



**Development of tuna fisheries in the Pacific ACP countries
(DEVFISH) Project**

**AN ASSESSMENT OF DEVELOPMENT
OPTIONS IN THE LONGLINE FISHERY**

November, 2006



A report by
Peter W. Philipson



FFA

**PACIFIC ISLANDS
FORUM SECRETARIAT**



TABLE OF CONTENTS

List of Tables
 List of Figures
 Appendices
 Abbreviations
 Currency

Executive Summary

1. Introduction

Methodology
 Background to the study
 Discussion

2. Operational evaluation

Evaluation criteria
 Operational evaluation results

3. Policy implications

Optimization of benefits to the national economy
 Effectiveness of government interventions
 Licensing regimes

4. Conclusion and recommendations

Building a national commercial fisheries sector
 Matching development with the opportunity

References

List of persons contacted

LIST OF TABLES

Table 1	Summary: Primary evaluation criteria by operational model
Table 2	Summary: Secondary evaluation criteria by operational model
Table 3	Operational models ranked by overall economic benefit

LIST OF FIGURES

Figure 1	Operational models graphed by overall economic benefit to the domestic economy
Figure 2	Radar charts of criteria by operational model
	Domestic longline vessel conventional model
	Domestic longline vessel landing direct to a foreign cannery
	Value added processing operation
	Combined catching and value added processing

APPENDICES

Appendix A: Terms of Reference

Appendix B: Economic evaluation criteria definitions

ABBREVIATIONS

C&f	Cost and freight (i.e. delivered price)
DFI	Direct Foreign Investment
EBIDTA	Earnings before Interest, Depreciation, Taxes and Amortization
EEZ	Exclusive Economic Zone
IRR	Internal Rate of Return
TAC	Total allowable catch
WCPFC	Western and Central Pacific Fisheries Commission

m	metre
km	kilometre
kg	kilogram
Kw	kilowatt
l	litre
mt, t	metric tonne

CURRENCY

Currency Unit – United States Dollar (US\$) : Conversions as at June 25 , 2006

US\$1.00	=	NZ\$1.65
	=	F\$1.78
	=	PNG Kina3.11

EXECUTIVE SUMMARY

- **Acknowledgement** Thanks are due to the numerous private sector fisheries enterprises who disclosed to the consultant, on a confidential basis, the detailed commercially sensitive data upon which this report is based.
- **Study objective** This study assumes that the appropriate national fisheries development goal in the longline fishery is the establishment of a commercially viable and environmentally sustainable commercial fishery that optimizes returns to the local economy.

The principal objective of this study is to determine the benefits returned to the national economy from different longline operational models and licensing regimes so as to inform policy decisions related to achieving the national goal.
- **Evaluation methodology** To achieve the study objective, detailed operational, marketing and financial data was obtained from a number of established commercial longline catching and processing enterprises in the region. The enterprises canvassed operated some 70 domestically-based vessels and virtually all the on-shore processing plants for longline catch. Overall, the data utilized in this reports represents about 15,000 t. of annual longline catch.

This data was then aggregated and evaluated against a number of economic and commercial criteria.

This evaluation was used, in turn, to identify the optimal mix of operational models and licensing regimes that would best achieve the national goal identified above.
- **Evaluation results** The different operational models evaluated in this study showed a very wide range in terms of their benefit to the national economy, based on the evaluation criteria used.

The model with the greatest economic impact was that which combined a conventional longlining operation with full scale on shore value adding. This model produced the maximum scores for employment returns, value added, and profitability, and second highest for local purchases (all on a per tonne of raw material basis).

The evaluation findings clearly show that it is the operational model adopted by industry which most directly affects the quantum of benefits to the economy. However, the licensing or domestic / foreign status policies adopted by the national government have a major indirect effect on outcomes by influencing the choices that industry makes between different operational models, and on who the industry participants are.

Despite the clarity of these findings, it is still the case that each country, for a range of reasons, will have a different optimal mix of operational models and licensing regimes.

Further analysis would be necessary to determine what this optimal mix might be at the country level.

- **Policy implications**

Optimization of benefits to the national economy requires a more proactive policy environment that can respond to economic findings from studies such as this, particularly those done at the national level.

Previous emphasis on the development of the catching sector may have occurred at the expense of the processing sector, which, if true, has been to the detriment of overall returns from the long line fishery.

The key element in increasing returns from the longline fishery is the development of large scale, commercially viable on-shore value added processing. As local investors have been slow to respond to this opportunity, direct foreign investment (DFI) should be encouraged into the processing sub-sector.

Licensing regimes should be designed to achieve the goals set out for the longline fishery above, namely, establishment of a commercially viable and environmentally sustainable commercial fishery that optimizes returns to the local economy. This may require allowing DFI in the catching sector, at least on a temporary basis.

- **Conclusions and recommendations**

Building a national commercial fisheries sector is not necessarily best initiated by a focus on the creation of a domestic catching sector. In fact, this report highlights the beneficial affects of on-shore processing to the national economy, and the fact that returns to the economy are not significantly directly effected by the ownership of the assets.

It is concluded that the quantum of returns is most directly influenced by the operational model adopted, and policies should be aligned to ensure that this is optimized, allowing DFI wherever this is most beneficial to the industry, and to the national economy.

It is recommended that an action plan be devised, possibly at the national level, to enable an effective programme to support and facilitate industry in developing the on-shore longline value added sub-sector.

1.0 Introduction

1.1 Methodology

This report is based on fieldwork conducted in the Cook Islands, Fiji, the Marshall Islands, and Papua New Guinea during the period April 23 - May 25, 2006. These visits were facilitated by the staff of the Cook Islands Ministry of Marine Resources (MMR); the Fiji Ministry of Fisheries and Forests; the Marshall Islands Marine Resources Authority (MIMRA); and the Papua New Guinea National Fisheries Authority (NFA) respectively.

The principal objective of this study is to evaluate the benefits that accrue to the national economies as a result of different longline operational models and licensing regimes, computed, for comparability reasons, on a per tonne basis. The primary source for the derivation of these per tonne returns was individual fisheries enterprises currently operating in the sector in the countries chosen for this study. In each case, the company disclosed to the consultant detailed financial, operational and marketing data which has enabled the findings to be based upon actual empirical data, rather than assumptions or interpretations of current practice and benefit outcomes. Data obtained related principally to the 2005 calendar year.

As this source material is commercially sensitive and was disclosed in confidence, none of the raw data is presented in this report. In addition, wherever possible multiple sources for the various parameters quantified was sought, and normalized figures are used rather than the actual figures obtained from any one enterprise.

There are a number of assumptions and conventions that have been followed in arriving at the criteria discussed in Section 2.1 below. These relate to matters such as the determination of local content in various expenditures, the distinction between intermediate goods and services, and others. These are relatively detailed and do not effect the overall analysis and are discussed in Appendix B.

The report also draws on material and findings from a range of earlier studies (see References), and prior work conducted by the consultant.

1.2 Background to the study

The Terms of Reference for this study are set out in Appendix A. Unfortunately, the limited duration of the country visits and the extended time necessary for data acquisition and analysis made it impossible to address some of the issues that might be regarded as subsidiary to the main purpose of this study.

Accordingly, analysis has necessarily been focused on the primary objective, economic analysis and the evaluation of the direct benefits to local economies from the longline fishery, and how these findings might best be reflected in policy formulation.

