Smart Fish
Secure fisheries *Secure futures*

REPORT/RAPPORT : SF/2011/20

Programme for the implementation of a Regional Fisheries Strategy for the Eastern and Southern Africa and Indian Ocean Region

Programme pour la mise en oeuvre d'une stratégie de pêche pour la région Afrique orientale-australe et Océan Indien

# OPERATIONALIZATION OF FISH AUCTION MARKET FEASIBILITY STUDY

August 2012

Funded by *European Union*

INDIAN OCEAN COMMISSION

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The Eastern-Southern Africa
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Implementation of a Regional Fisheries Strategy
For The Eastern-Southern Africa and India Ocean Region

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# PREFACE

This Value Chain Analysis for the artisanal fisheries on the island of in Rodrigues complements a report of similar focus, prepared for Mauritius. Within the broader framework of the IOC SmartFish Programme (Implementation of a Regional Fisheries Strategy for ESA-IO programme), under the Regional Trade component, this report has been prepared to assist with a better understanding of the situation in the artisanal fishery from an economic and value perspective. This will allow for objective planning for potential interventions to assist in the move towards a more market driven and sustainable fishery that will enhance and contribute to the growing demand for fish in the country as well as investigate and enhance the ability to export beyond Rodrigues to markets in the region, specifically Mauritius, and Réunion are identified specifically.

This report looks closely at the different types of fishing methods within the artisanal sub-sector, such as the hand-line (motorized and non-motorized) fishery, the basket trap fishery, the large net fishery as well as the on-foot fishery. It provides a detailed analysis of performance in terms of typical business models for each unit and makes assessments of performance with respect to catch potential and capacity /over-capacity vs. stocks. Ultimately the impact on the local fishing communities, as well as the broader issue of increasing demand in the region is addressed and how to re-model and empower the artisanal fishery to better serve the economy, as well as the local population. Recommendations for short-term interventions are made to inform the many stakeholders of what works and what doesn't work so well and a view to the future for everyone's benefit.

Regionally, small island artisanal fisheries, as well as regional coastal artisanal fisheries are all dealing with issues of over-capacity and depleted stocks in coastal lagoons, as well as deciding how to ensure future productivity of the sector where local fishers derive a significant part of their livelihoods from fishing. This report will contribute to the regional knowledge in this regard and inform other initiatives to be planned regionally under the SmartFish programme.

# List of Abbreviations and Acronyms

| | |
|---|---|
| AMB | Agricultura l Marketing Board |
| B/E | Break-Even |
| BOI | Board of Investment |
| CoP | Code of Practice |
| CFCF | Code of Practice – Chilled and Fresh Fish |
| DCF | Discounting Cash Flow |
| DF | Discounting factor |
| EEZ | Exclusive Economic Zone |
| ESA -IO | Eastern South Africa - Indian Ocean |
| EU | European Union |
| FAD | Fish Aggregating Devices |
| FAM | Fish Auction Market |
| FCS | Fishmongers Cooperative Soci eties |
| FIT | Fishermen Investment Trust |
| GDP | Gross Domestic Product |
| HACCP | Hazard Analysis and Critical Control Points |
| IRFS | Implementation of Regional Fisheries strategies |
| IOC | Indian Ocean Commission |
| IOTC | Indian Ocean Tuna Commission |
| IPU | Ice-flakes Production Unit |
| IRR | Internal Rate of Return |
| ISSF | International Seafood Sustainability Federatio n |
| JICA | Japan International Cooperation Agency |
| MFCF | Mauritius Fishermen Cooperatives Federation |
| MOFED | Ministry of Finance and Economic Development |
| MOFR | Ministry of Fisheries and Rodrigues |
| MPA | Mauritius Port Authority |
| MPI | Ministry of Public Infrastructure |
| NGO | Non Governmental Organisation |
| NPV | Net Present value |
| PPP | Public-Private Partnership |
| PV | Present value |
| RFMO | Regional Fisheries Managemen t Organisation |
| ROI | Return of Investment |
| SE | South East |
| S/I | Semi Industrial |
| t | Metric tonnes |
| TLL | Tuna Long Line |
| UNESCO | United Nation Education Social and Cultural O rganisation |
| USA | United States of America |
| VAT | Value Added Tax |
| WIO | Western Indian Ocean |

# Foreword & Disclaimer

The feasibility study report on the electronic fish auction market of Mauritius has been prepared for the Ministry of Fisheries and Rodrigues by the Implementation of Regional Fisheries Strategies of the Eastern South Africa – Indian Ocean (IFRS ESA-IO) under the aegis of the Indian Ocean Commission (IOC) and funded by the European Union.

The report is based on information gathered from primary desk research and by means of interviews of reliable and reputed stakeholders of seafood industries and tuna transhipment base.

The report is believed to be accurate but it contains evaluation of future events and users of this report should exercise due diligence and make their own inquiries to satisfy themselves on all matters.

## LAYMAN'S SUMMARY

*The Ministry of Fisheries and Rodrigues has embarked on a project for setting up an electronic fishing auction market at Fort William to equip the domestic fishing industries and the seafood hub with an efficient marketing logistics. It has already invested Rs 35 million on construction works and electro-mechanical and refrigeration installations. An additional investment of Rs 15 million will be required for the acquisition of an electronic fish auctioning system and associated mobile assets to be ready on turn-key basis. The Ministry reckons that it is not its vocation to cater for the operationalization of the fish auction market on account of its commercial /business oriented nature of its activities. It intends to procure the additional investment and the operationalization of the project through a suitable Public-Private Partnership scheme. To have a clear view on the strategies to be adopted for the operationalization of the project, the Ministry has commissioned the present feasibility study.*

*The project in its present layout is economically not viable and has to be streamlined accordingly. The facility at Fort William is equipped to auction local supply of fresh and chilled fish which is scant and therefore it runs the risk to be redundant. On the other hand, the facility is not properly located and equipped to auction by-catch landed by the South East Asian tuna long line vessels, which provides the critical mass for its economic viability. To optimize the existing installation, it is proposed to set-up an ice-flakes production unit to cater for the need of the artisanal and semi- industrial (chilled) fisheries in their quest to improve food safety and quality of fish on the local markets. The platform for auctioning by-catch will require an operational arrangement with the 300 tonne AMB cold storage at the fish docks. In brief, the driving force of the FAM project resides in the reliability and continuity of supply of by-catch in Mauritius and its main weakness is the lack of local expertise in electronic fish auction system that can be compensated by attracting a proven international auction operator.*

*It is recommended to assign the AMB cold storage facility and the fish auction market to the Fishermen Investment Trust with a clear mandate to expedite the structural and operational adjustments. The regulatory frameworks related to the by-catch trade will have to be reviewed accordingly. Two main strategies can be considered for the operationalization of the electronic fish auction market namely, a long term lease agreement and a Joint Venture with a strategic partner.*

*The study reveals that the project is viable and can generate attractive rate of return on investments. It is resilient enough to withstand adverse conditions during its gestation period. Government commitment is key driving force for its success. As a powerful marketing logistics, the electronic fishing auction market will, in due course link the domestic seafood industries to global markets. It will play a pivotal role in boosting economic efficiencies in the value chains, enhancing food safety and traceability of fish and fish products, judicious allocation of resources and attracting foreign investments and know how in the domestic fisheries and seafood hub of Mauritius. It has the potential to become a regional tower-house for fish trade in the Western Indian Ocean. The project should be fuelled by a vision for fisheries sector of Mauritius.*

## RÉSUMÉ DES NON-INITIÉS

Le Ministère des Pêches et de Rodrigues a mis en œuvre une halle et criée électronique de poissons afin de doter le secteur des pêches et le Seafood hub dune logistique de marché efficace. Le Ministère a déjà investi 35 million de roupies dans la construction dun bâtiment et des installations

électromécaniques et de réfrigération à Fort William. Il faudra un investissement additionnel de 15 million de roupies pour acquérir un système de criée électronique et des matériels relatifs pour passer à l'exploitation. Conscient de ses limites en matière de gestion dune entreprise à caractère commercial, le Ministère a choisi de contracter un opérateur privé pour lapport du complément d'investissement et pour l'opérationnalisation de la criée dans le cadre d'un Partenariat Publique – Privé (PPP). Afin d'avancer dans cette voie, le Ministère a commandité cette présente étude de faisabilité.

La halle et criée de poissons dans sa présente configuration ne peut être une entreprise rentable et nécessite des réaménagements structurels et opérationnels. Elle est équipé des matériels de réfrigération tels qu'une machine à glace

et d'une chambre de stockage réfrigéré pour vendre du poisson frais « sous glace » provenant de la petite pêche et la pêche intermédiaire dont la production est insuffisante et inaccessible. D'autre part cette installation est inadaptée pour intervenir dans la vente du poisson d'accompagnement (by-catch) provenant des thoniers-palangriers étrangers basés à Port Louis, ce qui est prometteur. En vue d'optimiser les structure existante, il est proposé d'agencer une unité de fabrique des paillettes de glace à titre commercial ce qui servirait à la préservation des produits de la pêche mis en vente localement.

La criée devra impérativement accéder aux installations frigorifiques au port de pêche qui sont sous la gestion de l'Office Nationale du Marché pour intervenir efficacement dans la vente des poissons d'accompagnement. En somme, le point fort de ce projet est incontestablement la disponibilité des poissons d'accompagnement en quantité suffisante et le manque de compétences locales pour l'opérationnalisation demeure une faiblesse majeure, ce qui peut être palier par l'acquisition de compétence internationale.

Il est donc recommandé que la chambre froide appartenant à l'Etat et gérée par l'Office nationale du Marché ainsi que les installations de la criée soient placer sous l'égide de la Fishermen Investment Trust (FIT) en vue d'entamer une refonte structurelle et fonctionnelle de la criée dans son ensemble. Les réglementations sur les poissons d'accompagnement et l'octroi des licences de pêche aux bateaux de pêche étrangers doivent être revus également. L'opérationnalisation de la criée peut être effectuée par l'octroi d'un bail à long terme à un opérateur chevronné choisi par un appel d'offre international sinon, par une Joint Venture entre la FIT et un partenaire stratégique par biais d'une corporation publique spécialement crée pour le besoin.

A condition que les réaménagements suscités soient entamés, la criée serait économiquement rentable pour attirer un opérateur étranger. Le soutient infaillible de l'Etat est indispensable pour la réussite du projet. La criée devra prendre son envol progressivement pour être un pilier de l'industrie de la pêche au diapason du commerce international des produits de pêche. Elle est capable d'émerger comme une plateforme régionale dans l'océan Indien occidental. Ce projet doit être animé par une vision du devenir du secteur des pêches à Maurice.

## EXECUTIVE SUMMARY

With an EEZ of 1.9 km$^2$, the Government of Mauritius envisions the land based oceanic industries as a strategy for extracting more value from the ocean to spearhead sustainable economic growth. Development of the seafood hub, the marine fisheries and aquaculture are the landmarks of the aforesaid strategy.

In 2007 the Ministry of Fisheries and Rodrigues (MOFR) has precipitated the development of an electronic fish auction market at Fort William without any feasibility study and/or a business model. Actually construction works are completed and installation of electro-mechanical and refrigeration equipment is underway at a total cost of Rs 35 million. An additional capital investment of about Rs
15 million would be required for the acquisition of an electronic fish auction system and associated equipment to enable the operationalization of the facility.

The parent Ministry reckons that it is not within its prerogative to be directly involved in the operationalization of the fish auction market on account the commercial / business orientation of the latter. It intends to procure a private operator-cum-investor to operationalize the facility through a Public-Private Partnership model. The present study has been commissioned by the MOFR to perform a techno-economic appraisal of the project in view to chart out appropriate operationalization strategies for the project.

The fish auction at Fort William is designed to deal in fresh / chilled fish harvested by the domestic fisheries but an in-depth supply analysis has concluded that this is not feasible for various reasons. All the same, the facility is not adequately located and equipped to auction frozen by-catch of foreign tuna long line vessels which is available in sufficiently large

quantities at the fishing port. Therefore the project is techno-economically unsustainable unless it is overhauled.

According to the By-catch regulation 2004, all licensed foreign tuna long line vessels have an obligation to land their by-catch at the Agricultural Marketing Board (AMB) Cold Storage Facility at the fish docks while non-licensed visiting vessels have no obligation whatsoever unless the market conditions are attractive. The total annual supply of frozen by-catch in Mauritius estimated between 4000 and 9000 metric tonnes.

To take advantage the market opportunities, the business model of fish auction facility to be adjusted to frozen by-catch trade and in this process the 300 tonne AMB cold storage facility at the fish docks of Fanfaron will have to be amalgamated with the FAM. The refrigeration system installed at the FAM will be operated as an Ice-flakes Production Unit on a commercial basis. It will cater for effective demand of ice-flakes arising from the artisanal and semi-industrial (chilled) fisheries as well as fish marketing structures in its surrounding. However the administrative centre including the electronic backbone of the auction system will stay at Fort William.

S.W.O.T analysis of the project has concluded on two critical points which are:

-The frozen by-catch is a secured business under the By-catch Regulations and the Licensing Policies of foreign tuna long line vessels. Government commitment to this project is a key determinant for the success of the project.

-The major weakness of the project is the lack of local expertise and familiarity in electronic fish auction that can be obviously compensated by a proven foreign operator –cum-investor through a suitable PPP model or a strategic alliance by means of a Joint Venture. investment

The feasibility study of the FAM is prepared in a conservative approach. The total Public Investment is re-adjusted at Rs 25 million to reflect its actual market value. Additional Private Investment is estimated at Rs 15 million. The opportunity cost of long term public borrowings is taken at 6%, which is slightly higher than current financial market rates and that of the private project loans, at 10%. A weighted mean discounting factor of 7.75 % is used to examine the Net Present Value (NPV), Internal Rate of Return (IRR) and Break-Even (B/E) points of the project. The life cycle of the project is assumed at 15 years.

