The significant contribution of FADs to Solomon Taiyo Limited's fishing operations

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Abstract

From 1972, when Solomon Taiyo Limited (STL) started a pole-and-line fishing operation, to 1980, STL vessels had been catching tuna almost exclusively from surface free-swimming schools. In 1981, a FAD programme group purse-seining fishing operation, using the Filipino "payao" model, was put in place. Results were excellent and STL vessels quickly adapted their fishing methods to make the best use of FADs. STL slightly modified the original payao design to better suit its own needs and nowadays, about 90% of the group purse seine catch, i.e. 5,800 t annually, and around 60-70% of the pole-and-line catch, i.e. about 15,000 t annually, come from FAD fishing. FADs bring benefits not only to STL but also to the rural communities of the region. For STL, it allows savings on the operational costs, especially those of pole-and-line fishing operations, reduction of searching time and a better regularity of fish landings. For the rural communities, it gives better returns to bait-ground owners through royalties paid by STL for their bait-fishing boats and it allows local fishing communities (known as canoe-fishermen) to increase their catches using fishing methods (artisanal) such as trolling and midwater handlines set around FADs. This provides fish for family consumption and a source of income from fish sold. Overall, the importance of FADs to STL's fishing operation, and therefore to the local economy as a whole, is high, although no precise value can be attached to it.

Introduction

The Solomon Islands have about 900 islands scattered between 05°-13° S latitude and 155°-171° E longitude (fig. 1). Six large mountainous islands with other smaller islands lie in a double chain formation called the Main Group Archipelago (MGA; fig. 2). Numerous other small islands are scattered to the southeast of the MGA. With the scattering of islands, the Solomons have an exclusive economic zone (EEZ) of around 1.3 million km^2 (Anon., 1994).

The fishing grounds around the Solomons are rich in tunas, and large areas are available for catching live bait in lagoons for pole-and-line fishing operations. Purse seining is also carried out in offshore waters targeting surface schools of tunas, while longlining for larger, deeper-swimming tunas is also carried out in some areas. Skipjack tuna

(*Katsuwonus pelamis*) is the principal tuna species taken in the waters of the Solomon Islands, followed by yellowfin tuna (*Thunnus albacares*), and to a lesser degree, bigeye tuna (*Thunnus obesus*) and albacore tuna (*Thunnus alalunga*). The total catch of all species from 1985 to 1995 for both domestic and foreign fishing operations in the waters of the Solomon Islands were consistent at around 40,000-50,000 mt annually, except for 1995, when the catch increased by some 48 per cent to 74,000 mt (FFA, 1996).

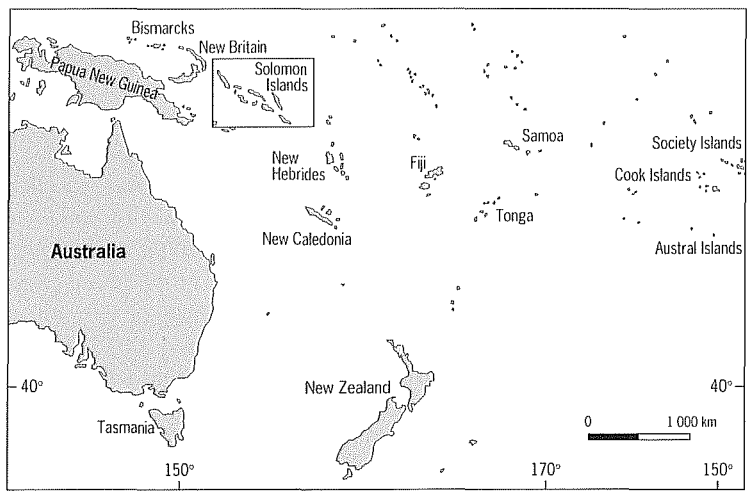


Figure 1
The location of the Solomon Islands in the Western Pacific.