1.3 Discussion

The Terms of Reference for this study call for the collection and analysis of data to be segregated into three categories for comparison purposes: foreign licensed; locally based foreign vessels; and local vessels.

These three categories were also to be considered within the framework of four geographic sub-categories, as shown in the table below, extracted from the Terms of Reference:

	Economic circumstances seem to favour domestic fleet development -at least some elements of the fleet are fully domestic	Economic circumstances do not seem to favour development of a fully domestic fleet – emphasis on shore based employment.
Fisheries targeting Albacore, primarily for the cannery market	<i>Fiji</i>	<i>Cook Islands</i>
Fisheries targeting Yellowfin and Bigeye for the Sashimi market	<i>Papua New Guinea</i>	<i>Marshall Islands</i>

During the course of the fieldwork for this study and at the industry operational level, it became clear that the distinction between these three categories within a national licensing regime is often blurred, and at the operational and commercial level the similarities among them appear to be more common than the differences. Furthermore, from the standpoint of evaluating different strategies and their impact on the domestic economies, it was apparent that the key determinant was the operational model implemented by industry in the fishery.

That is to say, it is the operational model adopted by industry which most directly affects the quantum of benefits to the economy. However, the licensing or domestic / foreign status policies adopted by the national government have a major indirect effect on outcomes by influencing the choices that industry makes between different operational models, and on who the industry participants are.

The same can be said of commercial viability, an essential element, of course, in any sustained private sector activity. Commercial viability is found to depend upon the operational model, not the status of the enterprise within the national licensing regime.

To accommodate these findings, this study has been undertaken in two phases: the first, based on fieldwork, evaluates the outcomes that result from different longline operational models, as measured against specified commercial and economic criteria.

The operational models evaluated are:

- **Domestic longline vessel conventional model:** *This category includes all longline operations that can be classified as fully “local”, and which all follow the conventional regional longline model, where whole chilled fish are air freighted to sashimi markets, principally Japan, and the albacore component is frozen for canning (albacore is sold locally in the Cook Islands). By catch is sold locally.*
- **Domestic longline vessel landing direct to a foreign cannery:** *This model utilizes data from longline vessels operating within a country’s zone but landing to a foreign cannery*
- **Value added processing operation:** *Operations in this category embrace shore-side activities ranging from those that simply receive fish from the catching sector and contract pack and ship, with no processing, to those that follow an increasing trend towards on-shore processing (value-adding) of a proportion of the long line catch. Which fish are processed and which are shipped conventionally (that is, chilled, whole, by air) is determined by size, grade, species, and day to day market indications.*

Processed product can be frozen and shipped by sea to markets, or air freighted, chilled, again depending on marketing criteria.

- **Combined catching and value added processing:** *This model has been created by the consultant within the study by combining the conventional longline vessel with the value added processing model. A number of adjustments beyond simple addition are necessary, for example with sales, to avoid double counting. This is designed to forecast the benefit flows that would arise from the full integration and marketing optimization of such an activity.*
- **Foreign licensed:** *In the case of evaluating the benefits provided to the local economy by foreign licensed longliners it is assumed that, as is typical, there is no interaction between the vessel and the economy in whose EEZ the vessel is licensed to fish.*

The second phase uses the understanding developed in the first phase to assess the effectiveness of different policy strategies on the optimization of returns to the national economy; the enhancement of the effectiveness of government interventions; and the value of different approaches to direct foreign investment (DFI) in the fisheries sector.

In summary, the contrasting benefits of these operational models are first determined (Section 2), and then these findings are used to inform policy discussion (Section 3) in the designing of licensing regimes to optimize the economic benefits arising from the local longline fishery, which is the ultimate objective of this study.

2.0 Operational evaluation

2.1 Evaluation criteria

This Section sets out to evaluate the benefits derived from a number of different longline operational models currently used in the region. As noted above, this analysis is undertaken as a prelude to evaluating and suggesting strategies to optimize the benefits to the national economy derived from different licensing regimes.

The following sections are based on data provided by industry in various forms, and for the assessment of economic contribution, commercial viability and other purposes, inserted into Excel models developed by the consultant for this purpose. This is a lengthy process, requiring consideration and evaluation of the various factors used and only the outcomes are shown in summary. In many cases, as well, the data is commercially sensitive.

The evaluation criteria are divided into two groups: those regarded to be of primary interest and those seen as secondary. These are set out in Tables 1 and 2 respectively below. These are discussed in Appendix B, and briefly defined below. In addition, the primary criteria are presented diagrammatically as “radar” charts, which seek to represent the range of benefits that result from each operational model, on a per tonne basis.

Criteria chosen to evaluate these models are:

Primary \$ per tonne criteria

- **Value added** - *Value added is an economic term to express the difference between the value of goods and the cost of materials or supplies used in producing them [intermediate costs]. Value added is thus defined as the gross sales of a firm minus the cost of goods and services purchased from other firms.*
- **Net local purchases** – *This is a measure of the local purchases made by the entities analyzed, reduced by an amount representing an estimate of the off-shore content of the products or services purchased.*
- **Employment earnings** - *This measure includes expatriates resident in the country and employed by the enterprise, for example Fijian crew on a Cook Island longliner. This is on the basis that the operational model offers these jobs on the local market, although they may not be taken up.*
- **Balance of payments** - *This is a composite made up of export sales, reduced by the imported content of local purchases (for example fuel) and direct imports and off shore services (bait, marketing commissions). Any local sales made by the enterprise are treated as an addition to balance of payments on the basis of import substitution.*
- **EBIDTA (profit)** - *Earnings before Interest, Depreciation, Taxes and Amortization (EBIDTA) is a measure of the surplus cash generated operationally by an enterprise. It is useful metric to use when comparing results within an industry sector, as is the case in this study, as it eliminates from income measures the expenses of interest, depreciation and amortization which can vary widely between companies as a result of different accounting policies adopted.*

Other criteria

- **Value added ratio (%)** – *as defined above, but expressed as a percentage of sales.*

-
- **Government revenue per tonne** - *This measure attempts to capture all government revenue streams that result from the operational model under examination. Indirect government revenue is not included.*
 - **Jobs per t.** *as defined above, but expressed on a per tonne basis.*
 - **IRR (%)** – *Internal rate of return is the rate of return on the capital that is invested in the project.*

In most cases, enterprise-wide figures have been obtained and used. That is, for an enterprise which has a number of longline vessels and shore administration, the total benefit flows on an enterprise-wide basis are assessed, and the fleet-wide catch used to determine the benefits generated per tonne.

This is not the case in the first operational model evaluated, the conventional domestic longliner, where a single vessel approach is taken.

2.2 Operational evaluation results

Summary

Because they depend upon the presentation and analysis of confidential data from private sector entities, all the material concerning the derivation of the results presented in this section are contained in a Confidential Appendix (Appendix C).

The results of the analysis are shown below in Tables 1 & 2. It should be noted that these figures are average values derived from operators whose performance inevitably varies within and between the various countries included in the analysis. This process of averaging has the strength of reducing the impact of operators, who, while remaining within the model, produce results that exceed, or fall below the norm. On the other hand, the averaging process also masks the variances that arise more substantively between countries and fisheries.

