated prior to implementation, if the development projects are to be executed successfully and risks are to be avoided.

Currently, the following air lines serve Tonga (Fua'amotu Airport)**:

* R. Lascellés, et. al., op. cit., P VIII.

** R. Lascellés, et. al., op. cit., p. 20.

Tonga: Direct Air Services 1978

To Tonga	Weekly Frequency	Aircraft	Weekly Seat Capacity
From Apia	3	HS 748	120
	1	B 737	100
From Auckland	1	B 737	100
	3	BAC 111	222
From Niue	1	HS 748	40
From Suva	3	BAC 111	222
From Pago Pago	3	Twin Otter	57
	4	HS 748	160

As Tonga will negotiate with air lines, she should be engaged in aggressive marketing activities. An important element will be to develop a business entities capable of formulating and implementing periodical package tours.

A comparison of past visitor statistics against the then available accessibility will prove the importance of adequately improving Tonga's external accessibility. As Fiji Airways (now, Air Pacific) changed its aircraft from Heron (11-seat, reciprocating engine) to HS-748 (40-seat, prop-jet) in 1968, the number of visitors to Tonga increased from the 1,530 in 1967 to 3,130 in 1968. As Fua'amotu Airport was improved to accommodate BAC-111 jets and as BAC-111 jets commenced serving Tonga in 1973, the number of visitors increased from the 4,597 in 1972 to 6,356 in 1973. Subsequently, as the number of BAC-111 flights serving Tonga increased (except during the period of the oil crisis), the number increased from the 9,312 in 1976 to 11,023 in 1977. The realization of potential visitors by increase in flights is not peculiar to Tonga but is generally observed.

With regard to the improvement and expansion of airport facilities, let us first look at the airport development plan formulated by the

Australian Government in 1977*, which contemplates on development in three steps:

First Step

In order to accommodate BAC-111-475's at their maximum take-off weight (and to accommodate B 737-200 under certain restrictions on take-off weight), an estimated construction cost of T\$1.4 million (in 1977 price) be invested for immediate:

- Runway extension by 120 metres (total runway around 2,070 metres) and
- Terminal building expansion to handle 100 arriving and 100 departing passengers at the same time.

Second Step

In order to accommodate Tonga-Auckland service of B-727's at full passenger load (and to accommodate the below listed aircrafts under certain weight restrictions)**, an estimated additional construction cost of T\$3.5 million (in 1977 price) be invested for:

- The runway extension by additional 215 metres (for the total runway length of around 2,300 metres), and
- Extension of the aircraft apron, strengthening of the existing pavement and improvement to the terminal building to cater for 150 arriving and 150 departing passengers at the same time, both in 1985 or later.

* Australian Development Assistance Bureau (ADAB), Kingdom of Tonga, Fua'amotu Airport, Report on Airport Development, Aug., 1977.

** ADAB, op. cit., p. 10.

Unrestricted Operations
(Runway Length 7,500 FT/2,300 M)

	Maximum Take-off wt. lb (kg.)	Tyre Pressure p.s.i. (kPa)	Payload	
			lb (kg)	Passengers' Seat (See note 2)
BAC 111-475	92,000 (41,800)	80 (550)	14,000 (6,400)	70 (T/A)
Boeing 737-200	116,800 (53,000)	150 (1,040)	24,200 (11,000)	119 (T/A)
Boeing 727-200	186,000 (84,400)	160 (1,100)	32,000 (14,500)	157 (T/A)
Boeing 707-320	274,000 (124,000)	160 (1,100)	28,300 (13,000)	140 (T/H)
Boeing 747-200	657,000 (298,000)	160 (1,100)	94,800 (43,000)	463 (T/H)
DC10 30	472,000 (214,100)	160 (1,100)	61,700 (28,000)	300 (T/H)

- Notes:
1. Unrestricted operation is defined as operations by regular public transport aircraft without restriction in number of aircraft movements at the take-off weights listed.
 2. Passenger numbers on the basis of 200 lb. (91 kg) per passenger. Sector T/A = Tonga/Auckland; T/H = Tonga/Honolulu.

Third Step

In order to accommodate Tonga-Honolulu service of B-747/DC-10 class aircrafts, an additional construction cost of an estimated T\$2.5 million (in 1977 price) be invested for:

- Extension of the runway by 300 metres (total length around 2,600 metres),
- Widening of the strip from 177 metres to 300 metres,
- Installation of a precision approach and landing system, and
- Terminal building expansion to cater for 300 arriving and 300 departing passengers at the same time.

The Tourism Development 10-Year Plan advocates the immediate implementation of both the First and Second Steps*. Before discussion of the justification of this advocacy, let us try to discern qualitative difference between the First Step actions and the Second Step actions. Table II shows the ratios of the direct operating cost (DOC) of L-1011 to DOC of B-727 (in 1975 price) by route distance and by the number of passengers per annum**. Calculation of the ratios is not extended to the route distance of 2,100 kilometres, which corresponds to that between Tongatapu and Auckland, but such ratios can be inferred from the way in which the ratios shown on the table change (the ratio is little sensitive to route distance, because the rate of increase diminishes as route distance increases).