Supply of by-catch supply for the first year of operation is projected at 1500 metric tonnes with and increment of 10% per year for the consecutive years. The mean market price of by-catch fish species is taken at prevailing international ex-vessel price including a price inflation rate of 5% per annum. Auction fee is projected at 10 % of the primary sale price. The Ice-flakes Production Unit (IPU) will operate at 50% of its installed capacity which is minimal.

Based on the above critical assumptions, the economic analysis of the FAM including the IPU concludes the followings:

- IRR is slightly above 18.5 %
- ROI is at 35.3 % per annum (inter-annual mean)
- B/E quantity is at 2054 t (inter-annual mean)

The frozen by-catch auction as a standalone business of the FAM is also economically sustainable.

- IRR is slightly above 12.2 %
- ROI is at 30.4 % per annum (inter-annual mean)
- B/E quantity is at 1597 t (inter-annual mean)

The Ice-flakes Production Unit is also self-reliant and contributes positive the cash flow of the entire project.

- IRR is slightly lower than 10%
- ROI over the project life is 14%
- Break-Even Qty is 37 % of installed capacity ( 550 t / year)

The project is flexible and resilient. At an auction fee of 10% (inclusive of the IPU) the B/E quantity is 2050 metric inter-annual mean for 15 years or 968 metric tonnes for the Year 1 + 10 % increment per year over 14 years. Alternately, at the supply projection of 3177 metric tonnes inter-annual mean for 15 years or 1500 metric tonnes for Year 1 + 10% increment per year over 14 years other factor remaining constant, the project breaks even at 6.5 % of auction fee. At this level, the IRR is slightly above 7.75 % and the ROI is 16 %.

To facilitate the aforementioned structural and operational re-adjustments of the FAM project, it recommended:

- To reinstate the cold storage facility at the fish docks of the Ministry of Fisheries and Rodrigues which is managed by the AMB to the FIT.

- To assign the FAM to the FIT with a proper mandate.

- To review the By-catch regulations 2004 and associated Government policies to enable the emerging fish auction market to perform efficiently.

Two main strategies emerge for the operationalization of the FAM namely, a long term lease agreement to a proven private operator through an international procurement procedure or request of proposals. Alternately the FIT may be entrusted with responsibility to operationalize the FAM through a Joint Venture with a strategic partner. The Joint Venture will be in form a Special Vehicle Company on the basis of a business plan and will be managed as business organisation.

In keeping with foregoing findings and proposals, the FAM can be operationalized as an efficient marketing logistics in the seafood industries of Mauritius. The political will of the Government is the critical determinant for the success of the project. The FAM has intrinsic capabilities to connect the domestic seafood industries to global markets by provoking economic efficiencies in the value chains, enhancing food safety and traceability, judicious allocation of resources and attracting foreign investments and know how in the domestic fisheries and seafood hub of Mauritius. It will also enhance the domestication of foreign fishing vessels. The project must be purported a strong political will and vision to hoist it as a regional tower-house for fish trade in the Western Indian Ocean.

# 1.0 INTRODUCTION

The fish auction market (FAM) project dates back to 2007. At the outset it was conceptualized to enhance marketing logistics[1] of the seafood hub and the domestic fishing industries in Mauritius. However, it has been implemented without an in-depth feasibility study. Currently construction works are completed at the cost of Rs 23.8 million, which was funded through a development aid from the Greece Government. The Ministry of Fisheries and Rodrigues (MOFR), has drawn an additional amount of Rs 10 m on its 2011 investment budget to finance the supply and installation of electrical, mechanical and refrigeration equipment. Installation of refrigeration equipment is underway. The project will require an additional investment of Rs 15 million to acquire an electronic auction network and associated mobile assets to be technically ready for operation.

The MOFR knows that it does not have the competence to undertake the operational management of FAM on account of the commercial nature of its activities. It intends to contract out the operationalization of the FAM to a bona-fide private operator who will also have to contribute any additional investments required under an appropriate Public-Private Partnership (PPP) framework. The project is nearing completion and the parent Ministry wants to have a clear view on the economic viability and operationalization strategies of the FAM before initiating the procurement process.

In January 2011, a group of economic operators of the seafood hub expressed their interest in the operationalization of the FAM as a producer and non-profit making organisation as a logistics support to the domestic seafood industries[2]. This proposal was dropped due to the lack of consensus between the parties. The MOFR, in consultation with the PPP Unit of the MOFED, is convened to prepare a project feasibility study of the FAM with the main objectives to undertake market and economic analyzes and to chart out appropriate operationalization strategies.

This feasibility study has been requested by the MOFR to the "Implementation of Fisheries Regional Strategies (IFRS) for the ESA-IO" under the aegis of the IOC and funded by the EU. The global objective of the IFRS Programme is to enhance socio-economic, environmental development and deeper regional integration in the ESA-OI through sustainable exploitation of fisheries resources. This assignment falls specifically under the Module of Result 4 related to the implementation of strategic improvement to production and supply of fish. The purpose of the mission is to prepare a feasibility study[3] of the FAM project in Mauritius to assess its techno- economic, financial and strategic viability.

## 1.1 Work Plan & Implementation

In preparing the feasibility study report the consultant will:

- Review and analyze sector policies to know how the project shall fulfil the sector needs in the country;

1. Address of the Hon Arvind Booleell, Ministry of Agro-Industries and Fisheries at the unveiling of plaque ceremony at Fanfaron fishing Wharf.
2. Operationalization of the Electronic Fish Auction Market at Fort Williams, ReCoMaP / IOC, Jan. 2011
3. The Terms of Reference for the mission is given in Appendix 1.

- The feasibility study shall demonstrate the „affordability of the Service Provider and shall give an early forecast of how value for money shall be achieved;

1 Address of the Hon Arvind Booleell, Ministry of Agro-Industries and Fisheries at the unveiling of plaque ceremony at Fanfaron fishing Wharf.
2 Operationalization of the Electronic Fish Auction Market at Fort Williams, ReCoMaP / IOC, Jan. 2011
3 The Terms of Reference for the mission is given in Appendix 1.

- Conduct alternative options analysis to develop the most appropriate form of a Service provider Contract. The selection of the most appropriate option would be based on the case of implementation, maximisation of benefits to stakeholders, and the ability to control and manage risks;

- Perform a SWOT analysis of the service to be provided;

- Identify the potential risks and determine the optimum transfer formula, by proposing which party, whether the private party or the Government or a combination of both are in a better position to bear and manage them;

- Take into account the capital and operating costs, both direct and indirect, associated with the electronic network and auctioning systems, such as: equipment, furniture and fitting, maintenance and delivering on services over the period, insurances, etc.

- Provide the business case / key findings to support the FAM and inform the private sector and others regarding the potentials of the project;

- Provide financial projection and cash flow statement;

- Prepare sensitivity analysis on key cash flow to determine the robustness of the project to potential changes in assumptions.

## 1.2 Methodology

The FAM aims at providing marketing logistics to the domestic fishing industries and the by-catch landed by licensed tuna long line fishing boats. Most of the information used in this study was gathered from reputed and reliable contacts[4] involved in the supply chain of domestic seafood industries and in the transhipment and operational base of S E Asian tuna long line vessels in Mauritius. A site visit to the FAM facility at Fort William was conducted. Discussions were also held with all public bodies, Corporations and NGOs implicated in the marketing channels of raw fish. This was supplemented with literature research and information from web resources.

4 A list of persons contacted during the study is given in Appendix 2

# 2.0 OVERVIEW OF THE FISHERIES SECTOR

With an EEZ of 1.9 km$^2$, the Government of Mauritius envisions the land based oceanic industries as a strategy for extracting more value from the ocean to spearhead sustainable economic growth. Development of the seafood hub[5], the marine fisheries and aquaculture form an integral part of the aforesaid strategy. Fisheries sector contributes approximately 1.5% of total GDP and about Rs 18.5 Billion to the national economy. The sector provides direct employment to 12,000 people which represent approximately 2% of the active population. Fish is also important for food security and is an important source of protein in the local diet. The current annual per capita consumption of fish is at 23 kg. The country enjoys a positive balance of trade for fish and fish products. There is no custom duties and VAT on raw fish and fish products.

Main domestic fisheries include island-based artisanal fisheries (lagoon and off-lagoon); Fish Aggregating Device (FAD) fishery, offshore bank fishery off the banks of the Mascarene Plateau and the Chagos Archipelago; and industrial tuna fisheries in the Western Indian Ocean. The first mariculture project for farming sea bream started in 2002 with a production capacity of 500 t. Currently, the annual direct consumption of fish and fish products exceeds 18 000 t; the local production of fish is at 7 000 t and some 11 000 t are imported annually.

Mauritius is emerging as a world class seafood hub for trading, warehousing, processing, distribution and re-export of fresh, chilled and frozen raw fish as well as value added seafood products. It has attracted international seafood players from countries like Spain, Malaysia, Japan, USA, Sri Lanka and France. Government is providing most competitive fiscal incentives and business environment to capture massive local and foreign direct investments and know-how in this sector. Existing companies in the seafood hub are processing over 100 000 t of raw fish, mainly tuna annually and their intake of raw fish is growing at the tune of 10 000 t per year. Considering the tuna production in the WIO, there is a potential for additional tuna canning facility in Mauritius[6].

Major shipping lines operating in the region have chosen Mauritius as their main port of call. Extensive reefer container services are available for the re-export of frozen fish. There is a regular reefer service from the Seychelles to supply frozen tuna to canning and other processing plants in Mauritius. Modernization of market logistics of the fisheries sector in Mauritius is long overdue. It is a pre-requisite for promoting judicious utilization of resources and improving the competitive edge of the domestic seafood industries on the global markets.

## 2.1 Fishing Agreement and transhipment activities

Mauritius has fishing agreements with the EU and the Federation of Japan Tuna Fisheries Cooperative Associations, under which their vessels are licensed to fish in its EEZ. Licenses are also issued to individual tuna long line fishing boats of the SE Asian countries. Mauritius also has bilateral agreements which allow Mauritian flagged vessels to fish in the Seychelles and Mozambique waters. An agreement with Madagascar is under negotiation.

Port Louis harbour and Freeport offer efficient infrastructure and logistics facilities including one- stop-shop for administrative services needed for rapid transhipment of fish including tuna. Over 150 Asian tuna fishing vessels, mainly Taiwanese use Port Louis as a transhipment and operational base. Over 25 000 t of tuna are transhipped annually. Foreign tuna long line vessels licensed in Mauritius have an obligation to land their by-catch at the AMB cold storage at Fanfaron fish docks. The by- catch regulations dated 2004 aim at supplementing the supply of frozen fish on the local market and to improve security in restricted zones of fishing port. However these regulations were not enforced effectively.

5 Seafood hub is defined as an efficient and attractive environment for the supply of value added processes and services related to the sourcing and market of sea food products.

6 Commonwealth Secretariat Interim Report 2007 – Technical Assistance to Mauritius for the development of a cost comparative study of the seafood hub sector

# 3.0 PROJECT PROFILE OF THE FISH AUCTION MARKET

## 3.1 Project background

The FAM project was first announced on the 20th February 2007 by Hon. Arvind Boolell then Minister of Agro-Industries and Fisheries at an unveiling of plaque ceremony at Fanfaron fishing wharf. A funding of Rs 25 million in the form of development aid was obtained from the Greece Government and the project was to be located near an existing cold storage facility of the AMB at the fish docks of Fanfaron. The Minister announced that the FAM was sought to enhance the development of the seafood hub, the domestic fisheries sector and marine aquaculture in Mauritius. In the 2010 Budget, the project was placed within the framework of the Government programme for the Development of seafood hub, Food Security, Poverty Alleviation and Empowerment of Fishermen. The project was meant to comply with world class food safety and quality standards including the EU health and sanitary regulations for import of fish and fish products and to align with the HACCP.

The project could not be implemented timely at the Fanfaron Fish Wharf because it was found to be within the buffer zones of the Appravasi Ghat, which was proclaimed as a World Heritage by the UNESCO. In October 2008, an alternate site was identified at Fort William, which is located in between the Bulk Sugar Terminal and the Coast Guards Station at Les Salines. In fact the MOFR has leased a plot of land to the extent of 1 642 square metres ($m^2$) from the Mauritius Port Authority (MPA) for a period of 20 years, renewable for an addition period of 4 x 10 years to build the FAM facility.

In January 2009, the Ministry of Public Infrastructure (MPI) submitted the preliminary architectural and engineering lay-out and cost estimates of the FAM to trigger the procurement procedures. Construction works started on 11 May 2010 and was completed on 16 January 2011 at cost of Rs
23.8 million. The works completion certificate has been delivered by the MPI and the property is under responsibility of the MOFR. The facility has total surface area of 627 square metres and comprises of 4 sections namely:

- Fish reception area of 128 $m^2$
- Fish handling space (for sorting, grading and weighing) of 192 $m^2$
- Auction auditorium of 160 $m^2$
- Fish delivery area of 96 $m^2$

The MOFR has provided for an additional investment of Rs 10 million in its Budget 2011 for the supply and installation of electrical, mechanical and refrigeration systems. The installation works are due to be completed. Actually there are no dockside facilities allowing direct access to the FAM by sea. According to the Lease Agreement, infrastructural works which include widening of the access road over 75 metres and reinforcement of a small bridge would be on the care and account of the MOFR. The access road has been widened and reinstated however the small bridge has not been widened, which may cause serious traffic congestion on the peak hours of the FAM. Parking space is also limited.

An additional investment of Rs 15 million would be required for the acquisition of an electronic auction system and other mobile assets such as refrigerated truck, motor vehicle, fork lift, furniture and fitting and office equipment to complete the facility on a turn-key basis. The MOFR intends to mobilize this additional investment through a PPP procurement framework.