These variances within the region arise from such factors as proximity to market, wage rates, national tax regimes, and so on. These factors will all result in greater or lesser profitability, a higher or lower value added %, etc. So it might be that a country with high wage rates might skew the findings away from more labour intensive operational models, and favour those with less labour inputs. Problems such as these are unlikely to affect the overall objective of this study, which is to rank different operational models and licensing regimes in terms of their benefits to the economy, rather than to establish quantitative measures of individual factors, an objective that can only usefully be pursued at the national level. This supports the recommendation contained elsewhere in this report on the desirability of completing some complimentary national-level analysis.

Nonetheless, some of the figures shown in the two tables do need discussion.

In the case of government revenues it is certain that the data obtained and reported in this analysis significantly underestimates the true figure. In many cases, respondent companies were less diligent in identifying all payments to government, as opposed to relatively simple figures such as fuel purchase. Conversely, there were some companies, often with the objective of wishing to highlight the onerous nature of government imposts, that identified far higher per tonne government payments than others

Furthermore, as noted elsewhere, attempting to estimate the indirect benefits to government from taxes and other sources of revenue resulting from the different longline models lies

outside the scope of this study but might well be substantial, and, if taken into account, would likely further highlight the benefits of onshore processing.

A second figure that requires discussion is the value added %, which is well below estimates contained elsewhere. One of the most thorough recent sector analyses¹ assessed the value added ratio for large-scale offshore fishing to lie in the range of 40% - 55%. This study determined the average value added of operations of this type analyzed to be only 16.9% (Value added ratios in other sub-sectors of the fisheries sector evaluated by this report were similarly far lower than assessed by earlier reports). The reason for this discrepancy probably largely lies in the low profit levels currently in the industry – profit (or loss) is included in value added.

¹ Gillett, R. and C. Lightfoot 2001. *The Contribution of Fisheries to the Economies of Pacific Island Countries*.

Model	Value added	Net local purchases	Employment earnings	Balance of payments	EBITDA (profit)
Domestic longline vessel conventional model	934	525	562	1,830	365
Domestic longline vessel landing direct to a foreign cannery	416	0	0	416	416
Value added processing operation	770	602	201	1,364	602
Combined catching and value added processing	1,704	602	763	1,110	968
Foreign licensed	n/a	0	0	350	n/a

Table 1. Summary: Primary evaluation criteria by operational model (all US\$ per tonne)

Model	Value added ratio (%)	Government revenue per t.	Jobs per 100 t.	IRR (%)
Domestic longline vessel conventional model	16.9%	174	13.2	17.1%
Domestic longline vessel landing direct to a foreign cannery	20.2%	13	0	13.0%
Value added processing operation	21.6%	46	6.0	28.4%
Combined catching and value added processing	19.3%	220	19.0	22.8%
Foreign licensed	n/a	350	0	n/a

Table 2. Summary: Secondary evaluation criteria by operational model

Comparative analysis

The results tabulated above are also presented in “radar” charts. Radar charts are designed to allow the presentation of a number of different data sets for the same analysis. In this case, for each of the five operational models evaluated, a radar chart is shown incorporating the results of the determination of the five primary criteria, except for the foreign licensed.

The radar charts presented below all have the same scale along the five axes, so the relative size of the enclosed area along each axis accurately reflects the relative size of the factor illustrated on that axis for each operational model as compared to the other models charted.

In the charts, all five primary factor values have been adjusted to base 100. This effectively means that for evaluation purposes each factor has been given equal weight. Of course, evaluation is possible from a number of standpoints. Jobs generated per tonne, for example, might be more important to one observer than to another. Similarly, other factors such as profitability might seem the most important to a commercial operator, while balance of payments issues might be more important to a government official.

With this proviso, the area of a chart and its symmetry does indicate the extent to which the different operational models meet each of the individual evaluation criteria, and the degree to which the operational model is able to effectively meet the combined criteria.

On balance, the combined “base 100” scores, as shown in the side bar tables in the radar figures, and in Table 3, are probably an accurate way of ranking the contribution by models to the national economy, with the proviso noted above that the method gives equal weighting to all five factors.

While a single score based on the five priority criteria might seem a crude measure, it can be noted that it combines many hundreds of individual empirical numbers ranging across the full spectrum of operations, marketing and finance for each of the models evaluated.

These scores are summarized in Table 3 below, with the operational models ranked by score.

Model	Score
Combined catching and value added processing	455.6
Value added processing operation	308.2
Domestic longline vessel conventional model	353.6
Domestic longline vessel landing direct to a foreign cannery	90.3
Foreign licensed	19.1

Table 3. Operational models ranked by overall economic benefit

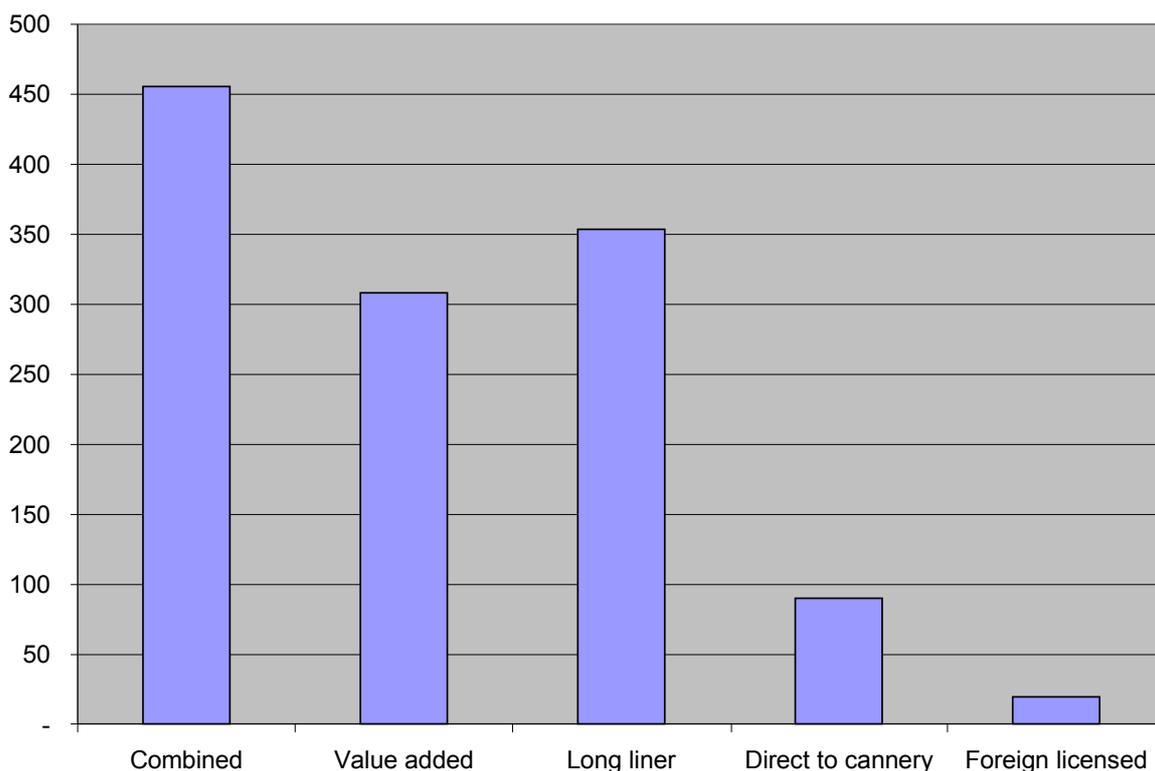


Figure 1. Operational models graphed by overall economic benefit to the domestic economy

The radar charts below reveal two salient characteristics of the economic impact of the different operational models

Firstly, as the overall score decreases, the models also become increasingly skewed and lose their symmetry, which shows that not only are they losing their benefits in sum, but also that some of the primary criteria are being significantly impacted on. The extreme is the foreign licensed model, where the criteria achieved are so skewed that it is not possible to create a meaningful radar chart.