In terms of air transportation demand, B-727's would be more advantageous than L-1011's when the number of passengers is in the order of 50,000 per annum. When the number of passengers reaches 100,000, the two would become comparable to each other and remain so up to about 500,000. The higher the frequency of flights the shorter the actual (including waiting time) travel time and, therefore, as long as DOC is

* R. Lascelles, et. al., op. cit., p. 126

** The method of calculation is in accordance to Air Transport Association of America, Standard Method of Estimating Comparative Direct Operating Cost of Turbine Powered Transport Airplanes, Dec. 1967.

the same, B-727's would be preferred over L-1011's up to about 500,000 passengers per year. In the order of 750,000 passengers or more, L-1011's would be clearly advantageous. In other words, within the limit of visitors flow as expected by the Kingdom of Tonga, full operation of B-727's would be more efficient than air-bus type aircrafts represented by L-1011.

A similar but more simplified comparison is made between B-727's and B-737's as follows, based on the data calculated for various routes:

km	DOC of B-727/DOC of B-737
152	.9056
530	1.0189
727	1.0384
948	1.0517
1,285	1.0641
1,702	1.0731

No assertion can be made in the absence of calculations by the number of passengers, but the simple comparison of DOC's in the above tends to suggest the recommendability of full operation of B-737's until the number of passengers will increase to the extent requiring the operation of B-727's.

The second consideration about the qualitative difference between the First Step and the Second Step actions pertains to the possibility of serving tourists on package tours. Table 12 presents the landing/take-off distance of various air transports by their cruising radius class. The group of transports belonging to the first category (2,200 kilometres or less) cannot serve between Tonga and Auckland. Those in the second category ($5,100 > R > 2,200$ km) can serve as regional carriers but not between Tonga and Honolulu or Guam. Those in the third category can serve long distance routes. Even the runway extension in the Second Step would allow the operation of B-707's and DC-8's--which are often used to serve package tour passengers--only under certain restrictions.

In view of the above, the suggestion of ADAB is believed logical that the First Step development* is quite adequate while only the full operation of BAC-111-500 and B-737-200 class aircrafts is sufficient and that the Second Step development should be implemented when the full operation of B-727-200 class aircrafts has become essential. If air transportation demand forecasts and the result of negotiation with Japanese and American air lines point to certain volume of package tour tourists, however, both the First and the Second Steps should be implemented at the same time as advocated by the 10-Year Plan.

* The runway should be a little longer than indicated by the Report in the interest of B-737-200 operation.

5. Fisheries

The current status and future prospect of Tongan fisheries industry will be summarized based on the 1978 FAO report* which offered a comprehensive and technical statement of measures that should be taken.

As can be seen from Table 13, which presents the current status of Tongan fisheries industries, the current level of production is less than meeting the demand. This is hard to believe in view of the geographical situation of the Kingdom of Tonga.

Two studies answer the question as to whether the production's failure in meeting the demand is due to the lack of fisheries resource or to immature fishing technology: The study conducted by the Government of Japan's facts finding mission in December 1973 through January 1975 and the study done by FAO from 1975 through 1977**. FAO study, which was more intensive than the Japanese study, will be discussed.

The total potential annual fisheries yield of 2,150 tons has been calculated from Table 14, which summarized the FAO study findings (provided that the yield of skipjack which is live bait constraint has been calculated to be only 450 tons per year). Because this total represents future increases in most part, 70% of it is added to the 1977 production of 2,150 tons and a total of 3,136 tons per year is arrived at, which is 436 tons in excess of the demand of 2,700 tons according to Table 13.

It may be concluded that the fisheries resource available to Tonga is less than "very abundant" but is that which can not only satisfy domestic demand but also support exports when the resource is fully developed.

* FAO, Tonga, Marine Resource Development, Oct. 1978

** FAO, op. cit.

Measures for the securing of the needed volume as recommended by the FAO report have been summarized by Chart 1. Likewise, constraints to development as pointed out by ADB* have been summarized by Chart 2. The FAO recommendation for fisheries development using 42- to 52-foot fishing boats is consistent with ADB-pointed out constraint as seen from the current situation of the industry. The feasibility of FAO recommendation for the development of outer reef and skipjack fishing, which is deemed further developable based on FAO recommendation, depends on the economy of such fishing vessels. FAO report calculates:

• 52/54-foot snapper-smack (ten men crew) vessel	
Anticipated revenue/year	T\$58,880
Anticipated annual expenditure	T\$31,595
Indicative net-returns	T\$27,285**
• 42-foot multi-purpose fishing (six men crew) vessel	
Anticipated revenue/year	T\$33,600
Anticipated annual expenditure	T\$15,458
Indicative net-returns	T\$18,142***

In his paper which advocated changeover from reef fisheries to outer reef and near pelagic fisheries, Wilkinson, Fisheries Officer of the Government of Tonga, estimated net returns of about T\$6,750 per annum after a 50% allowance for interests and operation expenses against the revenue of T\$13,500 as estimated based on 30-week operation (5-day week) of a from 30- to 40-foot fishing boat, a daily catch of 300 lbs., and a fish price of T\$0.3/lb.****

Even if difference in the size of fishing vessels is taken into consideration, a substantial gap exist between the net returns of T\$6,750 per year per boat as professionally estimated by Wilkinson and the net

* ADB, op. cit., pp. 25 - 27.