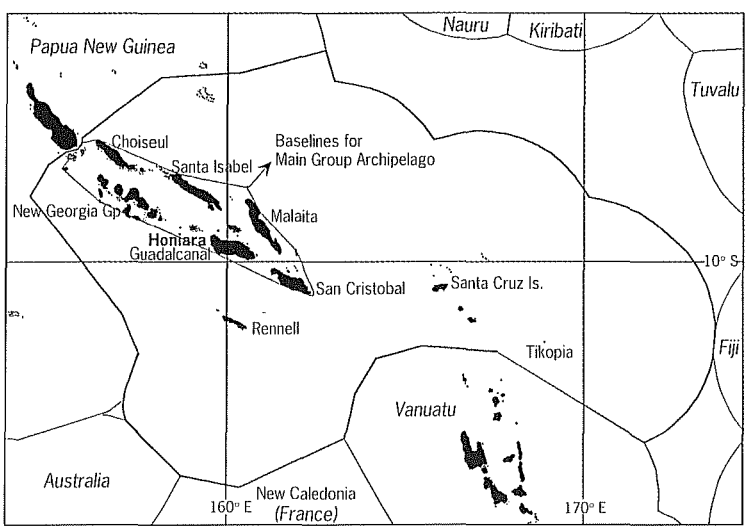


Figure 2
Solomon Island's EEZ showing the Main Group Archipelago (MGA).

Fish exports have been very important to the Solomons. In the 1980s, fish exports, mainly canned and frozen tuna, made up 25-30 per cent of the total exports by value. However, in the late 1980s and early 1990s, logging became the main export earner for the Solomon Islands, although fish exports remained around the same level. With logging greatly restricted in the mid-1990s, it is expected that fish exports will again overtake logging (CBSI, 1999).

The main focus of this paper is to provide information on the importance and growing reliance on FADs to the fishing operations of Solomon Taiyo Limited, and is not written as a scientific or academic paper. Much of the information presented here is anecdotal, collected from the fishing skippers, managers of the fishing operation, and from records kept by the company. The landings of catch by fishing method are precise, however, the split between FAD and non-FAD associated catches are estimated by percentage, based on the information provided by vessel skippers.

History of Solomon Taiyo Limited

Solomon Taiyo Limited (STL) was established in 1972 as a joint venture between the Solomon Islands government and Taiyo Fishery Company Limited (renamed Maruha Corporation in 1993) of Japan. The company has been governed by three sets of joint venture agreements:

- Joint venture agreement 1 (JVA1, 1972-1980): Initially, Taiyo Fishery Company Ltd held 75 per cent of the shares with the Solomon Islands government holding 25 per cent. This changed in 1979 with Taiyo Fishery Company Ltd holding 51 per cent and Solomon Islands government 49 per cent of the shares.
- Joint venture agreement 2 (JVA2,1981-1992): Solomon Islands Government held 51 per cent of the shares and Taiyo Fishery Company Ltd held 49 per cent.
- Shareholders agreement (agreement no. 3; 1993 to present): This was a shorter and simpler agreement with the shareholding remained the same as JVA2, with Taiyo Fishery Company Ltd changing its name to Maruha Corporation Limited.

Since 1989, STL has consolidated all operations at its Noro base, Western Province and closed its first established base at Tulagi in Central Province, whilst its head office remains in Honiara. The key operations of the company are fishing, processing and marketing with supporting infrastructure, administrative and technical and engineering services.

The company currently employs about 2,300 persons, of which around 80 are expatriates. STL is the largest female employer in the country employing some 600 female workers in the cannery and smoking factory, and about 20 in other offices. Today the company owns and operates 21 pole-and-line fishing vessels and 4 group purse seine fishing vessels working as a unit.

Fishing operation

The main fishing grounds for fishing vessels, both pole-and-liners and group purse seiners, are within the Main Group Archipelago (MGA) waters including the 12-mile territorial waters. The government grants STL, free access to its fishing waters through a licensing system, which is now covered under a new Solomon Islands National Tuna Management and Development Plan (Solomon Islands Government, 1999).