*Table 1: Breakdown of Capital Investment*

| Items | (Rs / M) | Source of finance |
|---|---|---|
| Land ( 1642 $m^2$ ) | - | Leased from MPA. |
| Construction of Building & associated work | 25.0 | Funded by the Govt. |
| Electrical, mechanical, Refrigeration eqt & Installation | 10.0 | Funded by MOFR |
| Electronic Network & Auction system | 8.0 | |
| Logistics (Fork lift, Refrigerated lorry, Motor Vehicles ...) | 4.0 | To be financed by private |
| Furniture, Fittings and office equipment | 2.0 | counterpart |
| Contingencies | 1.0 | |
| Total | 50.0 | |

As shown above, Capital investment on a turn-key basis is estimated at Rs 50 million, excluding working capital requirement. Significant cost overruns[7] have been incurred and they are attributed to change in location, in project concept and delay in implementation.

## 3.2 Installed Capacity

The FAM has an installed capacity of up to 10 t of fresh / chilled fish per day, which represents an annual turnover of 2 500 t on the basis of 5 working days per week. However, the trading capacity of an electronic fish auction can be boosted significantly by the use of virtual devices such as video display, e-commerce, bidding through internet and logistics networking. The main difficulty of the project is the scarcity of fresh/chilled fish in its surrounding.

## 3.3 Location of the FAM

The AMB cold storage at the fish docks was ideally situated for the FAM for auctioning by-catch of the SE Asian tuna long line vessels. The new location is not integrated to the fish docks, seafood hub and Freeport logistics, which will affect the efficiency of the project.

Apparently the business strategy of the FAM has been changed from fresh/chilled fish to frozen fish (by-catch) without any techno-economic and marketing consideration. Actually the project is in a dilemma – it has been built to trade in fresh/chilled fish which is scarce and it is not adequately located and equipped to trade in frozen fish which is available in relatively large volume.

The FAM has to be restructured judiciously to market frozen by-catch and at the same time, to optimize the use of the installed refrigeration equipment such as ice plant, chill room and accessories which will otherwise be unutilized.

The MPA is considering major land reclamation works and infrastructure developments at Fort William in its future Port Master Plan. It includes construction of a deepwater fishing port and an

7 Initially the Quantity Surveyors of MPI has estimated the project cost on a turn-key basis at Rs 25 million whereas the actual cost will nearly double on completion.

extension of fish transhipment, Freeport and seafood hub activities. It is most likely that these future developments will not come up in time to salvage the FAM. To counter the potential location risks, the project will have to groom strategic alliances with the logistics providers at fish docks the seafood hub.

## 3.4 The risks and uncertainties of Operationalization of the FAM

It is summarized as follows:

1. Absence of a feasibility study and business model at the outset to monitor the project. „As is where is, the FAM is running the risk of fore-closure

2. The FAM facility is meant to auction fresh/chilled fish, which is not available/ accessible. It cannot standby for future developments to take place in the artisanal and semi-industrial (chilled) fisheries to be fully operative.

3. The idea of setting up a centralized FAM at Fort William to auction the catch of the artisanal fisheries which is scattered around the island is far-fetched. Supply of fresh fish is scant and prices are volatile. The demand pull inflation is estimated at 15% per annum[8]. The local marketing channels are operating efficiently. There is no urge to change the present marketing system in the artisanal fisheries.

4. The dual concept - to sell catch of the domestic fisheries and the by-catch of licensed foreign vessels at the same auction can be a source of potential conflicts amongst stakeholders of the domestic and foreign fisheries.

5. In the absence of food safety and quality standard and traceability policy in the domestic fisheries at all levels, it is premature to establish a FAM in the sector. The latter will operate in sub-standard manner and will be limited to the local markets.

6. Actually the FAM is not adequately equipped /organized to auction frozen by-catch fish. It will have to arrange for complement logistics at the fish docks.

7. There has been no effective consultation with key stakeholders of the domestic fisheries and the transhipment base (local shipping agents and representatives of SE Asian tuna long line fishing vessels) in the planning and implementation phases of the project.

8. Bad reputation of the by-catch business and insecurity in the fishing port may not attract local investor and service providers unless Government shows a clear commitment to the project.

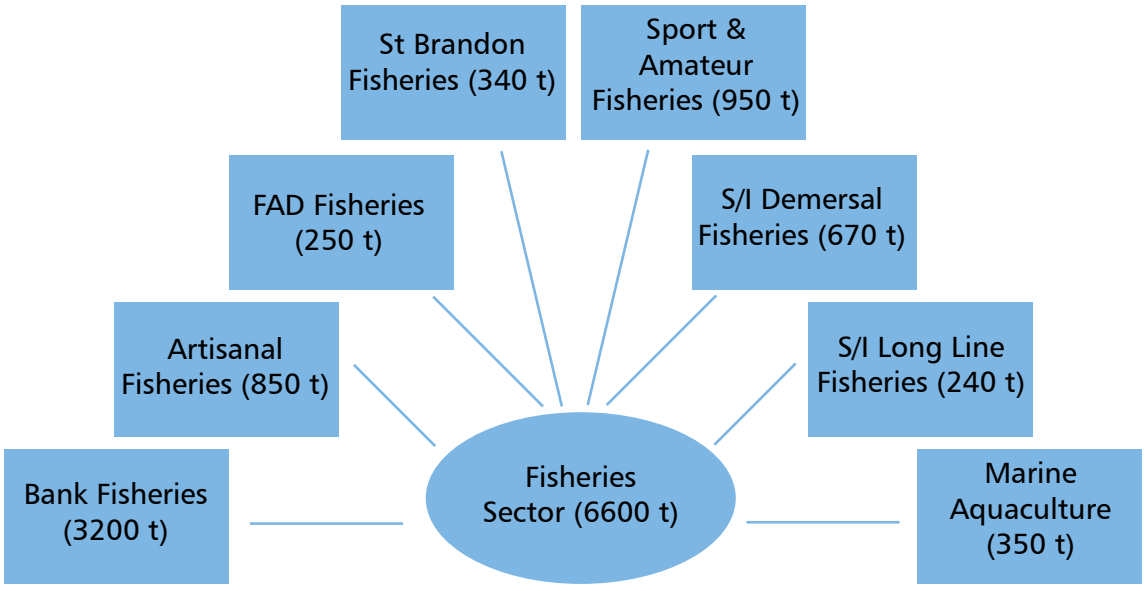
8 Value Chain Assessment of the Artisanal fisheries for Mauritius – IFRS ESA-OI , Oct. 2011

# 4.0 SUPPLY ANALYSIS

It aims at determining the adequacy of supply of raw fish and fish production that potentially attract the upcoming FAM.

## 4.1 Domestic fisheries

Illustration 1: Composition of domestic fisheries sector of Mauritius - 2009




Domestic supply of fish and fish products is scarce on the local markets. The local production can satisfy less than 50% of the annual direct consumption. Enforcement of Food safety and quality standards and traceability policy is still lagging behind in the domestic fisheries sector. Existing marketing structures are rooted to the local socio-cultural and economic ways of life of the fisher communities. Most small scale fishing enterprises are vertically integrated and have no real interest in selling their catch through the auction.

## 4.2. Supply of By-catch

Mauritius is a reputed transhipment and operational base for SE Asian tuna long line (TLL) fleet mainly Taiwanese. Over the past 5 years, 138 licenses have been issued to foreign TLL vessels to fish in the Mauritius EEZ on an annual basis. In 2010, the number of licensed TLL vessels has increased to 161. On an annual average, a licensed TLL vessel effects 3 transhipments in Mauritius and by-catch represent at least 9 %[9] of the catch transhipped.

According to the AMB By-Catch Regulations 2004, licensed TLL vessels have an obligation to land their by-catch at the AMB. Non licensed vessels have no compulsion to sell their by-catch through the AMB and they do so if the market prices are conducive.

9 Mauritius Tuna Fisheries Country Report presented to IOTC 2010

*Table 2: Supply of By-catch by Species in Mauritius*

| Years | 2009 / Qty (t) | | | 2010 / Qty (t) | | |
|---|---|---|---|---|---|---|
| **Fish species** | **Licensed** | **Unlicensed** | **Total** | **Licensed** | **Unlicensed** | **Total** |
| Wahoo ( Acanthocybium solandri) | 91.4 | 149.6 | 241 | 192 | 218.9 | 410.9 |
| Dorado ( Coryphena hippurus) | 149 | 166 | 315 | 136 | 310.1 | 446.1 |
| Oilfish ( Revetus pretiosus) | 585.6 | 1975.4 | 2561 | 310 | 2,792.8 | 3,102.8 |
| Sailfish ( Isthiophorus platypterus) | 252 | 671.2 | 923.2 | 192.3 | 748.7 | 941 |
| Skipjack ( Katsu pelamis) | 0 | 4.4 | 4.4 | 0 | 0.3 | 0.3 |
| Angelfish (lepidotus brama) | 4.1 | 25.9 | 30 | 46.9 | 116.9 | 163.8 |
| Moon fish ( Lampris guttatus) | 21.7 | 181.3 | 203 | 273.9 | 68.1 | 342 |
| Spanish mackerel (C. commerson) | 0 | 3.3 | 3.3 | 0 | 1.4 | 1.4 |
| Gastero (gasterochima melanpus) | 25.3 | 68.7 | 94 | 250 | 268.2 | 518.2 |
| Miscelleneous | 515 | 0 | 515 | 266 | 3.4 | 269.4 |
| **Total** | **1,644.1** | **3,245.8** | **4,889.9** | **1,667.1** | **4,528.8** | **6,195.9** |

*Source: MOFR*

In 2010 over 6 000 t of by-catch were available in Mauritius out of which 1 667 t were reported from the licensed vessel. However only 350 t were formally landed at AMB.

*Table 3: Supply projection of by-catch in Mauritius*

| Items | Units /No | Qty / t |
|---|---|---|
| No of licensed foreign tuna long line boats in Mauritius | 161 | |
| No of trips / transhipments per year ( 161 x 3 trips) | 483 | |
| Estimated quantity of by-catch / trip[10] (483 x 10 t @ trip) | | 4,830 |
| By-catch reported by non licensed vessels | | 4,500 |
| Total Estimates ( metric tonnes) | | 9330 |

According to a survey of the IOTC and ISSF, by-catch of the industrial TLL fleet in the WIO is estimated at 17 % of the total reported catch. RFMO worldwide are tightening fisheries regulations to reduce discarding of by-catch at sea and it is evident that by-catch landing will increase significantly in the future. The FAM will play a proactive role in market development and dissemination of marketing information on by-catch fish.

## 4.3 Regulatory framework of by-catch trade

The Sale of by-catch is regulated by the « The Mauritius Agricultural Marketing Board Act » which is also cited as the Mauritius Agricultural Marketing (Prices of Controlled Products) By-catch Fish (Amendment) Regulations 2004 made under the Section 14 of the Mauritius Agricultural Marketing Board Act 1971. The main implications of these regulations are as follows:

10 Reputed and reliable foreign tuna long line vessel owners' representatives and agents were interviewed on the availability of by-catch fish at Port Louis. A mean quantity of by-catch was estimated between 10 to 20 tonnes per transhipment call. The lowest figures are retained in the estimates of supply.

1. Definition of by-catch and downgraded fish: By-catch is defined as fish caught by tuna long line fishing vessels pursuant to their fishing licenses issued under section 37 of the Fisheries and Marine Resources Act, which are not required by such licenses. Downgraded fish means fish damaged through fishing and landing operations.

2. Controlled Products: The Regulations provide for by-catch and downgraded fish landed by foreign fishing vessels in Port Louis as controlled products, which shall be bought by the AMB at the prices specified in the Second Schedule.

3. Scheduled of controlled products and prices

| | Category A\ Rs per Kilo | Category B* Rs per Kilo |
|---|---|---|
| Becude / Dorade / Gastero / Oilfish[11] | Rs 28 | Rs 14 |
| Empereur / Marlin /Swordfish/ Tuna[12] | Rs 27 | 12 |
| Moonfish /Tetsu | Rs 12 | 6 |
| Bonite & Sharks | Rs 8 | 1 |

- By-catch Regulations were introduced to secure a reliable source of supply of quality frozen fish at relatively low prices for the local markets and to enhance security[13] at the fishing wharf of Fanfaron.

### 4.3.1 Enforcement of the by-catch regulations

- AMB is mandated for the by-catch regulations while the Mauritius Fishermen Cooperatives Federation (MFCF) is appointed as the exclusive administrative agent of the AMB. There are 28 registered Fishmongers Cooperative Societies[14] (FCS) affiliated with the MFCF which are authorized by the Ministry of Cooperatives to buy by-catch from the licensed TLL vessels.

11 Oil fish, Ruvettus pretiosus, is a species of snake mackerel in the family Gempylidae, and the only species in the genus Ruvettus. The flesh has an oil content of around 25 % and the oil actually consists of wax esters, which are not digested like traditional oil. With serving sizes of several ounces and upwards, some people experience a laxative side effect from such a large amount of wax esters. Oil fish is pleasantly rich in taste and can be substantially cheaper than some fish species, leading to some fish sellers to intentionally mislabel it as butterfish despite utter lack of relation. Because of this Japan, Italy and Australia have imposed ban on oil fish. The USFDA has warned consumers about potential mislabelling in oil fish but has concluded any laxative side effects that occur are uncomfortable at worst and pose no health risk.

12 It is misleading to classify these fish species as by-catch because they are in fact targeted species of the industrial tuna long line fisheries and are sold at premium prices on export markets.

13 Insecurity in the Fishing Port was as a result of gang wars between opposing groups for the control the procurement of the by-catch fish directly from the fishing vessels.