** See Table 15 for detail.

*** See Table 16 for detail.

**** W.A. Wilkinson, Outer Reef and Near Pelagic Fisheries, Nimeo, p. 3.

returns of T\$27,285 per year per boat as estimated by FAO based on an experimental operation.

The Wilkinson Paper and FAO Report are compared for information pertaining to production (the former gives no information on expenses):

	Wilkinson	FAO
Fish price (T\$/lb.)	.3	.33
Annual operation days	150	180 ¹⁾
Daily catch (lb)	300	960
Round-trip trawling (lb/day)	0	1,152

1) Included 20 days of trawling operations on round trip.

FAO conceived of intensive fishing operations as can be seen from the fact that it assumed 120 lb/reel/day in contrast to 75 lb/reel/day of Wilkinson if 4 reels is assumed for each boat (or 50 lb/reel/day if 6 reels is assumed), and that FAO assumed trawling operations on round-trip. Whether the FAO concept is realistic or not should be tested by experiment before implementation.

The introduction of an entirely new fishing technique will naturally entail training. FAO offered a curriculum consisting of a 7-week shore course and a 5-week ocean training (see Chart 3). When, in addition to the training, fishermen will have acquired consciousness of hard labour-high income, they will be more likely to come to own their own boats (provided that adequate financial aid will be provided). In this sense, hard, non-compromising training should be given.

The ADB Report dedicated its last chapter to policy issues and advocated:

- Establishment of a special lending agency, and
- Establishment of a special fishing cooperation.

The Tonga Development Bank (TDB) has since been established and is now playing the role of such a special lending agency. Although the newly established TDB is actively engaged in lending business, it has not quite started to finance the construction of 40- to 50-foot vessels. Construction of such vessels would be impossible in Tonga at the present time. Therefore, when said policy issues are overlapped with FAO recommendation for emphasis on outer reef fishing, a practical suggestion results.

6. Proposal

The Fourth 5-Year Development Plan is now being compiled to cover both tourism and fisheries--the two subjects of this Study--based on papers as referred to in the above. Therefore, Japan's assistance is unnecessary at this stage but is vitally essential to Tonga to formulate practical programmes for the realization of the long range development objectives.

Practical approaches to such programing efforts in the areas of tourism and fisheries will be demonstrated by the following discussions.

6-1 An Example of Tourism Project Implementation

Project implementation problems in developing nations generally stem not from poor planning but from the lack of creativity and low efficiency on the part of the implementing body. Therefore, it is desirable that the function of implementing body be first clearly defined.

Here, let us assume that the Tonga Visitors Bureau is enhanced and reorganized into a Tourism Development Public Corporation, and that International Dateline Hotel (IDH) is leased to this Corporation on a long term base in order that the secured operation base is provided to the Corporation together with other adequate incentives. The next step would be to determine the object of action. This Corporation would gain creditability based on the cash flow to be generated through the IDH operation. Then, the Corporation may be able to use such credit for the purpose of extending visitors' lengths of stay by, for instance, developing marine recreational facilities or vacation villages for hibernating visitors or for the purpose of increasing tourist spendings by, for instance, expanding existing duty-free shops and establishing new ones. In order to select from such many projects those which are feasible and will have the greatest desirable impacts, it will be essential that detail studies be done on

the objects of action, plan scales, cause-effect relationships between projects, and financial and human resources (including such potential resources to be created as a result of trainings and assistances).

If, for instance, increase in visitor arrivals is set forth as the immediate objective and if the extension of Air New Zealand service to Tonga becomes essential, a sufficiently attractive condition not only to Tonga but also to the airline must be offered in order to convince and have Air New Zealand open Tongatapu-Auckland route, whether it be to organize package tours by strengthening overseas agents network, thereby gradually inducing Air New Zealand to offer irregular flights or to guarantee a certain level of fare revenue at the risk of Tonga.

The implementation of each basic project must be accomplished through such a practical approach as exemplified in the above.

6-2 An Example of Fisheries Project Implementation

Let us assume that a Special Fishing Corporation (SFC) is to be established as the body of project implementation according to the policy issues raised by ADB Report in the above. The plausible course of SFC would be either:

- To make efforts for the development of outer reef fisheries, or
- To offer to local fishermen marketing capabilities on a nationwide basis.

If the establishment of outer reef fisheries is set forth as the main objective in accordance with the recommendation of FAO, the sequence of essential projects would be:

- Step 1: Establishment of outer reef fisheries training centre (located in Vava'u)
- Step 2: Designing of a standard fishing vessel and the establishment of a ship yard (located in Vava'u)
- Step 3: Provision to the graduates of the training centre of standard fishing vessels under the "hire and purchase" system.
- Step 4: Establishment of a system for the purchase of catches and the construction of a cold storage (located in Vava'u and later in Ha'apai)
- Step 5: Commissioning of a transport to serve between Vava'u and Tongatapu.
- Step 6: Development of a marketing/sale system in Tongatapu.