Secondly, and perhaps conversely, the high ranking models in terms of overall score also have more symmetry, indicating a good coverage of all criteria.

The implications of this operational evaluation will be considered in the next two sections.

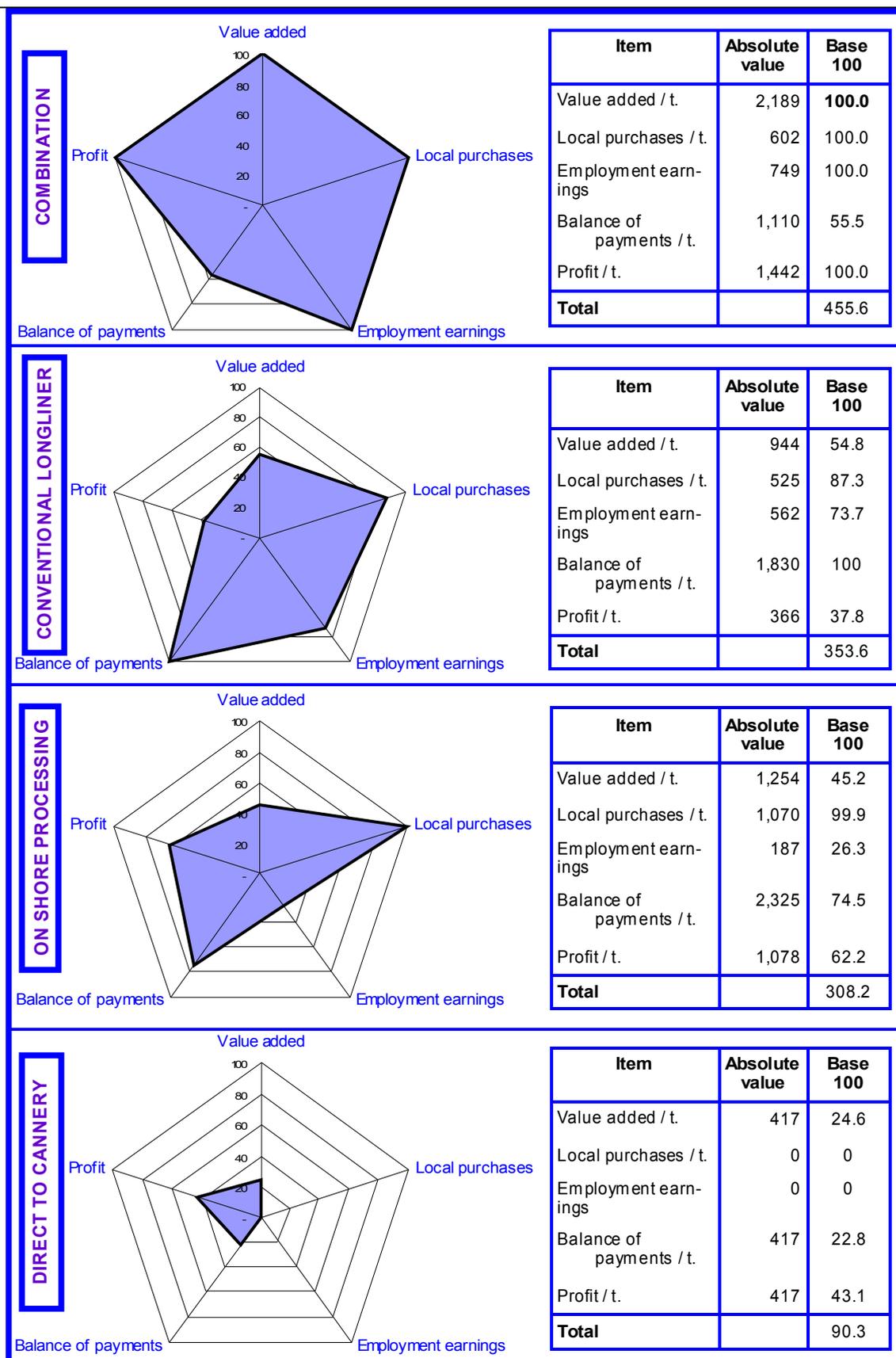


Figure 2. Radar charts of criteria by operational model

3.0 Policy implications

3.1 Optimization of benefits to the national economy

The findings of this study clearly show that an integrated fishing – processing – marketing longline fisheries sector will return the greatest benefits to the national economy on a per tonne of fish caught basis.

This is not, of course, a surprising finding, but it does reinforce the belief in some quarters that a focus on building a domestic fishing fleet, as opposed to a national fishing industry, has led to sub-optimal returns to date.

Another finding of this study is that it is the operational model that determines the returns to the economy, not, at least directly, the government-mandated licensing regime.

3.2 Effectiveness of government interventions

Some suggestions for effective government interventions flow from the findings discussed above.

The first is that the key to optimization of returns, on a per tonne basis, lies in enhancing the extent and profitability of on-shore processing, which is currently at inadequate levels, according to data obtained by the study. This is particularly important now that strictures from the Western and Central Pacific Fisheries Commission (WCPFC) are expected to progressively restrict national longline catch volumes. In the sector previously, government interventions have been very largely focused on the catching sector. This study indicates that more emphasis be placed on the processing and marketing sectors.

The data indicates that this change in policy, if effective, will result in a significant increase in returns. It should be noted that much of the highest grade tunas will continue to provide an optimum return to shippers (and the economy) if sent whole, chilled to premium sashimi markets. However, with this caveat, an increase of on-shore processing appears to be the single most effective way of increasing returns from the sector, overall.

Secondly, while it is difficult to generalize, it seems that typically in the region entry into the catching sector has been possible for local participants. Evidence for this is that many regional countries have, or have had, significant longline fleets owned by nationals.

This suggests that current government policies favoring the growth of national fleets can safely remain in place. The exception is where, as is the case in a number of regional countries, the current downturn in profitability for conventional longliners has resulted in the national fleet shrinking and degrading. It is likely in cases such as this that governments should consider allowing, or encouraging, direct foreign investment (DFI) in the catching sector.

Conversely, while there are a limited number of notable local processing activities, all the significant (i.e. 1,000+ t. per annum throughput) value added processing activities for long line catch have resulted from direct foreign investment. This suggests that there is only very limited appetite for investment in value added fisheries processing on the part of national investors and lending institutions, and that any future growth in this area will have to rely significantly on DFI.

With the finding of this report that the most effective way of enhancing national returns from the longline fishery is to enhance the performance of the on-shore processing sector, it seems that active encouragement and facilitation of DFI in the fisheries processing sector is indicated.

3.3 Licensing regimes

It has been noted above that current policies, encouraging the establishment of local fleets has, over time, resulted in many locally-owned and operated longline vessels. One of the subsidiary findings of this report is that in terms of benefits to the local economy, there is very little difference between these locally owned vessels, and other locally based vessels that are owned by foreign nationals.