14 A Fishmonger Cooperative Society consists of a minimum of 5 licensed fishmongers. After being duly registered with the Mauritius Fishermen Cooperative Federation, it applies to the Ministry of Cooperatives for accreditation to a shipping agent of the foreign tuna long line fleet, which makes it eligible to buy the by-catch from these vessels serviced by the given shipping agent.

The AMB by-catch Regulations have been partially[15] enforced since its promulgation in 2004. By- catch has never been a controlled or discriminated product on the local markets. The prices of by- catch stipulated in 2nd Schedule of the Regulations are unrealistic and were never enforced. In practice, the price of by-catch is negotiated directly between the FCS and boat agents.

The declared quantity of by-catch landed at the AMB is lower than the by-catch statistics submitted by licensed vessels to the MOFR for 2 main reasons:

- Freeport enterprises[16] by-pass the AMB to procure by-catch directly from the vessels. The fish is re-enters the local markets after processing and packaging.

- Deliberate under-reporting / (Informal transactions)

To tighten the above loopholes, all foreign fishing vessels (licensed and non-licensed) must be instructed to declare the total load of fish on board - main catch and by-catch by species - in their Inward Manifest on arrival at Port Louis. These figures can be crossed checked and tally with the quantities transhipped and / or landed locally. This measure will also help to improve traceability of raw fish landed in Mauritius as an imperative for food safety and quality.

Fish sold by visiting fishing vessels is not limited to by-catch; sometimes targeted commercial species such as tuna, swordfish, marlin, squids and fish eggs are also sold either through the AMB or directly to fishmongers. With the advent of the FAM, the new marketing regulations must be broadened to encompass all categories of fish and fish products landed by licensed and visiting vessels. This will help to develop a reliable fishing marketing data-base at the national level.

### 4.3.2 Ex-vessel prices of by-catch

Prices of by-catch fish in Mauritius are comparable to international market prices in other fishing ports like Singapore and South Africa. In 2010 the mean ex-vessel price of by-catch fish at Port Louis is estimated at Rs 44.28 per kilo in addition to a commission of / fee of Rs 7.50 per kilo paid to AMB and MFCF by the FCS. The price of imported frozen fish increases at the tune of 5 to 7 % annual in Mauritius.

*Table 4: Ex-vessel Prices of by-catch at Port Louis – Year 2010*

| Fish Species | AMB–Fixed Price | ( Rs per Kg) | Actual Price |
|---|---|---|---|
| Mahi-Mahi / Dorade (US$ 1.650/t) | 28 | | 54.70 |
| Angel Fish (US$ 900 / t) | 8 | | 29.57 |
| Bonito ( US$ 800/ t ) | 8 | | 26.28 |
| Swordfish / Tuna | 27 | | - |
| Moonfish | 12 | | 55.80 |
| Oil fish | 28 | | 46.50 |
| Fish Egg ( US$ 2200 / t) | - | | 72.27 |

*Source: AMB / MFCF*

15 In fact the AMB Regulations have not administered by-catch as controlled products but rather a controlled business or cartel by a few politically linked fishmonger cooperative societies.

16 Freeport Enterprises are authorized to sell a part of the production on the local markets. It is easier for Fish and fish product being custom duty and VAT exempt.

*Table 5: Market Price Structure of By-catch – 2010*

| Items | Rs per Kilo |
|---|---|
| Mean Sale price ex-vessel | 44.28 |
| AMB – Commission / fee | 3.00 |
| MFCF – Administrative fee | 4.50 |
| Marketing Cost | 5.00 |
| Total | 56.78 |

### 4.3.3 AMB Cold storage facility

In the 1980s a 300 tonne cold storage facility was constructed at the fish docks of Fanfaron by the Japanese International Cooperation Agency (JICA) and donated to the Ministry of Agriculture and Fisheries. In the absence of a market logistics agency in the fisheries sector at that time, the facility was vetted to the AMB, which was under the mandate of the same Ministry. The AMB does not have any direct involvement in the fisheries sector except acting as a care-taker of the cold storage facility. Now, since a full-fledged Ministry of Fisheries exists, the facility owed to be transferred to its legitimate Ministry.

The facility is maintained regularly by the JIFCA and is apparently in good running condition. It is environment-friendly and cohabits harmoniously with its neighbouring Appravsi Ghat. It has 7 permanent staff. The current storage tariff is Rs 85 per 1.1 t / 24 hours basis

# 5.0 S.W.O.T ANALYSIS

## 5.1 Strengths

- Government's vision to enhance sustainable development of the fishing industry and the seafood hub as a main cluster of the national economy
- Political will of the Government to regulate trade of by-catch discharged by foreign fishing boats through the FAM.
- Public investment of Rs 35 million on the project.
- Construction works and Installation of refrigeration equipment are nearly completedat Fort William.
- Existing By-catch Regulations.
- Global awareness for judicious utilization of by-catch.
- Mauritius pioneering the creation of smart marketing platform for by-catch
- Mauritius as a reputed TLL transhipment and operational base in WIO
- Efficient logistics in the fish port and Freeport.

## 5.2 Weaknesses

- Lack of clarity in the mission and strategies of the FAM
- Isolated from the fishing port.
- Not integrated to the artisanal fisheries
- Aversion to local stakeholders
- Lack of consultation during planning and implementation
- Economic inefficiencies in operations
- Significant cost and time overruns,
- Potential political lobbies against the project.
- Absence of food safety and quality standards including traceability for fish sold at the auction.
- No local expertise in running an electronic FAM in Mauritius.

## 5.3 Opportunities

- Adequate supply of by-catch landed in Mauritius
- Existing logistics at Fanfaron to complement the FAM at Fort William
- Prospects for market development for by-catch / discarded catch.
- Regional perspective of FAM project.
- Fair competition and efficient allocation of scarce resources
- Creation of a reliable fish marketing data-base.
- Transparent market mechanism to boost reliability and economic efficiencies.
- Increase inflow of raw fish for domestic consumption and processing activities
- Positive synergies with the seafood hub.
- Domestication of foreign fishing boats.

## 5.4 Threats

- Overdependence on supply of by-catch
- Lack of integration to the domestic fishing industries.
- Concurrent development and management plans of the MOFR may lag behind.
- Boycott or lack of interest of buyers in the fish auction.
- Isolated from the fishing port
- Political lobbying against the project.
- Socio-cultural barriers and reluctance to change.

To conclude the S.W.O.T analysis on the FAM project the following points have to be underlined across the board.

- The most intangible assets of the FAM resides in its guarantee / exclusivity of supply of fish under the By-catch Regulations and the Fishing License Policy of Government that may be broadened further to include all categories of fish and fish products landed by the licensed and visiting fishing vessels.

- Local skills / know-how for the operationalization of an electronic fish auction platform is not available and this has to be overcome by attracting foreign intelligence through capacity building, external technical expertises, strategic alliances and PPP arrangement.

# 6.0 ECONOMIC ANALYSIS

The viability of the project is affected by a mismatch between its objectives and planning. The project has been developed to auction local supply of fresh and chilled fish, which is scant. And it is properly located and equipped to sell frozen by-catch, which provides a critical mass for its cost effective operations. Therefore the project has to be overhauled diligently to ensure its operational efficiency and economically viability.

## 6.1 Focus on frozen by-catch

An auction platform could have been arranged by using the existing AMB cold storage facility at the fish docks to withhold the by-catch prior to auctioning[17]. Additionally an auction hall and anadministrative centre should have been organized to complete the auction network. For this purpose, a smart building[18] could have been leased or constructed in the vicinity of the fishing port or on its actual site at Fort William. This concept would have been cost and time effective.

The location of the AMB cold storage facility at the fish docks is of prime importance for auctioning of frozen fish. The cold room can be used for handling, segregating, grading and display of by-catch prior to auction. The lots of the by-catch need not go through physical auctioning; they can be traded on the basis of prior inspection at the cold storage, samples and/or video display. The sold lots can be delivered directly from the cold room upon settlement. It does not matter if the cold storage facility and the auction centre are not at the same premises because they can be cable-linked, Moreover an electronic auction is equipped to provide real time market data, to handle forward offers of the suppliers, advance sale and remote biddings through internet.

The above arrangements have the advantage of restructuring the FAM without incurring additional capital investment and will rather lead to optimize the use of the AMB cold storage facility which is apparently underutilized.

## 6.2 Optimizing the present outlay

A significant part of the capital assets[19] of the FAM is committed to handling and preservation of fresh/chilled fish landed at the auction. So, they will have to be redeployed judiciously in the fisheries sector. Scarcity of ice flake is the main constraint for preservation of fresh fish in the artisanal fisheries in Fisheries[20].

It is proposed to use the existing ice-flake production unit (IPU) as an auxiliary commercial activity of the FAM to market ice flakes in its surrounding areas[21]. Nevertheless, the demand for ice flake will depend to some extent on the enforcement of the Code of Practice – Handling and Preservation of fresh and chilled fish. Therefore, the MOFR will have to expedite the implementation Food Safety and quality standard for fish and

17 This arrangement will not affect the buffer zones of the Appravsi Ghat in any way because the AMB cold storage facility exists since 1980s and will continue to exercise its usual business while no new extension or development will be undertaken on the site.

18 An Information, Telecommunication and Information technology enhanced building

19 Ice Plant (with an installed capacity of 5 metric tonnes per day), Chill Room (10 cubic metres capacity) and Refrigerated truck, total investment estimated at RS 10 million.

20 Study on fish handling, preservation and marketing in Mauritius and Rodrigues – Appavoo & Associates, 2007

21 Demand for ice flake in the surrounding area of the FAM will arise from some 300 artisanal fishing units at Tombeau Bay and GRNW, a dozen of semi-industrial (chilled) fishing boat based at Fanfaron, fish retail outlets in Port Louis.

fish products on the local markets.

The IPU is economical viable on its own and will contribute positively the cash flow of the FAM. A separate Cash Flow Statement is presented in Appendix 2.

## 6.3 Prerequisites of a by-catch auction platform

To promote the FAM as an exclusive auction platform for the catch[22] of licensed and visiting fishing vessels requires:

- Strong political will of the Government.
- Adherence of the AMB cold storage facility the MOFR.
- Review of the By-catch regulations to accommodate the FAM.
- Consultation / dialogues with all stakeholders to achieve a broad consensus on the project.
- Attract a large number of fishmongers and Freeport Operators/processors.
- Review of the catch reporting system (Inward Manifest) of foreign fishing vessels.
- Enforcement of food safety and quality standards in Mauritius
- Capacity building in fish auction market system.
- Economic diplomacy to attract proficient foreign private operators.
- Cooperation with friendly countries having experience is fish auctioning.
- To compensate foregone revenue of the MFCF with regard to by catch sale.

## 6.4 Adjusted Market Value of Public Outlay

The book value of Government investment on the FAM is at Rs 35 M. The procurement procedure of the Public Sector is reputedly more costly than its private counterpart. Also, due to major inconsistencies and cost overruns of the project, it is necessary to adjust the Public Sector investment to its realistic market value. This evaluation can be done by an independent qualified quantity surveyor. For the purpose of examining the economic and financial viability of the project, the initial outlay is assumed at Rs 40 M, comprising:

- Adjusted Public Investment: Rs 25 M
- Private Sector Investment: Rs 15 M

## 6.5 Organisational Review

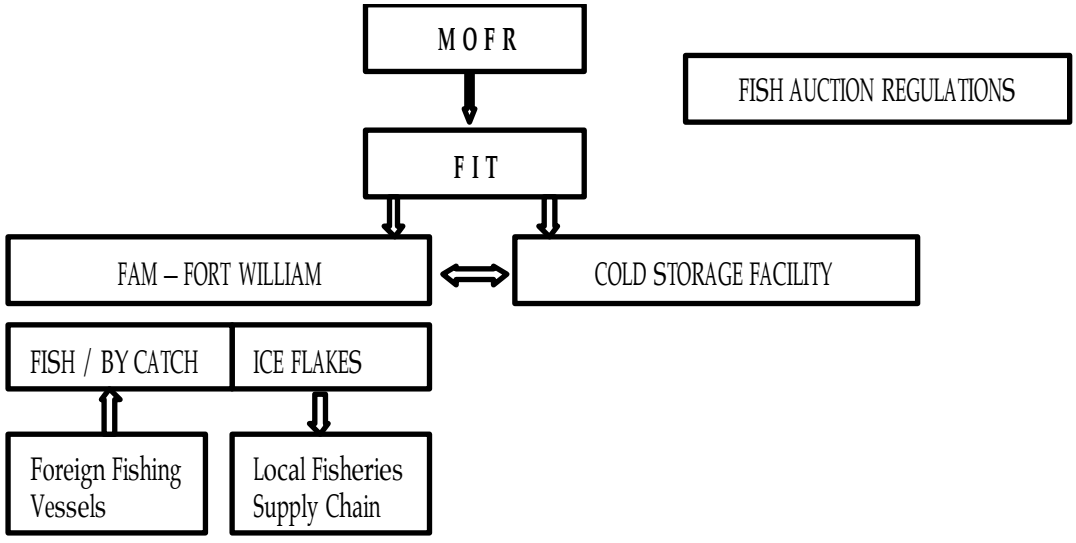
In 2006 Government has created the Fishermen Investment Trust (FIT) to act as an economic / Investment arm to uphold sustainable development of the fisheries sector as strategy to enhance socio-economic welfare of the fisher communities. In the absence of such a public corporation in 1980s, the cold storage facility at Fanfaron which was donated by the Japanese Government to the Ministry of Agriculture and Fisheries was

in turn assigned to the AMB although it had no direct involvement in the fisheries sector. It has acted as

22 The term catch is not limited to by-catch or untargeted fish species and has to be broadened to include all fish and fish products discharge by foreign licensed and non-licensed fishing vessels irrespective of gears and/or other characteristics.

a diligent care-taker of the facility to-date. Now that the fisheries sector and the seafood hub have a full-fledged Ministry, it is opportune to transfer the cold storage facility to the FIT and to mandate of the by-catch regulations in light of the new developments. Similarly it proposed to vet the FAM to the FIT with clear directives concerning the operationalization and administration of the FAM.