Unlike the case of tourism, a stable source of local funds is non-available for fisheries development. At each step, the possibility of foreign assistance must be ascertained. In view that the system/facility of Steps 4 and 6 already exist even in an inadequate form, the key task will be to develop a fleet of standard fishing vessels.

Ever since the 200-mile economic waters have been established, world's fishing nations have been stopping fishing operations and starting to purchase catches from marine resource nations. In this sense, for Tonga to develop standard fishing fleet and to have capabilities of exporting catches will be benefitable both to Tonga and fishing nations granting aid to Tonga. It is likely that this will constitute an important selling point in obtaining foreign aid for the Steps 1 and 2 projects (or for the provision of ready-built standard fishing vessels).

Remaining question would be as to whether or not outer reef fishing boats may be operated within the realm of economy. Therefore, experimental studies to establish economic and technical feasibility based on the factor of fishermen will be essential (such studies will include those on, for instance, relationship between Ekiaki and Tavake incentive systems and the crew morale, as well as experimentation using vessels leased under hire and purchase system).

Table 1

Statistics of the Kingdom of Tonga

	Unit	Source	1970	1973	1974	1975	1976
Population and Migration							
Total - as at 31, Dec.	(000)	St/Ab.2)	88.3	95.1	97.2	100.1	n.a.
Net migration	No.	T.P.1)	-1,326	-1,469	-2,248	n.a.	n.a.
Gross Domestic Product (year ending March)							
GDP at factor cost	T\$ (M)	St/Ab	11.8	15.0	19.1	25.2	n.a.
GDP per capita	T\$	St/Ab	133	158	197	252	n.a.
Agricultural Production							
Copra	tons (000)	T.P.	8.0	10.4	12.1	n.a.	n.a.
Dedicated Coconut	tons	T.P.	1,345	864	924	n.a.	n.a.
Transport							
Inwards cargo	tons (000)		27	33	46	53	37
Outwards cargo	tons (000)		18	16	18	26	18
Vessels arriving	psn (000)	M.F.A.	425	610	611	615	618
Aircraft arrivals		TVS3)	325	405	399	469	584
Building & Construction							
Private houses	No.		255	631	860	1,006	n.a.
Tourism							
No. of tourists Air	No.	T.P.	3,600	6,356	6,403	6,770	9,312
No. of tourists Cruise	No.	T.P.	n.a.	39,627	50,695	62,911	43,074
Consumers' Price Index (July-Sept. 1969=100)							
All groups	Index	St/Ab	101	133	152	166	n.a.

(Cont.)

	Unit	Source	1970	1973	1974	1975	1976
External Trade Balance							
Imports (cif)	T\$(M)	St/Ab	5.5	8.0	11.8	13.0	11.7
Exports (fob)	T\$(M)	St/Ab	2.6	3.2	4.4	4.4	3.2
Trade deficit	T\$(M)	St/Ab	-2.9	-4.8	-7.3	-8.6	-8.5
Exports (fob)							
Copra							
- value	T\$(000)	St/Ab	1,345	2,175	3,180	3,088	1,659
- volume	tons(000)	T.P.	7.9	12.4	8.1	19	13
Desiccated coconut - value	T\$(000)	St/Ab	521	336	428	345	375
- volume	tons	T.P.	1,538	1,332	789	136	197
Bananas							
- value	T\$(000)	St/Ab	466	306	360	370	276
- volume	cases(000)	T.P.	143	113	112	n.a.	n.a.
- price/case	T\$	T.P.	3.23	2.70	3.21	n.a.	n.a.
Imports							
Food, Bev., & Tobacco	T\$(000)	T.P.	2,060	3,303	4,733	n.a.	4,138
Mineral fuels	T\$(000)	T.P.	328	463	635	n.a.	1,298
Manuf. goods	T\$(000)	T.P.	1,256	1,581	2,604	n.a.	959
Machinery & transport	T\$(000)	T.P.	748	1,117	1,283	n.a.	1,828

Source: Anthony Haas (ed), "New Zealand and the South Pacific," Asia Pacific Research Unit, Wellington, 1977, pp. 89-90 quoting the following three reports.

- 1) T.P.: Kingdom of Tonga, Third Development Plan 1975-80
- 2) St/Ab: Statistical Abstract (1975), Kingdom of Tonga
- 3) TVS: Tonga Visitor Statistics for 1975, Tonga Visitors Bureau

Table 2

Balance of Payments
(1974/75-1976/77)

	T\$ (000's)		
	1974/75	1975/76	1976/77
Exports	5,678.5	3,586.4	3,717.8
Imports	13,960.9	12,845.8	13,383.4
Trade balance	-8,282.4	-9,259.4	-9,665.6
Balance on services	2,391.9	1,776.1	1,838.3
Net transfers	6,145.4	5,889.1	6,093.4
Balance on current account	254.9	-1,594.2	-1,733.9
Capital transactions			
- Official	2,290.6	1,577.9	1,395.0
- Private	24.3	86.4	-72.4
- Other	-687.2	-1,082.5	2,470.8
Balance on capital account	1,627.7	581.8	3,793.4
Change in monetary reserves	1,882.6	-1,012.4	2,059.5