Solomon Islands have the biggest domestic tuna industry in the Pacific Island nations. STL prides itself as being the founder of the domestic tuna industry, and is continuing to play a key role in this industry. This company represents some 70-80 per cent of the total output of the tuna industry in the Solomon Islands, which is responsible for about 30 per cent of the country's export earning. The company's average catch by pole-and-line vessels is around 20,000 mt a year and by group purse seine vessels, around 5,500 mt a year.

Availability of live bait for pole-and-line fishing operations is essential. Rural baitground (reef) owners, sometimes referred to as baitground communities, receive valuable income through payment of baitfish royalties by STL to gain access to baitfishing grounds. For example, in 1994, baitground communities received SID$ 274,139 (US$ 54,828); in 1995, SID$ 339,489 (US$ 67,898); in 1996, SID$ 380,857 (US$ 76,171); in 1997, SID$ 412,393 (US$ 82,479); and in 1998, SID$ 526,237 (US$ 105,247). STL actively uses 43 baiting grounds in three Provinces under a three-year term (renewable) baitfishing agreement.

Processing, production and marketing

STL's cannery utilizes about 15,000 mt of raw materials producing some 1.1 million cases of tinned tuna per year. The *arabushi* smoking factory uses some 4,500 mt of raw materials, producing about 950 mt of smoked fish per year. Fishmeal production, mainly using the offal and waste from canning and smoking operations (heads, guts, bones, red meat, etc) amounts to about 1,000 mt a year. The remainder of the catch from company vessels is exported mainly to Japan and Thailand as frozen whole fish.

About 820,000 cases of canned tuna are exported annually of which 80 per cent are exported to Europe. The domestic market absorbs another 280,000 cases of canned tuna as well as quantities of fishmeal and frozen fish. Other markets for fishmeal are Papua New Guinea and Australia. Smoked fish products (*arabushi*) are exported exclusively to Japan.

The development of FADs by Solomon Taiyo Limited

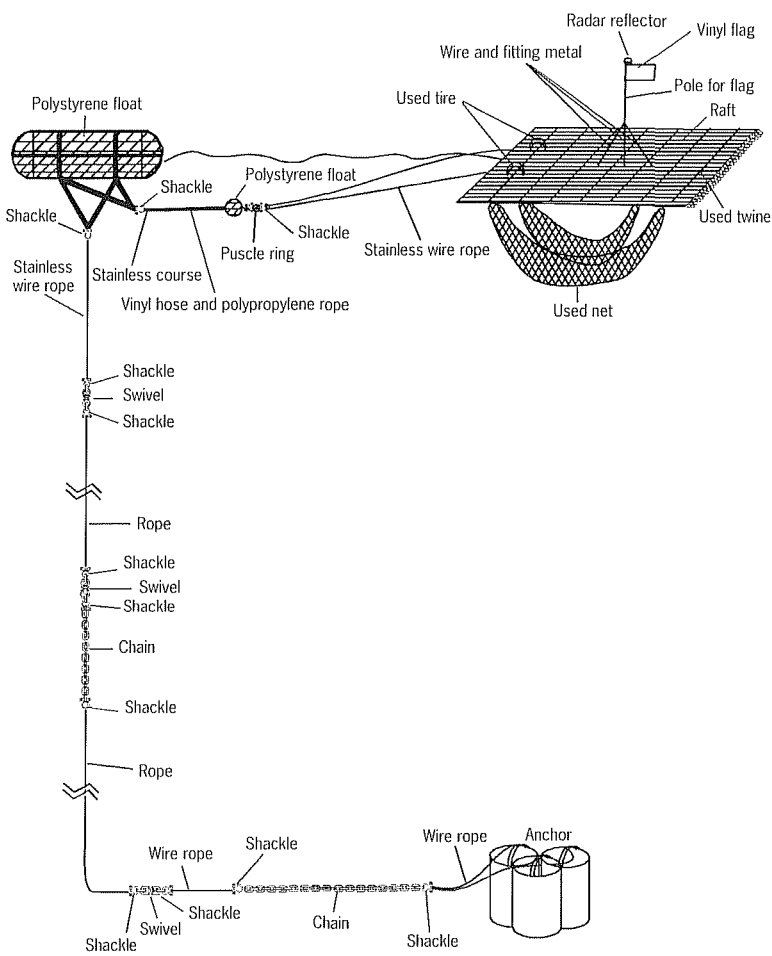
The deployment of anchored FADs by STL began in 1981 when the group purse seine fishing started. This type of fishing method relies heavily on anchored FADs, which aggregate fish to set points and from which fish are caught by encircling them with the purse seine net. The company's pole-and-line operations have also started to use the FADs increasingly over time.