*Illustration 2: Suggested Organisational Flow-Chart*



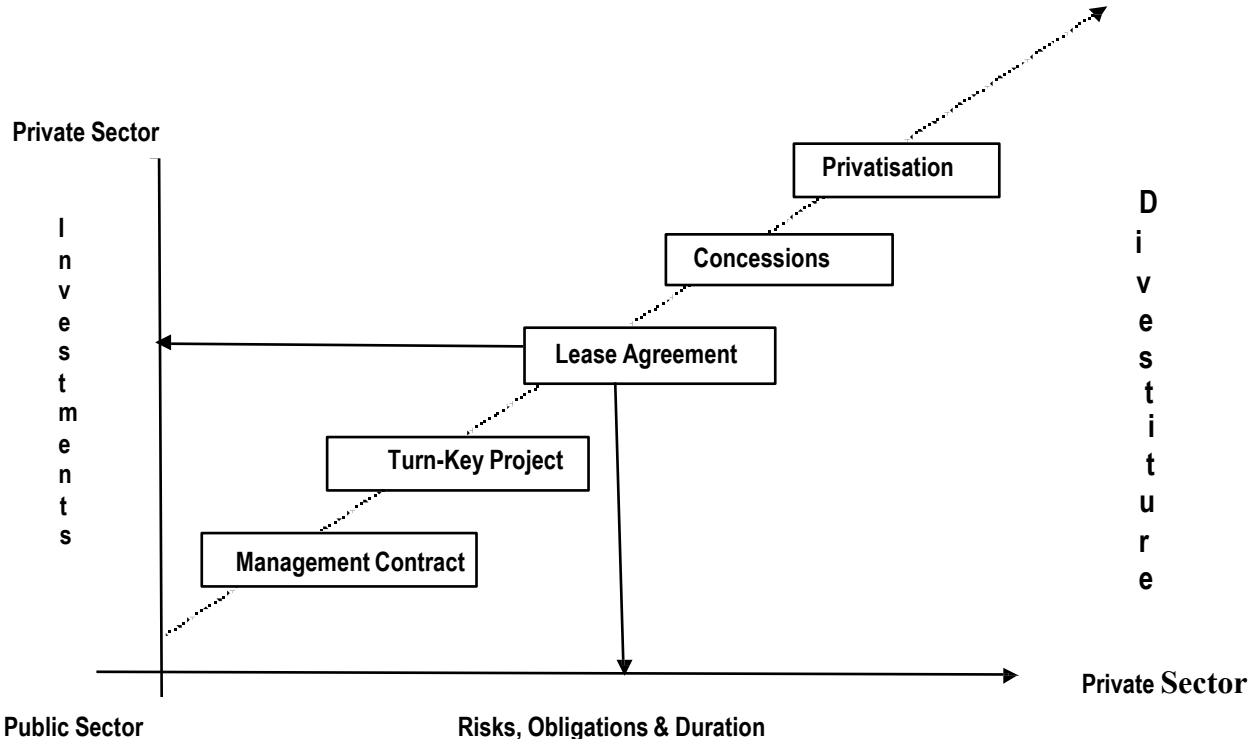

## 6.6 Operationalization Strategies

The FAM has encountered some setbacks in term of concept, location, time and cost overruns during its development phase that can be redressed satisfactorily. However, this should not overshadow the significance and prospects of the project in the seafood industry. Likewise the scope of the project should not be restrained to the trade of frozen by-catch instead, it has to emerge progressively as a regional marketing platform for fish and fish production the Western Indian Ocean. It is advisable to implement the recommended structural and functional re-adjustments to make the project more attractive and to enhance the negotiation power of the Public Sector in procuring a private operator.

### 6.6.1 Lease Agreement

An initial lease agreement of 15 years is realistic for the operationalization of the FAM on account of the capital investment to be incurred by the private operator and a relative longer take-off period. Under the lease agreement the operator will retain the revenue from the by-catch trade and sale of ice flake and makes a specified lease fee payment to the project owner. In this way the commercial / operational risk is passed on to the private operator while the investment risks are shared proportionately between both parties. The contracting party has to retain ultimate ownership of the facility and equipment.

*Illustration 3 : PPP Chart*




### 6.6.2 Joint Venture Arrangement.

Assuming that the FAM and the AMB cold storage facility are vetted to the FIT with a clear mandate, the latter will have to conclude a strategic alliance with a private operator of international repute. The search for a strategic alliance can be facilitated by the Economic Diplomacy and/or the Board of Investment. Eventually Joint Venture entity can be established as a Special Purpose Company on the basis of a business plan that will be managed a private corporation.

# 7.0 FINANCIAL ANALYSIS

A precautionary approach has been adopted in forecasting revenue and cost of the project so as to build-in resilience. Auction of by-catch is the core business of the FAM. The IPU is conceptualized as an auxiliary activity of the FAM which is economically viable on its own and will sustain the robustness of the entire set-up. Common indicators used to determine the financial viability of the project are Internal Rate of Return (IRR), Return on Investment (ROI) and Break-Even points (B/E). Key economic determinants of the project are discussed as follows:

## 7.1 Internal Rate of Return

The IRR is related to the opportunity cost of long term borrowings or the rewards for savings on the financial markets. It differs for the Public and Private sector. Considering the present and future cost of capital during the life-cycle of the project, the reference rates of interest are: Public Sector: 6 % per annum and Private Sector: 10 % per annum.

The discounting factor is used to calculate the break-even point of the project is taken at 7.75 %, which is a weighted mean of the Rate of Interest and Investments incurred by both parties – Public Sector ( Adjusted Outlay: Rs 25 M) and Private Sector (Initial Outlay: Rs 15 M). Discounted Cash Flow Method [23] is used to assess the economic viability of the project.

## 7.2 Life cycle of the Project

The initial life cycle of the FAM project is assumed at an initial period of 15 years and includes a gestation period of 5 Years, which is necessary for the project to well-establish in the seafood industries.

## 7.3 Supply Forecast

Regularly some 1666 t of by-catch are landed by licensed TLL vessels and 4709 t are transhipped non-licensed TLL vessels in Mauritius[24] every year. Actually the licensed vessels have an obligation under the By-Catch Regulations 2004 and Conditions attached to issuance of fishing license to land their catch at the AMB whereas the visiting vessels have no such obligation but according to the local shipping agents, they will be interested to discharge their by-catch with the advent of the fish auction. A licensed TLL effects 3 transhipment calls per year and on it carries about 10 t to 20 t per trip[25]. By extrapolation, the total availability of by-catch from these vessels is estimated between 4,140 t and 9,660 t per year. In a conservative approach the following supply projections is made:

23 Discounted cash flow methods for evaluating investments recognise that a Rupee today is better than a Rupee received in several years time because it could have earned interest in the interim. Thus, the future earnings are discounted by the "discount rate" to get present value. Internal Rate of Return (IRR) is the interest rate at which the present value of earnings from the investment over future years is equal to the present value of all of the investment and all cash outgoings from the project i.e. the discount rate which gives a Net Present Value (NPV) of zero.

24 Refer to details at Page 7 and 8

25 Information obtained from FGD with the Local Shipping Agents with help of Capt J S Wang, Chief Surveyor of the Taiwanese TLL fleet in Mauritius.

*Table 6 : Supply Forecast of by-catch (metric tonnes)*

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benchmark | 1,500 | 1,650 | 1,815 | 1,997 | 2,196 | 2,416 | 2,657 | 2,923 | 3,215 | 3,537 | 3,891 | 4,280 | 4,708 | 5,178 | 5,696 |

Supply of by-catch for the Year 1 is 1500 t followed by an increment of 10 % per year for the successive years. Mean annual supply during the period of the project is 3177 t.

## 7.4 Auction Revenue

The ex-vessel price of by-catch is estimated at Rs 45 per kilo[26]. It increases at the rate of 5 to 7 % per year on international markets. Here, it assumed at 5 % per annum. Auction fee varies between 8 to 12 % of the sale value at fish auction market across the world whereas Commission / fees charged by the AMB and MFCF rare are 17 % of the ex-vessel price. In this study it is assumed at 10 %.

*Table 7 : Projection of Auction market price of by-catch ( Rs'000 /t )*

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Market Price | 45.00 | 47.25 | 49.61 | 52.09 | 54.70 | 57.43 | 60.30 | 63.32 | 66.49 | 69.81 | 73.30 | 76.97 | 80.81 | 84.85 | 89.10 |
| Auction Fee - 10 % | 4.500 | 4.730 | 4.960 | 5.210 | 5.470 | 5.740 | 6.030 | 6.330 | 6.650 | 6.980 | 7.330 | 7.700 | 8.080 | 8.490 | 8.910 |

## 7.5 Ice-flakes Production Unit (IPU)

The table below shows the production and revenue forecasts of the IPU.

| Items | 50% Installed Cap | 80 % Installed Cap |
|---|---|---|
| Annual output | 750 t | 1,200 t |
| Selling Price[27] Rs 5000 @ t | Rs 3,750,000 | Rs 6,000,000 |
| Operation Cost (approx. 40%) | Rs 1,500,000 | Rs 2,400,000 |
| Operating Surplus | Rs 2,250,000 | Rs 3,600,000 |

## 7.6 Cost Estimates

The operating cost consists of the Fixed Cost and Variable Cost[28]. They have been assumed according to the industry standards. Non cash items such as depreciation and interest on borrowings are not included. The Operating Cost schedules and underlying assumptions are given in Appendices 5, 6, 7 and 10

26 Refer to details at Page no. 10 and 11

27 The actual price of Ice cubes is Rs 6.00 / kg (5 kg bag)

28 A fixed cost does not vary according to the levels of production or sales whereas a variable cost varies according to the change in the volume of production units. The total cost is the sum of total fixed costs and variable costs. It is to be noted that above definitions are usually overlapping in the services sector such the fish auction market.

# 8.0 RESULTS AND DISCUSSIONS

Three scenarios are presented below:

## 8.1 Consolidated FAM project (including IPU)

Based on the above benchmark assumptions, the FAM including the IPU is viable.

- IRR is slightly above 18.5 %
- ROI is at 35.3 % per annum (inter-annual mean)
- B/E quantity is at 2054 t (inter-annual mean)

A Discounted Cash Flow (DCF) for the entire project is given in Appendix 2

## 8.2 FAM as a standalone enterprise (excluding IPU)

Based on the above benchmark assumptions in addition to adjustment of operating cost, the FAM still viable

- IRR is slightly above 12.2 %
- ROI is at 30.4 % per annum (inter-annual mean)
- B/E quantity is at 1597 t (inter-annual mean)

A Discounted Cash Flow (DCF) for the entire project is given in Appendix 3

## 8.3 IPU as a standalone enterprise

The IPU is viable and contributes positively the efficiency and cash flow of the project.

- IRR is slightly lower than 10%
- ROI over the project life is 14%
- Break-Even Qty is 37 % of installed capacity ( 550 t / year) A Discounted Cash Flow Statement is given in Appendix 4

# 9.0 SENSITIVITY ANALYSIS

To assess resilience of the project, the following specific risks are analyzed.

## 9.1 Variation of Supply of By-catch

This is a key external factor that may have direct consequences on the financial stability of the project. Due diligence has been performed to determine the reliability and continuity of supply. The benchmark assumptions used in the financial models is realistic if not conservative. The mean break-even volume is at 1596t, which is lower than the landings actually reported by the licensed TLL fishing vessels and is insignificant as compared to the total supply of by-catch in Mauritius. Nevertheless, the buoyancy of the project is tested by steep variations of supply. The results are given below while a detailed DCF is presented in Appendix 8.

| Auction Fee | | Auction Fee : 10% | |
|---|---|---|---|
| Available Supply | Scenario 1<br>2,000 t +... | Scenario 2<br>1,500t+ ... | Scenario 3<br>1,250t + ... |
| IRR | 26% | 18.5% | 14% |
| ROI | 54% | 35 % | 26% |

## 9.2 Adjustment of Auction Fee

The auction fee is management tool to monitor the cash flow of the business. It has been assumed 10% of total auction sale. It is realistic because the actual commission charged on ex-vessel price is estimated at17 %. Auction fee on fish trade worldwide varies between 8% and 12 % for high market value fish and fish products. The cash flow is tested with a lower rate of auction fee at 3 different rates of auction fee as given in the table below:

| Available Supply<br>Auction fee | | Year 1 – 1500 t + 10% increment per year over 14 consecutive years | | |
|---|---|---|---|---|
| Auction fee | 10 % | 9% | 8% | 7 % |
| IRR | 18.5% | 16% | 13% | 9% |
| ROI (before tax) | 35% | 30% | 24% | 19% |

A DCF Statement is presented in Appendix 9

## 9.3 Other risks

Other risk associated with the operationalization of the FAM project and normal business risks are discussed in a risk assessment matrix given in Appendix 1.

# 10.0 CONCLUSION

In keeping with the aforementioned findings and recommendations in this report, the FAM can be promoted as an economically viable project. Government commitment is driving force for its success. As a powerful marketing logistics, the electronic fishing auction market will, in due course link the domestic seafood industries to global markets. It will play a pivotal role in boosting economic efficiencies in the value chains, enhancing food safety and traceability of fish and fish products, judicious allocation of resources and attracting foreign investments and know how in the domestic fisheries and seafood hub of Mauritius. It has the potential to become a regional tower- house for fish trade in the Western Indian Ocean. The project has to be purported by a strong political will and vision.