Source: Central Planning Department Nuku'alofa,
"Mid-Term Review Third Development Plan
1975-1977", Kingdom of Tonga, pp.33

Table 3

**Summary of Service and Transfer Transactions
(1974/75-1976/77)**

	T\$ (000's)		
	1974/75	1975/76	1976/77
Receipts			
(1) Freight, insurances, etc.	1,044.7	148.3	720.1
(2) Tourism and travel	3,354.7	3,380.2	3,803.3
(3) Other non-factor services	285.0	284.4	317.0
(4) Factor services	635.9	536.0	609.6
(5) Transfers	6,687.7	6,738.5	7,460.9
Total receipts	12,008.0	11,087.4	12,910.9
Payments			
(1) Freight, insurance, etc.	2,065.8	1,271.8	1,408.9
(2) Tourism and travel	278.2	440.8	756.8
(3) Other non-factor services	479.0	681.6	1,138.8
(4) Factor services	105.4	178.6	307.2
(5) Transfers	542.3	849.4	1,367.5
Total payments	3,470.7	3,422.2	4,979.2
Balance on services	2,391.9	1,776.1	1,838.3
Balance on transfers	6,145.4	5,889.1	6,093.4

Source: Central Planning Dept. op. cit., pp34

Table 4

Summary of Recurrent Revenue

(Constant 1975 prices T\$ (000's))

	1975/76		1976/77	
	Actual Revenue	DPIII Forecast	Actual Revenue	DPIII Forecast
Direct taxation	552	345	581	530
Indirect taxation*	2,894	3,418	3,292	3,710
Government services	1,153	1,144	1,440	1,400
Other revenue	290	348	211	443
Total revenue	4,889	5,255	5,524	6,083

Source: Central Planning Dept. op. cit., pp39

* 60% in 1976/77, 68% in 74/75 come from import duties.

Table 5

Development Expenditure by Sector

(Constant 1975 prices T\$(000's))

Sector	Total DPIII target	1975-77 target	1975-77 target	Actual as % of target	Actual as % of total target
Government housing	1,118.3	334.0	96.9	29	9
Education	2,653.1	811.4	216.4	27	8
Health	1,700.3	687.9	470.2	68	28
Agriculture & forestry	4,144.6	1,906.1	877.0	46	21
Fisheries	1,871.3	996.5	509.4	51	27
Manufacturing	2,900.6	395.8	130.1	33	4
Roads	2,149.2	1,113.5	227.3	20	11
Harbors & wharves	3,235.0	210.0	12.3	6	0.4
Civil aviation	2,499.9	268.0	222.6	83	9
Telecommunications	3,049.8	793.2	371.2	47	12
Marine & Shipping	1,266.4	919.5	559.8	61	44
Tourism	435.0	382.5	353.7	92	81
Electricity	920.0	577.6	445.2	77	48
Other	4,633.9	2,181.2	1,675.2	77	36
Total	32,577.4	11,577.3	6,167.3	54	19

Source: Central Planning Dept., op. cit., pp. 13

Table 6

Single Economy Fare and Mileage

from	to	Nadi (FIJI) Fare Mileage ¹⁾		from	to	Nadi (FIJI) Fare Mileage ¹⁾	
Australasia				Calgary			
	Auckland	190.8	1,609		Toronto	671.0	7,568
	Sydney	271.6	2,365		Montreal	736.0	9,416
	Melbourne	343.2	2,892			751.0	9,783
	Perth	543.8	4,809	Asia			
North America					Singapore	654.3	6,345
	Honolulu	490.0	3,808		Bombay	938.6	9,264
	Los Angeles	609.0	6,872		Tokyo	812.5	6,159
	Denver	662.0	7,830	Europe			
	Dallas	686.0	8,349		London	1,059.8	12,723
	Chicago	712.0	8,893		Paris	1,059.5	15,931
	New Orleans	710.0	8,880		Frankfurt	1,153.6	14,679
	Detroit	726.0	9,184				
	Miami	748.0	9,678				
	New York	756.0	9,769				
	Boston	761.0	9,922				
	Vancouver	609.0	7,056				

Source: ABC Travel Guides Ltd., "ABC World Airways Guide,"
Jan. 1979

Note 1) Maximum permitted mileage on World Airways Guide

Table 7

Traffic by Flight Stage (Scheduled Services)
during the Month of March 1976

A \ B	Nadi	Pago Pago	Noumea	Tongatapu ¹⁾	Papeete
Auckland	5,683 ²⁾ 3,692	1,191 1,051	1,122 680	348 348	4,608 2,974
Brisbane	609 460				n.r. 341
Honolulu	8,114 11,718				28 361
Nadi		494 504	912 875		1,684 1,710
Noumea	875 912				
Pago Pago	504 494			229 229	869 162
Papeete	1,710 1,684	827 869			
Sydney	12,410 10,635	1,381 993	2,260 1,855		
Wellington	390 410				
Portvila			1,073 1,051		
Tokyo			150 258		684 374
Vancouver					497 822
Lina					679 822
Los Angeles					4,732 6,905

Source: ICAD "Traffic by Flight Stage - March 1976"

Note: 1) Estimated figure as 65% pax. load factor and 36% transit rate.