Design used

The STL-type model originated from the Philippines model best known as "payao", meaning "bamboo raft". STL not only adopted the design from the Philippines, but also adopted the name as well. In its simplest description, a payao is an anchored bamboo raft. Through the rest of this paper, the word "payao" is used in preference to FAD.

Figure 3 illustrates the construction design of STL's payao. The basic structure is the same as the Philippine model, with the main difference being the number of shackles, swivels and the type of ropes being used. The company uses more shackles and swivels and has replaced the Manila ropes with stainless-steel wire ropes. These measures are taken to give the payao better durability and strength in withstanding the often severe current and weather condition experienced in the waters around the Solomon Islands.

Figure 3
The FAD design used by STL.



Experience and cost of payaos

STL started with around 30 payaos being deployed in 1981. The numbers increased over time and today there are about 100 payaos set around the MGA waters. The submerged part of the payao (the mooring) is expected to last about a year, whereas the floating part of the payao, bamboo raft, sometimes lasts about six months. Not all payaos have the expected lifespan, with many losses caused by strong current force. Other reasons of loss and damage are assumed to be caused by tuna longline fishing activity (longline gear tangling on mooring line) and by poachers (illegal use by others who do not care about the payao).

No separate costing is kept on payao expenses, making it impossible to give an accurate costing analysis. Payao capital cost and most of the related operating costs form part of the overall group purse seine fishing costs. Other payao related costs are accounted for in the pole-and-line operating cost. Nevertheless, the estimated cost of constructing a payao set is about SID$ 12,000 (US$ 2,400) and the recurrent cost is estimated at about SID$ 1.5 million (US$ 300,000 plus) per year.

Repair and maintenance programme

A small payao section has been established within the fleet operations department at Noro base. This Section is solely responsible for the construction of payao sets, and provides the fleet with supporting service in regard to the payao maintenance programme.

Repair and maintenance works are actually carried out by the group seine vessels, especially by the crews of the work boat. Repair and maintenance is largely the on-going task of the work boat crew of nine. At times they are assisted by the other three vessels when necessary. The function of the work (light) boat is to install the payao sets, monitor the aggregated schools around the payaos, regularly liaise with the fishing master of the net boat and carry out regular repair and maintenance of the payaos. Choosing the locations for each payao is largely decided by the fishing master in consultation with his vessel executives.

Regulatory measures in the Solomon Islands

There are no specific government regulations existing at present to governs such requirements as special licensing, marking procedures, etc. However, a start has been made to monitor the effects of FADs deployed in the Solomon Islands fishery waters. Under the newly implemented Tuna Management and Development Plan for the Solomon Islands (Solomon Islands Government, 1999), under the auspices of the new Fisheries Act 1998, certain conditions are laid down for FAD operators to adhere to. These include:

- FAD register: operators will be required to provide information on the ownership, type (anchored or free-floating), location, number and any other relevant information, for the purpose of the FAD register to be established by the fisheries department;

• Catch monitoring: through licence conditions operators will be required to record FAD catches in the prescribed log book forms;
• Restriction on deployment: restriction on deployment zones will be specified in the fishing licence condition. However, no restriction on the number of FADs is set under the Plan but could be introduced in the future at the discretion of the director of fisheries;
• Exclusion zone: the Plan restricts other vessels from fishing within five nautical miles of any FAD or payao belonging to a qualified fishing company.