# APPENDIX 1 - RISK MATRIX OF THE FAM PROJECT

| Risks / Description of Risk | Likely effects | Mitigation measures | Allocation |
|---|---|---|---|
| **1. Developmental risk**<br><br>Insufficient planning process – concept, business model, feasibility study and business plan | Mismatch between objective and strategies<br><br>Time and Cost overruns Difficulties in operationalization Dissipating of resources | Evaluation / Due of current status<br><br>Re-adjustment the mission and strategies<br><br>Risks analysis, Impact assessment and possible remedies<br><br>Appointment of Competent Project advisor | Implementing Agency (MOFR)<br><br>PPP Unit / MOFED Short Term Expertise |
| **2. Sponsor risk**<br><br>Deficient consultation / dialogue mechanism<br><br>Intra Public sectors / Corporations<br><br>Public – Private Sector<br><br>Poor communication<br><br>Poor exposure / Marketing of the project | No adherence and support to the project<br><br>Inefficiencies / Underutilization of existing capacities / resources<br><br>Reluctance / Aversion to participate in the project<br><br>Delay in operationalization | Set-up an Consultation mechanism to bring all Public & Private stakeholders on board to exchange views and opinions<br><br>Publicise the project internationally through the BOI and Economic Diplomacy.<br><br>Launch preliminary consultation / request of proposals from prospective local and international private operators<br><br>Due diligence of on prospective private operators. | MOFR<br><br>Fishermen Investment Trust<br><br>Board of Investment<br><br>Regional and International Organisations<br><br>Bilateral Cooperation. |
| **3. Cost overrun risk**<br><br>The actual costs have exceeded the estimated cost during design phase. | Financial fore closure<br><br>Delay in operationalization<br><br>Loss of confidence in the project<br><br>Dependence on Private Investors to complete the project on turn-key basis. | Re-assess investment and operational risks.<br><br>Review economic viability<br><br>Discuss procurement strategies / PPP Models | MOFR BOI<br>PPP Unit / MOFED<br><br>Private Sector |

| Risks / Description of Risk | Likely effects | Mitigation measures | Allocation |
|---|---|---|---|
| 4.Time Overrun Risk | Delay in operationalization<br><br>Foregone revenue<br><br>Lack of confidence in the project | Ad-hoc Project Management Unit<br><br>Efficient Planning and Monitoring<br><br>Periodical Review | MOFR<br><br>PPP Unit / MOFED |
| 5. Operating Risk<br><br>Lack of expertise and skill<br>Use of electronic fish auction system. Structural and Functional weaknesses<br>Absence of Food Safety and quality standards in the local fish markets.<br><br>Aversion of fishmongers / buyers<br>(political lobbying against the project) | Project failure | Evaluation of technical competence of prospective private operators. ( technical evaluation of request of proposals)<br><br>Acquisition of an appropriate electronic fish auction package adapted to the project environment.<br><br>Institutional and Regulatory reforms: Status of the AMB Cold Storage<br>Role of the FIT with regard to the FAM By-Catch Regulations 2004<br><br>Issuance of fishing License<br>Reporting of Catch / By-catch (Inward Manifest)<br>Enforcement of a food safety and quality standards at national level.<br><br>Strategic alliance with the logistics providers of the seafood hub and Freeport<br><br>Equitable sharing of operational risks with private operator.<br><br>Awareness building on the benefits of FAM to the seafood industries. | MOFR<br><br>Seafood hub Operators<br><br>Local fishmongers & processors and distributors<br><br>Logistics services Providers |

| Risks / Description of Risk | likely effects | Mitigation measures | Allocation |
|---|---|---|---|
| **6. Revenue Risk**<br><br>**Poor Cash Flow** | Insolvency | Economic & Market analyses<br><br>Financial & Sensitivity analysis to build up resilience<br><br>Appropriate Investment and Revenue Risk transfer strategies | MOFR<br>PPP Unit / MOFED Private Party<br>State Law Office |
| **7. Change in Tax rates**<br><br>Change is tax law or policy that have negative effect on the private party, its assets, or the project | Negative effect on the Private Party, its assets or the project | Sensitivity analysis to test the robustness of financial return<br><br>Compensation if such effects are discriminatory | MOFR<br>PPP Unit / MOFED Private Party |
| **8. Change in Interest Rate** | Negative effect on the Private Party, its assets or the project | Sensitivity Analysis | MOFR<br>PPP Unit / MOFED Private Party |
| **9. Force Majeure**<br><br>Flood, cyclone etc.; | Closure of operation and negative effects on assets and project | Robustness of cash flow<br><br>Provision of reserves<br><br>Relief for short-term close down… | MOFR<br>PPP Unit / MOFED Private party |
| **10. Dispute between parties**<br><br>Non-compliance of contract provisions, or difference in interpretation of provisions | | Establishment of a contract management framework and formalization of management responsibilities<br><br>Well defined dispute resolution mechanism spelt out in the contract<br><br>Appropriate regulatory mechanism<br><br>Termination of contract | MOFR<br><br>PPP Unit / MOFED Private party |

# APPENDIX 2 - DISCOUNTED CASH FLOW (CONSOLIDATED FAM PROJECT)

Assumptions

Volume of trade : 1500 mt in year 1 + 10% increment over consecutive years

Monetery Unit : Rs

Auction Fee : 10% in Year 1 + 5% increment over consecutive years

IPU operating at 50 % of rate capacity

Initial Layout : Rs 40 M ( Public Sector : Rs 25 M + Private Sector : Rs 15 M)

| Items | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Qty traded (m.t) | | 1,500 | 1,650 | 1,815 | 1,997 | 2,196 | 2,416 | 2,657 | 2,923 | 3,215 | 3,537 | 3,891 | 4,280 | 4,708 | 5,178 | 5,696 |
| Auction Fee | | 4,500 | 4,725 | 4,961 | 5,209 | 5,470 | 5,743 | 6,030 | 6,332 | 6,649 | 6,981 | 7,330 | 7,697 | 8,081 | 8,485 | 8,910 |
| Auction Revenue | | 6,750,000 | 7,796,250 | 9,004,669 | 10,400,392 | 12,012,453 | 13,874,383 | 16,024,913 | 18,508,774 | 21,377,634 | 24,691,168 | 28,518,299 | 32,938,635 | 38,044,124 | 43,940,963 | 50,751,812 |
| Sales - Ice flakes (50% Cap) | | 3,750,000 | 3,937,500 | 4,134,375 | 4,341,094 | 4,558,148 | 4,786,056 | 5,025,359 | 5,276,627 | 5,540,458 | 5,817,481 | 6,108,355 | 6,413,773 | 6,734,461 | 7,071,184 | 7,424,743 |
| Total Revenue | | 10,500,000 | 11,733,750 | 13,139,044 | 14,741,486 | 16,570,602 | 18,660,439 | 21,050,272 | 23,785,401 | 26,918,092 | 30,508,649 | 34,626,654 | 39,352,408 | 44,778,585 | 51,012,147 | 58,176,555 |
| Fixed Cost | | 3,230,000 | 3,445,050 | 3,711,551 | 4,011,168 | 4,349,715 | 4,734,167 | 5,172,904 | 5,676,004 | 6,255,595 | 6,926,282 | 7,705,663 | 8,614,957 | 9,679,758 | 10,930,951 | 12,405,816 |
| Variable Cost | | 4,947,670 | 5,195,054 | 5,454,806 | 5,727,546 | 6,013,924 | 6,314,620 | 6,630,351 | 6,961,869 | 7,309,962 | 7,675,460 | 8,059,233 | 8,462,195 | 8,885,304 | 9,329,570 | 9,796,048 |
| Total | | 8,177,670 | 8,640,104 | 9,166,357 | 9,738,715 | 10,363,639 | 11,048,787 | 11,803,255 | 12,637,873 | 13,565,557 | 14,601,742 | 15,764,896 | 17,077,152 | 18,565,063 | 20,260,520 | 22,201,864 |
| Net Cash Flow | | 2,322,330 | 3,093,647 | 3,972,687 | 5,002,772 | 6,206,963 | 7,611,653 | 9,247,016 | 11,147,528 | 13,352,535 | 15,906,907 | 18,861,758 | 22,275,256 | 26,213,522 | 30,751,627 | 35,974,691 |
| D.F : 7.75% | 1.000 | 0.928 | 0.861 | 0.799 | 0.742 | 0.689 | 0.639 | 0.593 | 0.550 | 0.511 | 0.474 | 0.440 | 0.408 | 0.379 | 0.352 | 0.326 |
| PV | -40,000,000 | 2,155,295 | 2,664,625 | 3,175,649 | 3,711,432 | 4,273,589 | 4,863,795 | 5,483,788 | ٦,١٣٥,٣٦٤ | 6,820,374 | 7,540,722 | 8,298,357 | 9,095,265 | 9,933,465 | 10,814,992 | 11,741,887 |
| NPV | 56,708,600 | | | | | | | | | | | | | | | |
| D.F : 18.5% | 1.000 | 0.844 | 0.712 | 0.601 | 0.507 | 0.428 | 0.361 | 0.305 | 0.257 | 0.217 | 0.183 | 0.155 | 0.130 | 0.110 | 0.093 | 0.078 |
| PV | -40,000,000 | 1,959,772 | 2,203,099 | 2,387,423 | 2,537,098 | 2,656,363 | 2,748,963 | 2,818,209 | 2,867,027 | 2,898,001 | 2,913,414 | 2,915,280 | 2,905,377 | 2,885,272 | 2,856,348 | 2,819,823 |
| NPV | 371,470 | | | | | | | | | | | | | | | |

IRR : Slightly above 18.5%
ROI : 35.3%
B/E : 2054 t

# APPENDIX 3 - DISCOUNTED CASH FLOW ( ICE FLAKE PRODUCTION UNIT AS A STAND ALONE PROJECT)

Ice Flake Manufacturing Unit

Assumptions

Operating Capacity : 50 %

Annual production : 750 t on the basis of 2.5 t / day x 300 days

Operating Cost : 74 % estimated revenue

Initial Outlay : estimated at Rs 10 M

| Items | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50% Op Capacity | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 5,696 |
| | | 5,000 | 5,250 | 5,513 | 5,788 | 6,078 | 6,381 | 6,700 | 7,036 | 7,387 | 7,757 | 8,144 | 8,552 | 8,979 | 9,428 | 9,900 |
| Sales - Ice flakes (% Cap) | | 3,750,000 | 3,937,500 | 4,134,375 | 4,341,094 | 4,558,148 | 4,786,056 | 5,025,359 | 5,276,627 | 5,540,458 | 5,817,481 | 6,108,355 | 6,413,773 | 6,734,461 | 7,071,184 | 7,424,743 |
| Fixed Cost | | 1,292,000 | 1,356,600 | 1,424,430 | 1,495,652 | 1,570,434 | 1,648,956 | 1,731,404 | 1,817,974 | 1,908,872 | 2,004,316 | 2,104,532 | 2,209,758 | 2,320,246 | 2,436,259 | 2,558,072 |
| Variable Cost | | 1,484,301 | 1,558,516 | 1,636,442 | 1,718,26 | 1,804,177 | 1,894,386 | 1,989,105 | 2,088,561 | 2,192,989 | 2,302,638 | 2,417,770 | 2,538,658 | 2,665,591 | 2,798,871 | 2,938,814 |
| Initial Outlay | -10,000,000 | | | | | | | | | | | | | | | |
| Total | | 2,776,301 | 2,915,116 | 3,060,872 | 3,213,915 | 3,374,611 | 3,543,342 | 3,720,509 | 3,906,534 | 4,101,861 | 4,306,954 | 4,522,302 | 4,748,417 | 4,985,838 | 5,235,130 | 5,496,886 |
| Operating profit | | 973,699 | 1,022,384 | 1,073,503 | 1,127,178 | 1,183,537 | 1,242,714 | 1,304,850 | 1,370,092 | 1,438,597 | 1,510,527 | 1,586,053 | 1,665,356 | 1,748,624 | 1,836,055 | 1,927,857 |
| D.F: 7.75% | 1.000 | 0.928 | 0.861 | 0.799 | 0.799 | 0.689 | 0.639 | 0.593 | 0.550 | 0.511 | 0.474 | 0.440 | 0.408 | 0.379 | 0.352 | 0.326 |
| NPV | -10,000,000 | 903,665 | 880,602 | 858,127 | 836,226 | 814,884 | 794,086 | 773,819 | 754,070 | 734,824 | 716,070 | 697,795 | 679,986 | 662,631 | 645,719 | 629,239 |
| PV | 1,381,742 | | | | | | | | | | | | | | | |
| D.F : 10 % | 1.000 | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.350 | 0.319 | 0.290 | 0.263 | 0.239 |
| NPV | -10,000,000 | 885,181 | 844,945 | 806,539 | 769,878 | 734,883 | 701,480 | 669,594 | 639,158 | 610,106 | 582,373 | 555,902 | 530,634 | 506,514 | 483,491 | 461,514 |
| PV | -217,809 | | | | | | | | | | | | | | | |