2) Upper figure for A to B, lower B to A

Table 8

Distribution of Visitor Arrivals by Nationality to Fiji

Nationality	1966	1967	1968	1969	1970	1971
Australia	10,056	14,928	21,402	26,884	34,409	45,462
New Zealander	12,342	14,830	13,239	15,779	19,070	25,843
American (USA)	10,204	12,754	16,650	22,276	31,257	44,535
British (UK)	4,017	3,698	3,896	5,658	6,491	7,862
Canadian	1,299	1,653	2,277	3,679	5,574	9,752
Pacific Islanders	3,772	4,423	5,764	6,368	7,436	10,144
Continental Europeans	1,963	2,012	1,783	2,893	3,439	5,224
Others	908	1,923	1,447	1,626	2,366	3,329
Totals	44,561	56,021	66,458	85,163	110,042	152,151

Source: UNDP, IBRD, Gov't of Fiji, "Tourism Development Programme for Fiji," 1973, p. 34

Table 9

Visitors from Australia, New Zealand or United States
to Selected Destination Areas in the Pacific Region

(1970)

from to	Australia		New Zealand		America	
Singapore	61,449	(31.6)	-	-	-	-
Hong Kong	57,618	(17.4)	8,970	(12.1)	251,609	(14.3)
Japan	34,500	(21.4)	8,700	(18.7)	-	-
Australia	-	-	96,676	(10.4)	64,281	(21.5)
Thailand	28,185	(31.0)	-	-	159,216	(16.2)
New Zealand	79,626	(14.0)	-	-	30,836	(13.6)
Philippines	12,388	(13.4)	2,092	(16.7)	69,476	(10.0)
Taiwan	12,959	(38.2)	1,481	(37.5)	124,951	(21.5)
Fiji	34,409	(28.8)	19,070	(16.0)	31,257	(25.8)
Tahiti	2,688	(29.9)	903	(40.0)	30,818	(22.9)
Western Samoa	-	-	2,438	(12.3)	8,020	(51.8)
American Samoa	-	-	-	-	10,931	(32.7)

Source: UNDP, IBRD, Gov't of Fiji, op. cit., P. 34-35

Note: Figures in parentheses are annual growth rate during 64 and 70.

Table 10

Stages and Sequence of Development Plan Proposals - Selected Components

For Immediate Action	1979-1982	1982-1985
<ol style="list-style-type: none"> 1. Discussions with Air New Zealand 2. Common rate and regional air fares negotiation 3. Establish hotels corporation 4. IDH improvement programme 5. Acquisition of PRH 6. Guest house loan scheme 7. Promotional and information materials 8. Tour guides training scheme 9. Handicraft design advice 10. Upgrading tourist sites 	<ol style="list-style-type: none"> 1. New external air routes - Nandi and Apia 2. Improve inter-island air services 3. Tourist air fares negotiation 4. Organize hotel corporation 5. Construction of new government owned hotels 6. Extension of PRH 7. Hotels and guest house legislation 8. Expand island and marine tours 9. New duty-free shop 10. Provide water-sports facilities 11. Revised marketing strategy 12. Tourist dev. loan scheme 13. Establish tourism department 14. Economic stimulation programme 15. Handicrafts mart 16. Extensions to Fua'amotu and Vava'u air ports 17. Road access improvements 18. Tourism areas and sites reservation 	<ol style="list-style-type: none"> 1. New external air routes - Sydney, Noumea and Rarotonga 2. Air fares and charter negotiations 3. Open new Nuku'alofa hotel 4. Open extension to PRH 5. Open government lodges on Ha'apai and Eua 6. Marina developments in Nuku'alofa and Neiafu 7. New duty-free shop 8. Recreational facilities development 9. National museum and cultural center 10. Road access improvements

Source: Roger Lascelles, Babar Mumtaz and Michael Safier, "Tonga, A Development Plan for Tourism 1978-87," Bartlett School of Architecture and Planning, University College London, Aug., 1978, p. 41

Note: IDH: International Dateline Hotel
 PRH: Port of Refuge Hotel

Table 11

**Comparison of DOC between L1011 and B727
by Route Length and No. of Passangers**

No. of passengers(10 ³) Length (km)	50	100	500	750	1,000	2,000
1,000	2.0038	1.0019	1.0019	0.8906	0.8349	0.8712
1,100	2.0042	1.0021	1.0021	0.8908	0.8351	0.8714
1,200	2.0046	1.0023	1.0023	0.8909	0.8352	0.8715
1,300	2.0049	1.0024	1.0024	0.8911	0.8354	0.8717
1,400	2.0051	1.0026	1.0025	0.8912	0.8355	0.8718
1,500	2.0054	1.0027	1.0027	0.8913	0.8356	0.8719
1,600	2.0056	1.0028	1.0028	0.8914	0.8357	0.8720
1,700	2.0058	1.0029	1.0029	0.8915	0.8357	0.8721
1,800	2.0059	1.0030	1.0030	0.8915	0.8358	0.8721

Source: Research Coordination Bureau of Science and Technology Agency, "STOL Yuso System ni Kansuru Sogo Kenkyu," Oct., 1974, p. 34