In terms of optimizing overall national returns, it would seem to be in the national interest where the number of effective and efficient nationally owned vessels are insufficient to harvest the target longline catch for the national EEZ, that a number of domestically based foreign vessels be licensed to enable this target catch to be taken.

In light of the importance of the on-shore value adding sub-sector highlighted in this report, any licenses granted to foreign longline vessels on this basis should include a provision requiring them to land their catch domestically, and to make it available for purchase, at market, to on-shore value added processors.

Similarly, licensing and other policies should be formulated in such a way as to encourage longline vessels catching in other EEZs or high seas areas to land their catch to national processors.

4.0 Conclusion and recommendations

4.1 Building a national commercial fisheries sector

The current national longline fleets were largely established when the conventional model, where whole chilled longline caught fish were exported by air to sashimi markets, was extremely profitable. This high level of profitability was advantageous to building national fleets in that it allowed new entrants with limited relevant skills to be successful, albeit at lower profit levels. It also allowed over-borrowing based on the debt service capacity created by the high returns. And finally, it allowed intermediary service providers such as packing and shipping to charge relatively high fees and to provide acceptable services to vessel owners that did not have such facilities.

In summary, the national longline fleets were able to flourish in this benign environment, despite including significant numbers of owner–operators who were inadequately skilled, over-borrowed, and had no supporting infrastructure.

Not surprisingly, with the recent increase in costs such as fuel and airfreight, and the reduction in market returns, a lot of the gains in national fleet numbers have been lost as these marginal operators moved to the wrong side of the profitability curve and dropped out.

One of the most compelling lessons that can be learnt from these efforts to establish domestic longline fisheries activities in the region over the last thirty years is that the acquisition of a number of fishing vessels is not equivalent to establishing a commercial fisheries sector.

4.2 Matching development with the opportunity

Building a national commercial fisheries sector is therefore not necessarily best initiated by a focus on the creation of a domestic catching sector. In fact, this report highlights the beneficial effects of on shore processing to the national economy, and the fact that returns to the economy are not significantly directly effected by the ownership of the assets.

It is concluded that the quantum of returns is most directly influenced by the operational model adopted, and policies should be aligned to ensure that this is optimized, allowing DFI wherever this is most beneficial to the industry, and to the national economy.

It is recommended that an action plan be devised, possibly at the national level, to enable an effective programme to support and facilitate industry in developing the on-shore longline value added sub-sector.

4.3 Future work

The principal finding of this report is that on-shore value added processing of longline catch offers the best chance of capturing optimum returns per tonne for the national economy.

Accordingly, priority should be given to assisting industry in progressively increasing the volume of longline catch that is value added processed on shore, providing, of course, that any such increase is commercially viable and does, in fact, add value to the product.

Secondly, given the diverse geographic, resource, and infrastructure situations between the various regional countries seeking to optimize returns from a viable longline industry, it is suggested that analyses such as this are carried out at the national level.

References

- Anon. 2005a.** *Fiji Ministry of Fisheries and Forests: Department of Fisheries Annual Report, 2004.*
- Anon. 2005b.** *Marshall Islands Marine Resources Authority: Annual Report 2003 / 2004.*
- Anon. 2005c.** *Conservation and management measures for bigeye and yellowfin tuna in the Western and Central Pacific Ocean.* Doc. D, Western and Central Pacific Fisheries Commission, Pohnpei. 2nd Session, 12 – 16 December, 2005.
- Aqorau, T. 2006.** *Moving towards a Rights Based Fisheries Management Regime for the Tuna Fisheries in the Western and Central Pacific Ocean,* Paper presented at the Sharing the Fish Conference 06, Perth, Australia, 27 - 28 February 2006.
- AusAID 2004.** *Pacific Regional Transport Study.* Forum Secretariat, Suva.
- Bartmanovich, A. 2005.** *Cook Islands: Review of fuel distribution and pricing system. Report to the Government of the Cook Islands.* Canberra, Australia.
- Clark, L. 2002.** *Transformation and Rights-based Fisheries Management Regimes: application to the western and central Pacific Ocean.* WP-4 in *Report of the rights based management workshop*, Nadi, 24 26 June, 2002. FFA, Honiara.
- Gillett, R. 2003.** *Domestic Tuna Industry Development in the Pacific Islands.* FFA Rep. 03/01.
- Gillett, R. and C. Lightfoot 2001.** *The Contribution of Fisheries to the Economies of Pacific Island Countries.* Pacific Studies Series, ADB, World Bank, FFA, SPC.
- Gittinger, J.P. 1982.** *Economic Analysis of Agricultural Projects.* World Bank: Economic Development Unit, Washington, D.C.
- Hand, T. 1999.** *A review of Fisheries Taxation and Licensing in the Solomon Islands.* ADB, Manila, Philippines.
- Independent Consumer & Competition Commission 2004.** *Petroleum Industry Pricing Review.* Port Moresby.
- Langley, A. and C. Reid 2004.** *An Economic Analysis of the Fiji Tuna Longline Fishery.* FFA / SPC Report to the Fiji Fisheries Department.
- Lewis, T. 2005.** *A review of current access arrangements in Pacific developing member countries.* Asian Development Bank. Manila, Philippines.
- NMFS undated.** *FAQ sheet for Value Added.* Division of Fisheries Statistics and Economics, National Marine Fisheries Service,
- Read, R. 2006.** *Sustainable Natural Resource Use and Economic Development in Small States: the Tuna Fisheries in Fiji and Samoa.* Sust. Dev., 14: 93 – 103.

Schurman, R. 1998. *Tuna Dreams: Resource Nationalism and the Pacific Islands Tuna Industry*. *Development and Change*, 29: 107-136.

van Santen, G. & P. Muller 2000. *'Working Apart or Together'*. World Bank, Washington, D.C.

List of persons contacted

Cook Islands

Cook Islands Ministry of Marine Resources

Ian Bertram, Secretary for Marine Resources
Peter Graham, Legal Advisor
Josh Mitchell, Director, Offshore Fisheries
Jason Marurai, MCS Officer
Pam Maru, Offshore Fisheries Data Base Analyst
Jo Akroyd, Advisor, CIMRIS Project

Tapi Taio
Josh Taio
Taio Marine Services Ltd.
President Fishing Industry Association

Chris Douglas
Jack Cooper
Blue Pacific Foods

Bill Doherty
Landholdings Ltd.

Glen Armstrong
Fiona Hogg-Tamariki
Cook Islands Fish Exporters Ltd.

Francis Garnier
Matira Sea Fisheries

Fiji

Fiji Ministry of Fisheries and Forests

Alefina Vuki, CEO
Saimone Tuilaucala, A/Director
Apolosi Turanganivalu, Principal Fisheries Officer, Management Division

Dave Lucas
Solander Pacific Ltd.

X. J. Du
Golden Ocean Fish Ltd.

Esaroma Ledua
Waikava Marine Industries Ltd.

Sheldon Xu
China Fisheries (Fiji) Holdings Co. Ltd.

Toru Nakano
Margaret Raisele
Tosa Bussan (Fiji) Ltd.

M. S. Park
Great Ocean Enterprise (Fiji) Ltd.

Adrian Chute
Celtrock Holdings Ltd.