IRR : Slightly below 10% ROI : 14 %

B/E Qty : 37 % of installed capacity (550 t p.a) The IPU is viable

# APPENDIX 4 - DISCOUNTED CASH FLOW ( FAM AS A STAND ALONE PROJECT)

Volume of trade : 1500 mt in year 1 + 10% increment over consecutive years
Auction Fee : 10% in Year 1 + 5% increment over consecutive years
Total Variable Cost : reduced by 20%
Initial Layout : Rs 40 M

| Items | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Qty traded (m.t) | 3,177 | 1,500 | 1,650 | 1,815 | 1,997 | 2,196 | 2,416 | 2,657 | 2,923 | 3,215 | 3,537 | 3,891 | 4,280 | 4,708 | 5,178 | 5,696 |
| Auction Fee | | 4,500.00 | 4,725.00 | 4,961.25 | 5,209.31 | 5,469.78 | 5,743.27 | 6,030.43 | 6,331.95 | 6,648.55 | 6,980.98 | 7,330.03 | 7,696.53 | 8,081.35 | 8,485.42 | 8,909.69 |
| Total Inflow | | 6,750,000 | 7,796,250 | 9,004,669 | 10,400,392 | 12,012,453 | 13,874,383 | 16,024,913 | 18,508,774 | 21,377,634 | 24,691,168 | 28,518,299 | 32,938,635 | 38,044,124 | 43,940,963 | 50,751,812 |
| Fixed Cost | | 3,230,000 | 3,445,050 | 3,711,551 | 4,011,168 | 4,349,715 | 4,734,167 | 5,172,904 | 5,676,004 | 6,255,595 | 6,926,282 | 7,705,663 | 8,614,957 | 9,679,758 | 10,930,951 | 12,405,816 |
| Variable Cost | (-20%) | 3,958,136 | 4,156,043 | 4,363,845 | 4,582,037 | 4,811,139 | 5,051,696 | 5,304,281 | 5,569,495 | 5,847,970 | 6,140,368 | 6,447,386 | 6,769,756 | 7,108,244 | 7,463,656 | 7,836,839 |
| Total Outflow | -40,000,000 | 7,188,136 | 7,601,093 | 8,075,395 | 8,593,205 | 9,160,854 | 9,785,863 | 10,477,185 | 11,245,499 | 12,103,565 | 13,066,650 | 14,153,049 | 15,384,713 | 16,788,002 | 18,394,606 | 20,242,654 |
| Operating profit | | -438,136 | 195,157 | 929,273 | 1,807,187 | 2,851,599 | 4,088,521 | 5,547,728 | 7,263,275 | 9,274,070 | 11,624,518 | 14,365,250 | 17,553,922 | 21,256,122 | 25,546,356 | 30,509,158 |
| D.F : 7.75% | 1 | 0.928 | 0.861 | 0.799 | 0.742 | 0.689 | 0.639 | 0.593 | 0.550 | 0.511 | 0.474 | 0.440 | 0.408 | 0.379 | 0.352 | 0.326 |
| PV | -40,000,000 | -406,623 | 168,093 | 742,834 | 1,340,707 | 1,963,370 | 2,612,537 | 3,289,987 | 3,997,553 | 4,737,125 | 5,510,642 | 6,320,088 | 7,167,486 | 8,054,886 | 8,984,358 | 9,957,975 |
| NPV | 24,441,019 | | | | | | | | | | | | | | | |
| D.F: 12.2% | 1.000 | 0.870 | 0.775 | 0.691 | 0.616 | 0.549 | 0.489 | 0.436 | 0.388 | 0.346 | 0.309 | 0.275 | 0.245 | 0.218 | 0.195 | 0.174 |
| PV | -40,000,000 | -380,988 | 151,249 | 641,889 | 1,112,568 | 1,564,657 | 1,999,420 | 2,418,022 | 2,821,530 | 3,210,921 | 3,587,083 | 3,950,816 | 4,302,837 | 4,643,783 | 4,974,208 | 5,294,591 |
| NPV | 292,587 | | | | | | | | | | | | | | | |
| PV | -217,809 | | | | | | | | | | | | | | | |

IRR : Slightly above 12.2 % ROI : 30.4 %
B/E Qty : 1597 t
FAM is viable without IPU
However the IPU contributes positive to the Cash Flow

# APPENDIX 5 - FIXED COST SCHEDULE

Assumptions

1. Rs 100,000 p.a
2. Actual rate : Rs 85 / mt / 24 hrs; Contract for 6000 mt / year
3. 5% of actual building cost of Rs 24 million
4. 5% of actual Ice plant + Cold Storage Eqt. Cost of Rs 10 milllion
5. 5% of electronic auction system estimated at Rs 8 million
6. 10% of cost of Motor Vehicles estimated at Rs 3 million
7. 1% of total project cost ( Rs 50 million)
8. Estimated at Rs300,000 p.a
9. Lumpsum of Rs 500 000 p.am
10. Annual increment of 5% is provided for interannual projections.

| Items | Notes | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lease (MPA) | 1 | 100,000 | 105,000 | 110,250 | 115,763 | 121,551 | 127,628 | 134,010 | 140,710 | 147,746 | 155,133 | 162,889 | 171,034 | 179,586 | 188,565 | 197,993 |
| Cold Storge Rental2(AMB) | 2 | 510,000 | 589,050 | 712,751 | 862,428 | 1,043,538 | 1,262,681 | 1,527,844 | 1,848,691 | 2,236,916 | ###### | 3,275,069 | 3,962,834 | 4,795,029 | 5,801,985 | 7,020,402 |
| Building | 3 | 120,000 | 126,000 | 132,300 | 138,915 | 145,861 | 153,154 | 160,811 | 168,852 | 177,295 | 186,159 | 195,467 | 205,241 | 215,503 | 226,278 | 237,592 |
| Cold room & | 4 | 500,000 | 525,000 | 551,250 | 578,813 | 607,753 | 638,141 | 670,048 | 703,550 | 738,728 | 775,664 | 814,447 | 855,170 | 897,928 | 942,825 | 989,966 |
| Electronic S | 5 | 400,000 | 420,000 | 441,000 | 463,050 | 486,203 | 510,513 | 536,038 | 562,840 | 590,982 | 620,531 | 651,558 | 684,136 | 718,343 | 754,260 | 791,973 |
| Motor vehicl | 6 | 300,000 | 315,000 | 330,750 | 347,288 | 364,652 | 382,884 | 402,029 | 422,130 | 443,237 | 465,398 | 488,668 | 513,102 | 538,757 | 565,695 | 593,979 |
| Insurance | 7 | 500,000 | 525,000 | 551,250 | 578,813 | 607,753 | 638,141 | 670,048 | 703,550 | 738,728 | 775,664 | 814,447 | 855,170 | 897,928 | 942,825 | 989,966 |
| Security **Services** | 8 | 300,000 | 315,000 | 330,750 | 347,288 | 364,652 | 382,884 | 402,029 | 422,130 | 443,237 | 465,398 | 488,668 | 513,102 | 538,757 | 565,695 | 593,979 |
| Advertising & Mark9eting | | 500,000 | 525,000 | 551,250 | 578,813 | 607,753 | 638,141 | 670,048 | 703,550 | 738,728 | 775,664 | 814,447 | 855,170 | 897,928 | 942,825 | 989,966 |
| Contingencies (5%) | 161,500 | 169,575 | 178,054 | 186,956 | 196,304 | 206,119 | 216,425 | 227,247 | 238,609 | 250,540 | 263,066 | 276,220 | 290,031 | 304,532 | 319,759 | |
| Sub-total | | 3,391,500 | 3,614,625 | 3,889,604 | 4,198,125 | 4,546,019 | 4,940,286 | 5,389,330 | 5,903,251 | 6,494,204 | 7,176,821 | 7,968,729 | 8,891,177 | 9,969,789 | 11,235,483 | 12,725,575 |

# APPENDIX 6 - VARIABLE COST SCHEDULE ( EXCLUDING PAYROLL)



Assumptions

1. Electricity Bills estimated at Rs 144,000 per annum
2. Water & Waste Water Mgmt bills estimated Rs 36,000 p.a
3. Running cost of Motor Vehicles taken at 10% of actual cost p.a
4. Telecoms and Internet Services taken at Rs 300000 p.a
5. Contingencies assumed at 5 % of Utility costs.
6. An increment of 5 % is provided for interannual projections.

Monetary Unit : Rs

| Items | Notes | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Electricity | 1 | 144,000 | 151,200 | 158,760 | 166,698 | 175,033 | 183,785 | 192,974 | 202,622 | 212,754 | 223,391 | 234,561 | 246,289 | 258,603 | 271,533 | 285,110 |
| Water | 2 | 36,000 | 37,800 | 39,690 | 41,675 | 43,758 | 45,946 | 48,243 | 50,656 | 53,188 | 55,848 | 58,640 | 61,572 | 64,651 | 67,883 | 71,278 |
| Building | 3 | 120,000 | 126,000 | 132,300 | 138,915 | 145,861 | 153,154 | 160,811 | 168,852 | 177,295 | 186,159 | 195,467 | 205,241 | 215,503 | 226,278 | 237,592 |
| Motor Vehicl | 3 | 300,000 | 315,000 | 330,750 | 347,288 | 364,652 | 382,884 | 402,029 | 422,130 | 443,237 | 465,398 | 488,668 | 513,102 | 538,757 | 565,695 | 593,979 |
| Telecoms services | 4 | 300,000 | 315,000 | 330,750 | 347,288 | 364,652 | 382,884 | 402,029 | 422,130 | 443,237 | 465,398 | 488,668 | 513,102 | 538,757 | 565,695 | 593,979 |
| Contigencies | 5 | 86,320 | 90,636 | 95,168 | 99,926 | 104,922 | 110,169 | 115,677 | 121,461 | 127,534 | 133,911 | 140,606 | 147,636 | 155,018 | 162,769 | 170,908 |
| Sub-total | | 866,320 | 909,636 | 955,118 | 1,002,874 | 1,053,017 | 1,105,668 | 1,160,952 | 1,218,999 | 1,279,949 | 1,343,947 | 1,411,144 | 1,481,701 | 1,555,786 | 1,633,576 | 1,715,254 |

# APPENDIX 7 - MANPOWER SCHEDULE

Assumptions

1. Pay roll includes 1 month end of year bonus
2. 5 % contigencies are provided for over times and acessories
3. Basic monthly salary of an attendant is taken at Rs 12000 per month
4. A salary increment of 5 % is provided across the board for interannual projections.

| Items | Notes | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Director | 1 | 975,000 | 1,023,750 | 1,074,938 | 1,128,684 | 1,185,119 | 1,244,375 | 1,306,593 | 1,371,923 | 1,440,519 | 1,512,545 | 1,588,172 | 1,667,581 | 1,750,960 | 1,838,508 | 1,930,433 |
| Water | 2 | 36,000 | 37,800 | 39,690 | 41,675 | 43,758 | 45,946 | 48,243 | 50,656 | 53,188 | 55,848 | 58,640 | 61,572 | 64,651 | 67,883 | 71,278 |
| IT Engineer | 1 | 520,000 | 546,000 | 573,300 | 601,965 | 632,063 | 663,666 | 696,850 | 731,692 | 768,277 | 806,691 | 847,025 | 889,376 | 933,845 | 980,538 | 1,029,564 |
| IT Technician | 1 | 260,000 | 273,000 | 286,650 | 300,983 | 316,032 | 331,833 | 348,425 | 365,846 | 384,138 | 403,345 | 423,513 | 444,688 | 466,923 | 490,269 | 514,782 |
| Accountant | 1 | 390,000 | 409,500 | 429,975 | 451,474 | 474,047 | 497,750 | 522,637 | 548,769 | 576,208 | 605,018 | 635,269 | 667,032 | 700,384 | 735,403 | 772,173 |
| Secretary | 1 | 195,000 | 204,750 | 214,988 | 225,737 | 237,024 | 248,875 | 261,319 | 274,385 | 288,104 | 302,509 | 317,634 | 333,516 | 350,192 | 367,702 | 386,087 |
| Quality Mana | 1 | 390,000 | 409,500 | 429,975 | 451,474 | 474,047 | 497,750 | 522,637 | 548,769 | 576,208 | 605,018 | 635,269 | 667,032 | 700,384 | 735,403 | 772,173 |
| Superviors | 1 | 195,000 | 204,750 | 214,988 | 225,737 | 237,024 | 248,875 | 261,319 | 274,385 | 288,104 | 302,509 | 317,634 | 333,516 | 350,192 | 367,702 | 386,087 |
| Attendants | 2 | 312,000 | 327,600 | 343,980 | 361,179 | 379,238 | 398,200 | 418,110 | 439,015 | 460,966 | 484,014 | 508,215 | 533,626 | 560,307 | 588,323 | 617,739 |
| Contingencies | | 194350 | 204,068 | 214,271 | 224,984 | 236,234 | 248,045 | 260,448 | 273,470 | 287,143 | 301,501 | 316,576 | 332,404 | 349,025 | 366,476 | 384,800 |
| Sub Total | | 4,081,350 | 4,285,418 | 4,499,688 | 4,724,673 | 4,960,906 | 5,208,952 | 5,469,399 | 5,742,869 | 6,030,013 | 6,331,513 | 6,648,089 | 6,980,494 | 7,329,518 | 7,695,994 | 8,080,794 |

# APPENDIX 8 - SENSITIVITY ANALYSIS

Variation Supply of by-catch
Other factors remaining constant.