Note: Figures in columns are DOC of L1011/DOC of B727

Table 12

Data for Existent Air Carriers

Type	Name	Length for take off (max pay load) (m)	Length for landing (m)	No. of pax	Cruising Radius (R) (km)	
1) 2,200 ≥ R	F-28	1,786	951	65	1,690	
	HS-121-TRIDENT	2,290	1,760	152	1,760	
	DC-9-40	2,180	1,580	110-130	1,890	
ii) 5,100 ≥ R > 2,200	A-300	1,870	1,740	232-331	2,600	
	BAC-111-200	-	-	58-74	-	
	BAC-111-500	2,225	-	97-119	2,720	
	B-727-200	2,440	1,387	163-189	2,630	
	B-737-200	1,420	1,372	115	2,350-2,630*	
	L-1011-1	2,320	1,620	255-326	3,890	
	IL-86	2,300	2,600	350	3,600-4,600*	
	Tu-134	2,180	2,050	72	2,400	
	Tu-154	2,100	2,060	158-164	3,800-5,300*	
	iii) R > 5,100	BAC-VC10	2,530	2,130	180	7,600
		B-707-320C	3,050	1,900	147-202	6,920
B-747-200		3,322	2,057	348-447	8,340-10,560*	
B-747-SP		2,500	1,710	281-315	10,750	
L-1011-500		2,970	2,250	240	9,750	
DC-8-63		3,600	1,900	196	6,580	
DC-10-30		3,470	1,940	206-380	7,780	
IL-62-M-200		2,800	-	140-198	8,000	
Tu-144		3,000	2,600	140	6,500	

Source: "The World Aircraft Annual 1979," Kantosya, Tokyo

Note: * Cruising Radius/max pay load - CR/max fuel

Table 13

Status Quo of Fisheries

Area	Production in 77 (ton)	1) Demand (est.) (ton)	2) No. of Fishermen	2) Vessels		Sea Animal consumed (lb/caput)	Popula- tion
				with E/G	without E/G		
Local Fishermen							
Yava'u	224	450	628	124	198	43.56	15,000
Ha'apai	189	300	575	33	274	41.58	10,000
Eua and others	180	240	497	49	77	40.02	8,000
Tongatapu	688	1,710				40.04	57,000
Gov't owned vessels	150 (for local use)						
Import (equiv. to raw fish)	200						
Total	1,631	2,700	1,700	206	549		

Source: FAO, "Tonga, Marine Resource Development," Oct., 1978
 ADB, "Kingdom of Tonga, Fisheries Development Programme
 1975/76-1979/80," Dec., 1975

Note: 1) FAO report
 2) ADB report
 3) 30 kg/caput is assumed as desirable consumption level

Table 14

Marine Resources by Fishing Method

	Potential annual yield	Remarks
Reef	poor	
Outer Reef	1,000 ton/year	100 ton/year in present
Skipjack	1,800 ton/year	450-500 ton/year is max. because of live-bait constraint unless other live-bait sources are discovered
Surface Troll	300 ton/year	2-3 ton/month. In the case of 15 vessels $15 \times 8 \times 2.5 = 300$
Long Liner	400 ton/year	Catches by 2 vessels
Bottomset Gillnets	promising	

Source: FAO, op. cit.

Table 15

Net Revenue Available from a 52/54 ft Snapper-Smack

Revenue from the Boat per Year	
Bottom fishing (8 reels x 10 lb/rh x 12hrs x 160days)	153,600 lb
Bottom fish caught by trolling	23,040 lb
Amount of sales [(153,600 ^{lb} + 23,040 ^{lb}) x .33 T\$/lb]	T\$58,800.00
Expenses Annually (fixed costs)	
Depreciation on capital (at 10 percent of 48,000)	T\$4,800.00
Commercial interest on total investment (at 8.5 percent of 53,000)	4,505.00
Insurance	2,000.00
Annual maintenance and repairs at 7 percent	3,640.00
Incidentals	500.00
	<u>15,445.00</u>
Operational Costs (per year)	
Fuel and lub. oil costs	T\$10,000.00
Ice	1,800.00
	<u>11,800.00</u>
Replacements in fishing gear per year	1,200.00
Other incidental expenses @ \$10 per trip for 45 fishing trips	450.00
Food at sea @1.50 per day for 180 days average for ten men	2,700.00
	<u>4,350.00</u>
	T\$31,585.00
Thus, revenue from the boat per year	T\$58,880.00
Operational and other expenses per year	31,595.00
Net revenue available from one boat/year	T\$27,285.00

Source: FAO, op. cit., pp.84 - 85

Table 16

Net Revenue Available from 42 ft Multi-Purpose Fishing Boat

<u>Expenditure-Recurring</u>	
Depreciation on boat and fixtures at 10 percent	2,730.00
Commercial interest on investment at 8.5 percent	2,878.00
Fuel and lub. oil costs	5,000.00
Ice for bottom fishing trips only	700.00
Replacements of fishing gear/year	700.00
Food at sea for 6 fishermen for 100 days @ \$1.50/day	1,150.00
Insurance	1,500.00
Expenses on investment on labour, fuel for live-bait capture, during season & one fisherman	800.00
	T\$15,458.00
<u>Anticipated Revenue</u>	
Sale of fish calculation at a low for reef and troll fish 3 lb/\$ and 4 lb/\$ for skipjack would give	33,600.00
Anticipated revenue/year	33,600.00
Anticipated annual expenditure	15,458.00
Indicative net returns available	T\$18,142.00