Marshall Islands

Marshall Islands Marine Resources Authority

Berry Muller, Oceanic Fisheries Division Chief
Xavier Myazoe, Licensing Officer
Emrina Langidrik

Gerry Yang
Marshall Islands Fishing Venture, Inc. (MIFV)

William Roberts
Maurie Williams
Marshalls Energy Company

George Chiu
Luen Thai Fishing Venture, Inc. (MIFV parent company, Guam)

Papua New Guinea

National Fishing Authority

Sylvester Pokajam, Acting Managing Director
Welete Wararu, Executive Manager - Provincial & Industry Liaison Group
Barre Kare, Manager - Information & Data
Ronald Kuk, Manager – Projects
Ludwig Kumoro, Fisheries Manager - Tuna

Blaise Paru
Sanko Busan (PNG) Ltd.

Maurice Brownjohn
Latitude 8 Ltd.
Chairman, Fishing Industry Association

Francis Houji
Fair Well Investment Ltd.

Norman Barnabas
DEVADS Ltd.

Appendix A. Terms of Reference

An Assessment of Development Options in the Longline Fishery

Introduction

A key objective of the DevFish project is to provide information on tuna fishery development strategies that allows the benefits and problems of different approaches to be clearly identified by decision makers. Being able to compare the economic benefits from each tonne of tuna caught is an essential first step in capturing greater returns for the countries in the region. This study will analyse returns in the longline fisheries in various countries, and contrast the economic benefits of three approaches: foreign access arrangements; locally-based foreign vessels; and a locally-based local fleet. As far as possible, social and other issues will also be documented.

Background

FFA Member countries have used different strategies relating to the role of local/national and foreign vessels in the development of domestic longline fishing industries. In general FFA Member countries give priority in their policies and laws to promoting nationally-owned, controlled and crewed longliners because they see small to medium-scale longlining as providing the best opportunity for increased national participation in tuna fishing. In this direction, an increasing number of FFA Member Countries, including Papua New Guinea, Fiji, Samoa, Cook Islands, Tonga and Niue no longer licence foreign distant water longline vessels under access arrangements.²

The economic advantages of the development of a national domestic fleet, operating nationally-owned and crewed vessels, are clear, especially where the catch is processed locally. They include improvements in incomes, government revenue, foreign exchange and potentially supplies of fish for food. However, progress towards the development of domestic industries based on nationally-owned and crewed vessels has been limited and uneven. Only Samoa appears to have been able to develop a national longline fleet servicing local processing at levels that largely utilise the potential yield of its relatively small national waters. Cook Islands, Fiji Papua New Guinea Tonga have made significant progress towards a mature national fleet and processing sector, but have been relying in varying degrees on foreign vessels. Other significant domestic longline industries in the Marshall Islands, Niue, Palau, and Solomon Islands (now closed) have been based almost completely on the operations of foreign vessels supplying tuna for processing onshore and transshipping..

The general constraints to domestic tuna fishery development faced by local and foreign investors alike have been well documented.³ They include factors such as excessive taxes and

² Generally, 'local' or 'national' fishing vessels are defined as those registered nationally and with some degree of control by nationals, with many countries requiring these vessels to be wholly or largely owned and controlled by nationals. 'Foreign vessels' are generally defined as all vessels except 'local' or 'national' vessels. Some countries also define a category of 'locally-based foreign vessels' which operate from the country concerned and land or transship a required proportion of their catch in that country.

³ See for example Domestic Tuna Industry Development in the Pacific Islands: the Current Situation and Considerations for Future Development Assistance: FFA Report 03/01 By

government charges, inadequate infrastructure and high input prices, especially for fuel, that directly reduce profitability; and other factors such as political instability, policy weaknesses and fluctuations in resource availability that increase risk and uncertainty.

But the development of national fleets faces several specific constraints including:

- higher labour costs and lower labour productivity of national crews. In most Pacific Island Countries, there is a lack of experienced crew for commercial fishing vessels, accentuated in some cases by at-sea jobs being regarded as relatively unattractive in economic and socio-cultural terms;
- difficult access to credit. Commercial financing in most Pacific Island Countries is expensive and averse to investments in sectors perceived as relatively risky. A poor record of investments in national longlining ventures in some countries has accentuated this problem;
- lower resilience to fluctuations that affect business conditions. Smaller local vessels have less scope for changing fishing grounds to respond to fluctuations in fishing conditions; and smaller businesses have less capacity to ride out the effects of changes in market conditions, catch rates, exchange rates or prices; and
- lack of entrepreneurial capacity and managerial expertise.

For these reasons, in some cases another class of vessel, described as ‘locally-based foreign’ has also been allowed to participate in the fishery. These vessels are typically foreign owned and flagged, but are permitted to operate by arrangement with a local company. Normally described as a charter, this may vary from a bare-boat charter, to an arrangement in which a local company simply provides a fishing licence in return for a fixed fee paid by the vessel owners. In some cases the arrangement has been promoted by a tuna processor/exporter to secure a supply of raw material that is not available from a domestic fleet.

Various advantages have been claimed for this sort of arrangement:

- It allows local companies to build up the size of their fishing fleets without increasing their indebtedness;
- It reduces the loss of foreign exchange involved in purchase of boats from overseas;
- It may allow the local fleet to build up a ‘critical mass’ needed to support necessary services (such as dedicated airfreight);
- It can provide the supply of fish needed to support on-shore processing facilities which then provide employment and other benefits;
- It can bring in foreign skills and expertise that may be needed;
- It allows ethnic Pacific Islanders to participate in the development of a fishery, in which expertise and access to capital may otherwise favour naturalized citizens;
- It allows the government to collect more licence fee revenue, especially if locally based foreign vessels pay a higher fee than the truly local boats; and
- It allows the country to develop a ‘catch history’ which is expected to help establish national claims to a greater share of the region’s tuna catch in future management arrangements.

Over time a number of concerns have emerged, however:

- There are sometimes compliance problems, with vessels targeting shark or disregarding other regulations;

-
- The local ‘partner’ may have little control over fishing operations but may be liable in any legal action;
 - There are concerns over the behaviour of foreign crew, ranging from social disturbances and spread of AIDS to smuggling and illegal immigration;
 - The vessels have sometimes proved to be quite inefficient, with low catch rates – this means that returns to the local partner are disappointing and the arrangements are short-lived, often leaving debts when the foreign party withdraws;
 - The foreign vessels are typically supplied from their home country, and make few local purchases– local expenditure is limited to fuel, port dues, air freight, and purchase of fresh vegetables;
 - In a truly local operation company profits, management and crew wages are retained in the economy – in some of these arrangements they are not;
 - The foreign vessels may compete with fully local boats for fish resources and air freight capacity, as well as causing congestion in the fishing port;
 - As countries in the region develop markets in the EU, catch from these vessels is disqualified under the rules of origin, unless it makes up only a small proportion of each consignment (under the value tolerance rules).

Overall, there is a concern that some Governments may have sacrificed access fee revenue to try to capture the economic benefits of a local fishery, but that these arrangements are simply providing a backdoor for foreign vessels that neither pay access fees nor deliver the expected benefits to the local economy.

Government Strategies

Governments have applied a range of strategies to promote domestic longline development.

Most FFA Member countries have at some time tried to support the development of a national longline fleet through:

- a) programmes to encourage small scale longlining including trial fishing, training and extension and infrastructure development; and
- b) direct involvement by the government in running commercial longline operations.