Higher forcast :

Available supply - Year 1 : 2000 t + 10% increment per year over consecutive years
Annual mean supply : 4236 t

| Items | Year 1 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Qty traded (m.t) | 4,236 | 2,000 | 2,200 | 2,420 | 2,662 | 2,928 | 3,221 | 3,543 | 3,897 | 4,287 | 4,716 | 5,187 | 5,706 | 6,277 | 6,905 | 7,595 |
| Net Cash Fflow | 21,565,714 | 4,572,330 | 5,692,397 | 6,974,243 | 8,469,569 | 10,211,114 | 12,236,447 | 14,588,654 | 17,317,120 | 20,478,413 | 24,137,296 | 28,367,858 | 33,254,801 | 38,894,897 | 45,398,614 | 52,891,962 |
| D.F : 26.2% | 1.000 | 0.792 | 0.628 | 0.498 | 0.394 | 0.312 | 0.248 | 0.196 | 0.155 | 0.123 | 0.098 | 0.077 | 0.061 | 0.049 | 0.038 | 0.030 |
| PV | -40,000,000 | 3,623,082 | 315,000 | 3,574,180 | 3,469,917 | 3,339,057 | 3,189,895 | 3,029,000 | 2,861,539 | 2,691,540 | 2,522,099 | 2,355,565 | 2,193,682 | 2,037,709 | 1,888,517 | 1,746,673 |
| NPV | 134,954 | | | | | | | | | | | | | | | |

IRR : Slightly above 26.2 %
ROI before tax : 54%

Lower forecast:

Available supply - Year 1 : 1250 t + 10% increment per year over consecutive years
Annual mean supply : 2648 t

| Items | Year 1 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Qty traded (m.t) | 2,648 | 1,250 | 1,375 | 1,513 | 1,664 | 1,830 | 2,013 | 2,214 | 2,436 | 2,679 | 2,947 | 3,242 | 3,566 | 3,923 | 4,315 | 4,747 |
| Net Cash Fflow | 10,411,232 | 1,197,330 | 1,794,272 | 2,471,909 | 3,269,373 | 4,204,887 | 5,299,255 | 6,576,198 | 8,062,732 | 9,789,596 | 11,791,712 | 14,108,708 | 16,785,484 | 19,872,835 | 23,428,133 | 27,516,056 |
| D.F : 14% | 1.000 | 0.877 | 0.769 | 0.675 | 0.592 | 0.519 | 0.456 | 0.400 | 0.351 | 0.308 | 0.270 | 0.237 | 0.208 | 0.182 | 0.160 | 0.140 |
| PV | -40,000,000 | 1,050,289 | 1,380,634 | 1,668,468 | 1,935,731 | 2,183,887 | 2,414,269 | 2,628,094 | 2,826,464 | 3,010,379 | 3,180,741 | 3,338,366 | 3,483,980 | 3,618,235 | 3,741,707 | 3,854,903 |

INPV 316,146
IRR: Slightly above 14 %
ROI before tax: 26%

# APPENDIX 9 - SENSITIVITY ANALYSIS

Variation

Other factors remaining constant in Auction fees

Scenario 1 - Auction fee : 9 %

| Items | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Qty traded (m.t) | 1,500 | 1,650 | 1,815 | 1,997 | 2,196 | 2,416 | 2,657 | 2,923 | 3,215 | 3,537 | 3,891 | 4,280 | 4,708 | 5,178 | 5,696 | 7,595 |
| Auction Fee 9% | 4,050.00 | 4,252.50 | 4,465.13 | 4,688.38 | 4,922.80 | 5,168.94 | 5,427.39 | 5,698.76 | 5,983.69 | 6,282.88 | 6,597.02 | 6,926.87 | 7,273.22 | 7,636.88 | 8,018.72 | 52,891,962 |
| Net Cash Flow | 11,898,496 | 1,647,330 | 2,314,022 | 3,072,220 | 3,962,732 | 5,005,718 | 6,224,214 | 7,644,525 | 9,296,651 | 11,214,772 | 13,437,790 | 16,009,928 | 18,981,393 | 22,409,110 | 26,357,530 | 30,899,510 |
| D.F : 16% | 1.000 | 0.862 | 0.743 | 0.641 | 0.552 | 0.476 | 0.410 | 0.354 | 0.305 | 0.263 | 0.227 | 0.195 | 0.168 | 0.145 | 0.125 | 0.108 |
| PV | -40,000,000 | 1,420,112 | 1,719,695 | 1,968,241 | 2,188,582 | 2,383,287 | 2,554,680 | 2,704,859 | 2,835,715 | 2,948,958 | 3,046,127 | 3,128,610 | 3,197,659 | 3,254,399 | 3,299,840 | 3,334,892 |
| NPV | -14,344 | | | | | | | | | | | | | | | |

Scenario 2 - Auction fee : 8 %

| Items | Year 1 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Net Cash Flow | 9,667,600 | 972,330 | 1,534,397 | 2,171,753 | 2,922,693 | 3,804,472 | 4,836,776 | 6,042,034 | 7,445,773 | 9,077,008 | 10,968,673 | 13,158,098 | 15,687,529 | 18,604,697 | 21,963,434 | 25,824,329 |
| D.F : 13% | 1.000 | 0.885 | 0.783 | 0.693 | 0.613 | 0.543 | 0.480 | 0.425 | 0.376 | 0.333 | 0.295 | 0.261 | 0.231 | 0.204 | 0.181 | 0.160 |
| PV | -40,000,000 | 860,469 | 1,201,658 | 1,505,134 | 1,792,542 | 2,064,915 | 2,323,193 | 2,568,231 | 2,800,801 | 3,021,598 | 3,231,243 | 3,430,285 | 3,619,205 | 3,798,419 | 3,968,278 | 4,129,071 |
| NPV | 315,043 | | | | | | | | | | | | | | | |

Scenario 2 - Auction fee : 7 %

| Items | Year 1 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Net Cash Flow | 7,436,703 | 297,330 | 754,772 | 1,271,286 | 1,882,654 | 2,603,227 | 3,449,337 | 4,439,543 | 5,594,896 | 6,939,245 | 8,499,557 | 10,306,268 | 12,393,666 | 14,800,285 | 17,569,338 | 20,749,148 |
| D.F : 9% | 1.000 | 0.917 | 0.834 | 0.758 | 0.689 | 0.627 | 0.570 | 0.518 | 0.471 | 0.428 | 0.389 | 0.354 | 0.322 | 0.292 | 0.266 | 0.242 |
| PV | -40,000,000 | 272,780 | 629,501 | 963,899 | 1,297,675 | 1,631,228 | 1,964,924 | 2,299,088 | 2,634,006 | 2,969,916 | 3,307,011 | 3,645,424 | 3,985,233 | 4,326,447 | 4,669,001 | 5,012,751 |
| NPV | -391,115 | | | | | | | | | | | | | | | |

Summary

| Auction Fee | 10% | 9% | 8% | 7% |
|---|---|---|---|---|
| IRR | 18.5% | 16% | 13% | 9% |
| ROI | 35% | 30% | 24% | 19% |

# APPENDIX 10 - ECONOMIC INDICATORS

| Year (t) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Scenario 1 | 1,000 | 1,100 | 1,210 | 1,331 | 1,464 | 1,611 | 1,772 | 1,949 | 2,144 | 2,358 | 2,594 | 2,853 | 3,138 | 3,452 | 3,797 |
| Scenario 2 | 1250 | 1375 | 1513 | 1664 | 1830 | 2013 | 2214 | 2436 | 2679 | 2947 | 3242 | 3566 | 3923 | 4315 | 4747 |
| Scenario 3 | 1500 | 1650 | 1815 | 1997 | 2196 | 2416 | 2657 | 2923 | 3215 | 3537 | 3891 | 4280 | 4708 | 5178 | 5696 |
| Scenario 4 | 2000 | 2200 | 2420 | 2662 | 2928 | 3221 | 3543 | 3897 | 4287 | 4716 | 5187 | 5706 | 6277 | 6905 | 7595 |

## Auction Fee Forecast

| Year (t) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Market Price | 45.0 | 47.3 | 49.6 | 52.1 | 54.7 | 57.4 | 60.3 | 63.3 | 66.5 | 69.8 | 73.3 | 77.0 | 80.8 | 84.9 | 89.1 |

## Auction fees

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.06 | 2.70 | 2.84 | 2.98 | 3.13 | 3.28 | 3.45 | 3.62 | 3.80 | 3.99 | 4.19 | 4.40 | 4.62 | 4.85 | 5.09 | 5.35 |
| 0.07 | 3.15 | 3.31 | 3.47 | 3.65 | 3.83 | 4.0 | 4.22 | 4.43 | 4.65 | 4.89 | 5.13 | 5.39 | 5.66 | 5.94 | 6.24 |
| 0.08 | 3.60 | 3.78 | 3.97 | 4.17 | 4.38 | 4.59 | 4.82 | 5.07 | 5.32 | 5.58 | 5.86 | 6.16 | 6.47 | 6.79 | 7.13 |
| 0.09 | 4.05 | 4.25 | 4.47 | 4.69 | 4.92 | 5.17 | 5.43 | 5.70 | 5.98 | 6.28 | 6.60 | 6.93 | 7.27 | 7.64 | 8.02 |
| 0.10 | 4.50 | 4.73 | 4.96 | 5.21 | 5.47 | 5.74 | 6.03 | 6.33 | 6.65 | 6.98 | 7.33 | 7.70 | 8.08 | 8.49 | 8.91 |

## Ice-flakes Production Unit Projection

| Items | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Install. Capacity | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 |
| Price - Rs / mt | 5000 | 5250 | 5513 | 5788 | 6078 | 6381 | 6700 | 7036 | 7387 | 7757 | 8144 | 8552 | 8979 | 9428 | 9900 |
| Scenario 1 | | | | | | | | | | | | | | | |
| 50 % Op. Cap. | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| Rs' million | 3.75 | 3.94 | 4.13 | 4.34 | 4.56 | 4.79 | 5.03 | 5.28 | 5.54 | 5.82 | 6.11 | 6.41 | 6.73 | 7.07 | 7.42 |
| Scenario 2 | | | | | | | | | | | | | | | |
| 80% □ Op. Cap | 750 | 776 | 803 | 832 | 861 | 891 | 922 | 954 | 988 | 1022 | 1058 | 1095 | 1133 | 1173 | 1214 |
| Rs' million | 3.75 | 4.08 | 4.43 | 4.81 | 5.23 | 5.68 | 6.18 | 6.71 | 7.30 | 7.93 | 8.62 | 9.36 | 10.18 | 11.06 | 12.02 |

# APPENDIX 11 – LIST OF PERSONS CONTACTED

| S/No. | Name | Position | Organisation |
|---|---|---|---|
| 1. | Hon . N.Vonmally | Minister | Ministry of Fisheries & Rodrigues |
| 2. | D. Mauree | Director of Fisheries | Same as above |
| 3. | V. Soondroon | PFO | Same as above |
| 4. | D. Noorungee | Div. Fisheries Officer | Same as above |
| 5. | B . Ramcharrun | Div. Fisheries Officer | Same as above |
| 6. | M. Kawol | Scientific Officer | Same as above |
| 7. | N. Wan | Executive Officer | Same as above |
| 8. | G. J. G. Shu | Chairman | Fishermen Investment Trust |
| 9. | M. Bonoo | Executive Officer | AMB / Cold Storage Facility |
| 10. | J.Y Thépaut | Director | Competent Authority / Seafood Hub |
| 11. | Capt J S Wang | Chief Surveyor | Taiwanese tuna long line vessels |
| 12 | J . Lee | Manager | Lee First Marine Ltd |
| 13 | P. Fortuno | Manager | Mauritius Fishermen Coop Federation |
| 14 | M. Nardeosingh | Corporate Secretary | Ministry of Business Ent. & Cooperatives |
| 15 | H. Ghina | Chairman | Sealords Fishing Co. Ltd |
| 16 | M. Rault | Managing Director | Froid des Mascareignes Ltd |
| 17 | S. Seelochurn | Asst Port Engineer | Mauritius Port Authority |

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La bonne gouvernance et de la gestion des pêches et de l'aquaculture permettent d'améliorer la contribution du secteur à la sécurité alimentaire, au développement social, à la croissance économique et au commerce régional ; ceci en assurant par ailleurs une protection renforcée des ressources halieutiques et de leurs écosystèmes.

La Commission de l'Océan Indien (COI) ainsi que la COMESA (Common Market for Eastern and Southern Africa), l'EAC (East African Community) et l'IGAD (Inter-Governmental Authority on Development) ont développé des stratégies à cette fin et se sont engagés à promouvoir la pêche et l'aquaculture responsable.

SmartFish supporte la mise en œuvre de ces stratégies régionales en mettant l'accent sur le renforcement des capacités et des interventions connexes visant à :

- mettre en place des mécanismes pour la gestion et le développement durable des pêches ;
- développer un cadre de gouvernance des pêches au niveau régional ;
- renforcer le suivi-contrôle-surveillance pour les pêcheries partagées ;
- développer des stratégies et supporter des initiatives propres à accroître le commerce régional du poisson ;
- contribuer à la sécurité alimentaire en particulier par la réduction des pertes après captures et la diversification de la production.

SmartFish est financé par l'Union Européenne dans le cadre du 10ème Fond Européen de Développement.

SmartFish est mis en œuvre par la COI en partenariat avec la COMESA, l'EAC et l'IGAD et en collaboration avec la SADC. Une collaboration étroite a également été développée avec les organisations régionales de pêche de la région. L'assistance technique est fournie par la FAO et le consortium Agrotec SpA.

By improving the governance and management of our fisheries and aquaculture development, we can also improve food security, social benefits, regional trade and increase economic growth, while also ensuring that we protect our fisheries resources and their ecosystems.

The Indian Ocean Commission (IOC), the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC) and the Inter-Governmental Authority on Development (IGAD) have developed strategies to that effect and committed to regional approaches to the promotion of responsible fisheries and aquaculture.

SmartFish is supporting the implementation of these regional fisheries strategies, through capacity building and related interventions aimed specifically at:

- implementing sustainable regional fisheries management and development;
- initiating a governance framework for sustainable regional fisheries;
- developing effective monitoring, control and surveillance for transboundary fisheries resources;
- developing regional trade strategies and implementing regional trade initiatives;
- contributing to food security through the reduction of post harvest losses and diversification.

SmartFish is financed by the European Union under the 10th European Development Fund.

SmartFish is implemented by the IOC in partnership with the COMESA, EAC, and IGAD and in collaboration with SADC. An effective collaboration with all relevant regional fisheries organisations has also been established. Technical support is provided by Food and Agriculture Organization (FAO) and the Agrotec SpA consortium.


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