Source: FAO, op. cit., P. 87

Chart 1: Recommendations by FAO

Introduction of larger and well equipped fishing vessels of 42 ft and 52 ft found suitable to exploit the available fishery by Tongan fishermen, at present beyond their reach;

Financial assistance at liberal terms and subsidies to fishermen who would eventually own such vessels;

Training of the operatives in navigational skills, engine running and maintenance, fish finding and fishing methods (found effective) and handling of fish on-board;

Making available repair, spares and servicing facilities for the fishing vessels at a moderate cost;

Availability of ice to the fishing vessels at a low cost;

Making available requirement for the daily operation of fishing vessels at a reasonable cost e.g. fuel, fishing gear and required supplies;

Establishment of central infrastructure facilities for the fishing vessels to land the catches at the major islands;

Provision of adequate cold store, ice and freezing facilities for preserving and marketing fish;

Evacuation of fish from major production points to consumer areas at a reasonable cost;

Making facilities for the marketing of fish landed in a regulated manner in the urban areas with high demand;

Assistance to the small scale fishermen in the outer-islands to procure fishing gear, fuel and other requirements at reasonable prices and facilities to market their catches to ensure a steady income;

Up-grading the technical skill of the small scale fishermen through extension services in fish handling, simple processing, use of effective fishing gear and maintenance of the out-boards used;

Once the local demand is satisfied, export possibilities for some of the locally produced fish products, which have high earning potential abroad, should be pursued.

Source: FAO, op. cit., pp. 81-82

Chart 2: List of Constraints to Development of Fisheries

- Lack of a centralized fish market and appropriate cool storage at Nuku'alofa
- Lack of ice and cool store facilities for fishermen serving Tongatapu
- Lack of ice making and cool store facilities in the other islands and lack of reefer type vessels for transporting fish within the three groups
- Lack of credit facilities for fishermen seeking to acquire larger and more efficient fishing vessels, etc.
- Lack of fishermen training and extension services
- Insufficient fisheries resource information
- Lack of a well conceived national fisheries development programme

Souce: ADB, op. cit., pp.25-27

Chart 3: Suggested Training Programme for Fishing Vessels Operatives in the Future

(Period - 12 weeks of which five weeks is spent at sea)

Navigation & Seamanship

- Thorough knowledge of the Admiralty Chart - explanations of signs and symbols on the chart - latitude, longitude - nautical mile calculation and measuring - position on a chart
- The magnetic compass - compass rose - Direction by degrees - north and south pole - true north - compass north - variation, deviation
- Laying course between two points - conversion of true to compass and compass to true courses; calculations of distances
- Fishing position, from land marks
- Time and distance calculations
- Dead-reckoning
- Knowledge of essential rules of the road and distress signals
- Beacons and buoys in Tonga ports and their approach

Engine Operation

- Principles of diesel engines and internal combustion
- Parts of an engine - functions
- Routine checks and procedures prior to operation
- Routine checks of gauges while running
- Exhaust colour - reasons
- Care of fuel tank - sea cocks - lub. and fuel filters
- Simple problems at sea and trouble shooting
- Types of pump on board - care and maintenance
- Stern gear care and stern gland packing
- Alignment checks and adjustments

- Care of the batteries and maintenance
- Out-board engine maintenance
- Panel and equipment maintenance

Fishing Gear and Methods

- Simple knots and splices used in ocean fishing
- Preparation of bottom fishing gear
- Preparation of trolling gear
- Preparation of pole and line
- Net mending
- Preparing simple lift nets etc., and live-bait collection, with light attraction: Day seining
- Knowledge in hand reel operation bait and baiting a hook, rigging of trolling lines, skipjack fishing - bird flocks and sighting of schools

Fish Findings

- Principle of echosounding in - finding depths
 - reef area
 - fish concentrations
- Operation of echosounders
- Interpretation of echograms
- Clarity and paper speed
- Care of echosounder

Care of the Catch

- Ice and quality of ice in fish preservation
- Quantity of ice to be used and how
- Storage of fish in boxes in fish holds
- Care of the insulated fish hold

General

- Maintenance of a fishing log on board - Cleanliness and hygiene on board - gally maintenance and food on board essential first aid
- Simple cost and earning calculations

Source: FAO, op. cit., pp. 88-89

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List of Abbreviation

ANU	Australian National University
CPD	Central Planning Department, The Government of Tonga
EEC	European Economic Committee
IBRD	International Bank for Reconstruction and Development
JICA	Japan International Cooperation Agency
MID	Ministry of Industrial Development
NRI	Nomura Research Institute
RSPS	Research School of Pacific Studies, ANU
SSIDO	Small Scale Industries Development Organization
UN	United Nations
UNCTAD	United Nations Conference of Trade and Development
UNDP	United Nations Development Programme

JPS	Journal of the Polyhesian Society
OUP	Oxford University Press

JICA