The significance of payaos to STL's fishing operation

There is no doubt in the experience of STL that the anchored payaos are critical to the sustainable fishing of both the group purse seine operation and the pole-and-line operation, all year round. Whilst anchored payaos were originally deployed for the group purse seine operation in 1981, the company's pole-and-line fishing vessels have increasingly utilized them as well. Now, anchored payaos are heavily used by its two fishing operations.
STL, under the new Tuna Management and Development Plan, is given permission to deploying its anchored payaos within the inner MGA (fig. 2), and within the 12-mile territorial waters, except on the shipping lanes as advised by the Marine Authority. This decision is very important, as it allows easy access for the pole-and-line vessels from the baiting grounds to the fishing grounds established by these anchored payaos and increases fishing activities through quick turn-arounds.

Catch performance of the group purse seine operation

The group seine fishing operation has relied heavily on the anchored payaos since its commencement in 1981. An estimated 90 per cent of this operation activity and catch is based on fishing around the company's anchored payaos. The balance of activity and catch for this operation comes from fishing around floating logs or setting on free-swimming schools. Table 1 shows the catches taken by STL's group purse seine operation.

Table 1 - Estimate of catch split by set type from total catch for STL's group purse seine operation (1994–1998).

Fishing activity	1994	1995	1996	1997	1998
Payao contribution 90%	6196	6668	5672	5705	4677
Rest from floating logs, free-swimming schools, etc.	688	741	630	634	520
Total catch	6884	7409	6302	6339	5197

The figures in table 1 clearly show just how important payao fishing is to the group seine in using the payaos. Fishing around floating logs makes up about 2 or 3 per cent of the total catch of the operation. Together with

the anchored payaos, the overall effect of FADs (anchored and floating) has contributed almost 95 per cent of the total catch of the group purse seine operation annually. This confirms how important payaos are to this type of fishing for STL.

Catch performance of the pole-and-line operation

Pole-and-line fishing is the main fishing method used by STL ever since the establishment of the company in 1972. Before the deployment of anchored payaos, pole-and-line fishing concentrated on free-swimming schools and floating logs. However, following the deployment of anchored payaos, pole-and-line fishing became increasingly reliant upon payaos and since about seven years ago (early 1990s) an estimated 60 or 70 per cent of total catch is derived from payao fishing as shown in table 2. The rest of the catch is from floating logs and free-swimming schools.

The double-digit inflation rate and very weak Solomon Islands dollar against the major currencies, have continued to push up operating costs. Without payaos, it is believed the per-vessel operating cost per metric ton would have been much higher than that shown in table 2. The presence of payaos has contributed to operational cost savings through saving time in steaming and searching, and quicker turn-around times between baiting grounds and payao locations. However, the lack of available costing analysis makes it difficult to put a real value on payaos to the fishing operation. It is assumed that some real cost savings are realized in such area as fuel cost.

Table 2 - Estimate of catch split by set type from total catch for STL's pole-and-line operation (1994-1998).

Fishing activity	1994	1995	1996	1997	1998
Payao contribution 60%	17764	16663	12340	11860	13811
Rest from free-swimming schools and floating logs (40%)	11843	11108	8227	7906	9208
Total catch (mt)	29607	27771	20567	19766	23019
Average operating cost/mt-SID$	1,988	1,790	2,229	2,587	2,187
(US$ equivalent*)	(417)	(376)	(468)	(543)	(459)
Average annual catch (mt)/vessel	1032	1389	979	1049	1096

* Exchange rate of US$ 1.00 = SID$ 0.21 used.

Payaos have attracted the schools to set points which are fished by the pole-and-line vessels thus reducing the high frequency of fishing on free-swimming schools and floating logs, as was the case before 1992. During bad weather, especially during the cyclone period and south-east trade winds, pole-and-line fishing vessels can still go out fishing around the payaos located in more sheltered locations, thus enabling fishing to continue.

Conservation and sustainability measures

STL holds itself to be responsible in undertaking good fishing practice measures which promote and maintain effective conservation and sustainability of tuna resources in the Solomon Islands. STL believes its group purse seine and pole-and-line based payaos fishing does not cause any significant ecological harm to the Solomon Islands fishery environment.