With the notable exception of the development of the Samoan small scale longline fishery, these government-driven programmes have failed to lead to viable national longline fisheries. Instead, viable national longline fisheries have tended to result from private sector-driven initiatives in countries with lower cost structures and better market access, a good overall investment climate, sound fisheries policies and a stronger private sector.

Approaches to the management of locally-based foreign vessels also vary. Some governments have sought to limit the number of foreign vessels to those chartered by local companies with their own boats and/or onshore processing facilities. Longline companies in PNG can only bring in chartered boats on a 1:1 basis (i.e one charter for each locally owned boat), in Cook Islands the ratio is 3 charters for each local boat, and additional charter arrangements are allowed for owners of fish packing plants.

Others have tried the locally-based foreign approach and given up on it. Tonga has recently cancelled an earlier arrangement to allow chartered vessels; and it seems that recent changes

to Fiji's Tuna Management Plan may also result in the exclusion of a number of Chinese longliners that had previously been licensed.

A different approach has been adopted in Micronesia, which has a long history of foreign longliners using its ports. FSM charges these vessels the same access fee as a foreign boat, but provides a rebate if the owner can demonstrate a certain level of expenditure in the local economy.

Elsewhere in the world, Australia has successfully used foreign charter/joint venture vessels to develop its domestic tuna fishery and New Zealand continues to make extensive use of charter vessels in the development of its offshore fisheries. In Namibia, the strategy of providing fishing rights to previously disadvantaged individuals who did not own boats contributed to local participation in the fishing industry through charter and partnership arrangements.

Ideally the strategy adopted will reflect the priority attached to development objectives.

- If the intention is to develop a local fishing industry, charter arrangements may be limited to companies which already have expertise in the fishery, will require some level of local crewing (probably increasing over time), and may be gradually phased out as the domestic industry develops.
- If the intention is to promote participation by indigenous Pacific Islanders, the charter arrangements need to be targeted at ensuring the development of indigenous capacity in the sector
- If the intention is to provide fish for local processing plants, then the emphasis may be on maximizing the efficiency of the fleet, to minimize raw material costs.
- If the intention is to capture benefits from on-shore support services, the nationality of the vessels is irrelevant but goods and services must be available at internationally competitive rates and bureaucratic procedures minimized.

If countries have not clearly established their priorities, pursue conflicting objectives or insist on commercially unrealistic conditions, then the strategy will fail.

The Questions

The key question involves tracing the flow of benefits to the national economy from the three classes of vessel: foreign access, local and locally-based foreign. For an access arrangement, the fees are easily quantified, although it can be argued that the recipient government does not always use them efficiently. In the case of genuinely local longliners, major expenses on imported fuel, bait, and equipment; and airfreight on international airlines mean that much of the catch value is not retained in the local economy. Value added ratio estimates of the contribution to GDP range from 40% - 60% for industrial fisheries in most Pacific Island countries. How much less is the benefit from locally-based foreign? Do measures such as requiring a minimum number of local crew significantly increase these benefits? It is recognized that in some of the more 'murky' arrangements, it may be difficult to obtain financial data; but there are cases in which a local partner has become disillusioned with the arrangement and should be willing to provide information. Other ongoing arrangements are relatively transparent.

The second question relates to the effectiveness of government efforts to encourage the development of domestic longline fishing fleets with a high degree of national ownership and crewing? What investments have been made by the government, what policy measures have been applied and how effective have they been? What has been the contribution of the national fleets to supporting domestic tuna processing? What has been the record of local investors and their financiers in longlining? What do these experiences suggest about the scope for future development of national fleets, and how can the effectiveness of investment programmes and policy measures for this purpose be improved?

The third question is related to the effectiveness of the operation of locally-based foreign vessels as part of the domestic tuna longline fishery. What contribution have foreign vessels made to developing and sustaining the domestic tuna fishing and processing sector? Have they crowded out national investors and crew, or have they created jobs and incomes for nationals? How many companies that have operated chartered vessels have actually re-invested the income in building up their own fishing operations? Have any chartered longliners remained operational in Pacific Island countries after their owners have withdrawn? Have national partners gained experience of fishing company operations and management, or have they just acted as a 'front' in dealings with local politicians and officials? In cases where foreign vessels have been brought in to supply a local processing plant, has this achieved a regular supply of fish at a competitive price? Have the arrangements helped to achieve the objectives of the national Tuna Management Plan?

Issues to be addressed

Government revenue - Identify sources of government revenue from local and locally-based foreign vessels – vessel registry fees, licence fees, port dues, direct taxes, indirect taxes and duties. Compare and contrast these with typical access fee revenues.

Economic analysis - Identify the flow of benefits to the local economy from local and locally based foreign vessels, including any benefits from processing and/or packing. Estimate the net added value in US\$ per tonne of catch. If possible, quantify total local purchases of goods and services and the local content of these items.

Social - Document the social benefits and problems arising from the use of local and foreign crew, including security concerns. Review experience with requiring foreign vessels to carry a specified number of local crew.

Market access - Identify the existing and possible future impacts of fish from locally-based foreign vessels on access to overseas markets.

Regional - Analyse the different objectives of encouraging locally based foreign vessels. Develop guidelines on licensing locally-based foreign vessels (including licence fees) that will enable countries to maximize the benefits from these arrangements, as well as clear performance measures that will allow monitoring of whether or not their objectives are being met.

Methodology - For purposes of analysis, the longline fisheries of the region may be divided into four groups according to economic circumstances (including the existence of local entrepreneurs willing to invest in fisheries, and the availability of competent crew at competitive wage rates) and target species. The study will examine the circumstances in one country in each category:

	Economic circumstances seem to favour domestic fleet development -at least some elements of the fleet are fully domestic	Economic circumstances do not seem to favour development of a fully domestic fleet – emphasis on shore based employment.
Fisheries targeting Albacore, primarily for the cannery market	<i>Fiji</i>	<i>Cook Islands</i>
Fisheries targeting Yellowfin and Bigeye for the Sashimi market	<i>Papua New Guinea</i>	<i>Marshall Islands</i>

The study will be implemented by a fisheries economist with expertise in fisheries management and development. Seven to ten days will be allowed for field work in each of the four countries, with an additional 10 days allowed for analysis and compilation of the report.

Logistics and Timing

As provided for in the bid, the consultant is expected to follow the indicative travel plan as provided in the table below representing the most economical and efficient routing.

Date	Activity
Sat 22 nd April	Travel Sydney – Auckland – Rarotonga
Week of April 24	Cook Islands
Sat 30 th April	Travel Rarotonga – Nadi
Week of May 1	Fiji
Fri/Mon, 5/8 May	Travel Nadi – Honolulu – Majuro
Week of May 8	Marshall Islands
Sat/Tues, 13/16 May	Travel Majuro – Guam – Cairns – Port Moresby
Week of May 15	Papua New Guinea
Tues, 23 May	Travel Port Moresby – Brisbane – Sydney

Expected output

- Before the start of the fieldwork an agreed work plan and methodology must be put into place based on the bid document but amended as necessary following an exchange of emails with the Project Team Leader.
- Within two weeks of completing field work a draft of the report must be submitted to Project Team Leader on which comments will be made within one week.
- Within one week of receiving these comments back from the Project Team Leader the final report with three hard copies and an electronic copy in MS Word must be submitted to FFA.

Appendix B. Economic evaluation criteria definitions

The various criteria used in this analysis are defined (where required) and discussed briefly below.

Value added ratio

“**Value added** is an economic term to express the difference between the value of goods and the cost of materials or supplies used in producing them [intermediate costs]. Value added is thus defined as the gross receipts of a firm minus the cost of goods and services purchased from other firms. Value added includes wages, salaries, interest, depreciation, rent, taxes, and profit.

Using the commercial [fisheries] harvesting sector as an example, the following goods or services would be deducted from revenues to compute value added: fuel/oil, ice, crew supplies, ... vessel and gear repair, wharfage, bait, insurance, and accounting fees.

For the processing, wholesale, and retail sectors, value added is typically sales less the cost of purchased seafood products, containers and packaging materials, ingredients and other materials, various supplies, fuel and electricity, transportation, insurance, repairs and maintenance, and miscellaneous service costs.”⁴

and

“It is usually convenient to express the intermediate costs as a proportion of the gross output. For example, in the case of small-scale fishing using motorized boats the fuel, bait, provisions and maintenance are all intermediate costs. If the total value of the catch is \$1,000 and the cost of the intermediate costs is \$400 then the proportion of the gross output attributable to intermediate costs is 40 percent. In this example the value-added by small-scale fishing using motorized is $\$1,000 * (1-0.40) = \600 ... the intermediate cost ratio is 0.40 and its reciprocal, 0.60 [60%], is the **value added ratio**.”⁵

The same authors assessed the value added ratio for large-scale offshore fishing to lie in the range of 40% - 55%. This study determined the average value added of operations of this type analyzed to be only 17% (Value added ratios in other sub-sectors of the fisheries sector evaluated by this report were similarly far lower than assessed by earlier reports). The reason for this discrepancy probably largely lies in the low profit levels currently in the industry – profit is included in value added.

Net local purchases per t. (US\$)

This is simply a measure of the local purchases made by the entities analyzed, reduced by an amount representing an estimate of the off-shore content of the products or services purchased, expressed on a per tonne caught / processed basis. There does not appear to be any accepted basis to estimate the local content in items used in the industry.

Jobs per t.

⁴ NMFS undated. *FAQ sheet for Value Added*.

⁵ Gillett, R. and C. Lightfoot 2001. *The Contribution of Fisheries to the Economies of Pacific Island Countries*.

This measure includes expatriates resident in the country and employed by the enterprise, for example Fijian crew on a Cook Island longliner. This is on the basis that the operational model offers these jobs on the local market, although they may not be taken up.

Balance of payments per t.

This is a composite made up of export sales, reduced by the imported content of local purchases (for example fuel) and direct imports and off shore services (bait, marketing commissions). Any local sales made by the enterprise are treated as an addition to balance of payments on the basis of import substitution.

EBIDTA per tonne

Earnings before Interest, Depreciation, Taxes and Amortization (**EBIDTA**) is a measure of the surplus cash generated operationally by an enterprise. It is useful metric to use when comparing results within an industry sector, as is the case in this study, as it eliminates from income measures the expenses of interest, depreciation and amortization which can vary widely between companies as a result of different accounting policies adopted. Tax expense can also distort comparisons as tax charges will vary between tax jurisdictions and will vary within jurisdictions depending on a range of non-operational factors such as the granting of tax holidays.

Hence EBIDTA is a relatively “clean” measure of profitability the use of which can enhance inter-company comparisons. The use of a per tonne measure eliminates the effects of differing scale from inter-company comparisons.

Government revenue per tonne

This measure attempts to capture all **government revenue** streams that result from the operational model under examination.

But the linkage between expenditures and government revenues can become tenuous. Fishing vessels buy fuel which will add to government revenues by increasing the amount of (duty paid) fuel imported, but also consequently increased fuel company employees who pay income tax, and buy duty paid imported food stuffs, etc. Such multiplier effects are well outside the scope of this study.

IRR (%)

Internal Rate of Return (IRR) has been defined as:

“Another way of ... measuring the worth of a project is to find the discount rate that makes the net present worth of the incremental net benefit stream or incremental cash flow equal zero. This discount rate is called the **internal rate of return**. It is the maximum interest that a project could pay for the resources used if the project is to recover its investment and operating costs and still break even. It is the rate of return on capital outstanding per period while it is invested in the project.

The internal rate of return is a very useful measure of project worth. It is the measure the World Bank uses for practically all its economic and financial analyses of projects and the measure used by most other international financing agencies⁶

Assumptions as to local content in local purchases

	Cook Islands	Fiji	Marshall Is.	PNG
Diesel	20% ¹	15% ⁵	26% ³	20% ⁴
Air freight ⁶	10%	10%	10%	10%
Electricity ⁷	10%	15%	10%	15%
Packaging ⁸	10%	20%	10%	20%
Vessel provisioning ²	25%	50%	25%	50%
Other ⁹	15%	15%	15%	15%

1. Price controls on fuel are in place in the Cook Islands. The local content in diesel purchased by fishing vessels (after rebate of the NZ\$0.22 per litre government duty) is 35%. However, around 40% of this local content represents an allowance for return on investment. On balance, an accurate estimate of local content might be 20%. **Bartmanovich, A. 2005.** *Cook Islands: Review of fuel distribution and pricing system. Report to the Government of the Cook Islands.* Canberra, Australia.
2. Meat and fresh vegetables, probably largely local. Rice, canned foodstuffs, take a local markup only. In Marshall Is. and Cook Is., meat and vegetables likely to be imported also. Use 50% for Fiji and PNG, 25% in Marshall Is. & Cook Is.
3. Mark up on landed cost used by Marshall Islands Public Utility company on diesel sales to fishing vessels is 26%. Margin is available in full to government to apply locally as cross subsidy to electrical generation, or any other purpose.
4. Diesel is price controlled in PNG. Wholesale markup is capped at 24 toea per litre and retail is 15 toea per litre. As fuel is now produced locally, it can be assumed the markup is retained locally. Using the 2005 price of K1.97 per litre this equates to a local content of 19.8%, 20% is used. **Independent Consumer & Competition Commission 2004.** *Petroleum Industry Pricing Review.* Port Moresby.
5. No data is available. As commercial forces are more effective in Fiji, it seems likely that margins might be less. 15% is used.
6. The extent of local content in air freight seems likely to be uniform across the region. Many of the regional airlines make regular losses, and even those that operate profitably, do so at marginal levels which are probably insufficient to cover capital costs (**AusAID 2004.** *Pacific Regional Transport Study.* Forum Secretariat, Suva). Given that local content in air freight is likely to be small, it seems that operating losses, borne locally, are likely to offset positive local contribution. Viewed from a marginal standpoint, additional local freight payments would at least decrease the negative local content, and so could be included. 10% might be a suggested figure.

⁶ Gittinger, J.P. 1982. *Economic Analysis of Agricultural Projects.*

7. Electricity: Fiji and PNG have limited hydro electricity generating capacity, while the Cook Is. and Marshall Is. rely entirely on diesel generated power. Local content 10%, where no local generation, 15% otherwise.
8. Packaging is manufactured (from imported materials) in both Fiji and PNG, but not the Marshall Islands or the Cook Islands, where it is fully imported. 20% where manufactured, 10% where not.
9. Flat provision of 15%.