There is no evidence from the company's catches that there are any increasing landings of juvenile and undersized commercial tuna fish from fishing around payaos. In support of this, the company applies its own restrictive management in payao fishing for all of its vessels.

The company has implemented a minimum size of 1.5 kg for tunas landed to their operation, whilst the Fisheries Authority's size limit in the Solomons is 1.0 kilogramme. The fishing master of the group purse seine operation is required to ensure fish sizes below the minimum size limit are returned alive by opening the purse seine net, or not set on an aggregated school if the echosounder indicates the fish sizes is too small. In certain instances where below minimum size fish are caught, they are still landed and used for smoked fish (*arabushi*). Thus there is no real wastage through discarding at sea. However, the company penalizes the crew by reducing their bonus rate for any undersized fish below the company's minimum size. Imposition of such a penalty discourages catching of very small tunas, and promotes conservation and sustainability measures. A similar penalty is applied to pole-and-line fishing vessels if undersized fish are caught, although still landed and used fully by the company.

By-catch represents about 2 or 3 per cent of the total catch of the group purse seine fishing operation. By-catch species are mainly island bonito (*Auxis thazard*), rainbow runners (*Elagatis bipinnulata*) and kingfish (*Acanthocybium solandri*), which are landed at the base. Except for the island bonito, which is used by the smoking factory, the other by-catch species are all sold at the local market.

Socio-economic impact of payao

Rural-based canoe fishermen (long, thin, outboard-powered fibreglass vessels called canoes) are increasing in number by using the payaos as their best fishing grounds. They use two fishing methods: trolling (several single lines with lures) and midwater handlines either using baited hooks or jigs. They catch both tunas and other species like rainbow runner, kingfish and trevally (several species). Catch from the payao provides the rural people their basic fish diet and also a good source of generating much needed income.

Catch data by the canoe fishermen using payaos are non-existent, but it is a known fact that there is an increasing involvement of rural canoe-fishermen in fishing activity using anchored payaos. Payao fishing by

canoe-based fishing methods is also used for providing fish for important social events, e.g. wedding feast, community functions, etc. Large quantities of fish can be caught in one, or combined operations by several canoe-fishermen for such a purpose. STL does not discourage this sort of canoe-based fishing activity from around their payaos, even though the full cost of constructing, deploying and maintaining these devices is borne by the company.

Ongoing development

The productive fishing areas of the inner and outer MGA are believed to be sustainable and the number of deployed payaos (replacement as well as new additions) pose no real danger to the tuna resources in these waters. If anything, they enhance the fishing in these areas by concentrating and holding tuna schools at specific locations.
The new Solomon Islands National Tuna Management and Development Plan, which came into effect on 1 June 1999, will be the key vehicle in ensuring the tuna fishery in the Solomon Islands is responsibly managed and monitored. It is hoped that in due course proper scientific research will be carried out on payao (FAD) fishing in the Solomon Islands, and its impacts on the resource and fishing environment, under the auspices of the Tuna Management Plan.

Conclusion

Payao or FAD fishing plays an important and critical role in the commercial fishing operations of Solomon Taiyo Limited. It is a proven method of assisting sustainable fishing and enhancing catching performance of both fishing techniques employed (purse seine and pole-and-line groups) by the company. Without payaos, the viability of STL's fishing operation would be greatly reduced to the current situation.

Bibliographic references

Anon., 1994. Annual report 1994. Ministry of Natural Resources. Fisheries Division, Solomon Islands government, Honiara, Solomon Islands, 39 p.

CBSI, 1999. Annual report 1998. Central Bank of the Solomon Islands, Honiara, Solomon Islands, 98 p.

FFA, 1996. Solomon Islands tuna policy review. Forum Fisheries Agency, Economic & Marketing Programme, Honiara, Solomon Islands. FFA Rep. 96/36, 52 p.

Solomon Islands government, 1999. Solomon Islands National Tuna Management and Development Plan. Solomon Islands Government, Honiara, Solomon Island, 83 p.