Republic of Senegal

PREPARATORY SURVEY ON BOP BUSINESS FOR MANUFACTURING FRP BOAT IN SENEGAL

FINAL REPORT

OCTOBER 2018

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

YAMAHA MOTOR CO., LTD.

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Abbreviations

Abbreviation	Official Name
ADF	African Development Foundation
AfDB	African Development Bank
APIX	Agence nationale chargée de la promotion de l'investissement et des grands travaux (French)
ANAM	Agence Nationale des Affaires Maritimes (French)
BNDE	National bank for Economic Development
BOP	Base of the Economic Pyramid
CEP	Cellule d'Etudes et de Planification (French)
CFAO	Compagnie Française de l'Afrique Occidentale (French)
CISPA	Cadre d'Investissement Sectoriel de la Pêche et de l'Aquaculture (French)
CLPA	Conseil Local de Pêche Artisanale (French)
DITP	Direction des Industries et de Transformation de la Pêche (French)
DPM	Direction des Pêches Maritimes (French)
DPSP	Direction de la Protection et de la Surveillance des Pêche (French)
EIA	Environment impact assessment
EU	European Union
FS	Feasibility study
FCFA	Franc de la Communauté Financière d'Afrique (French)
GDP	Gross Domestic Product
FRP	Fiberglass Reinforced Plastics
hp	Horse Power
IFC	International Finance Corporation
IUU	Illegal, Unreported and Unregulated
JICA	Agence Japonaise de Coopération Internationale (French)
LPS	Lettre de Politique Sectorielle des pêche et de l'aquaculture (French)
LPSDPA	Lettre de Politique Sectorielle de Développement de la Pêche et de l'Aquaculture (French)
MPEM	Ministère de la Pêche et de L'économie Maritime (French)
PROCOVAL	Projet d'étude de la Promotion de la Cogestion des pêcheries par le développement de la chaine de valeur (French)
PSE	Plan Sénégal Emergent (French)
SENELEC	Société National d'Éléctricité du Sénégal (French)
SIRN	Société des Infrastructures de Réparation Navale (French)
SRPS	Service Régional des Pêches et de la Surveillance (French)

Exchange Rates

1 EUR＝655.957 XOF (Conversion Rates)

1 EUR＝129.769000 JPY (August, Monthly exchange rate in JFY 2018)

1 XOF＝0.197830 JPY (August, Monthly exchange rate in JFY 2018)

Chapter 1 Executive Summary

1-1. Survey Overview and Consistency with Development Issues

(1) Overall Image of Survey

Table 1 Overall Image of Survey

Items	Details
Objectives	The sale of FRP boats to artisanal fishermen currently using wooden boats will not only increase safety of operation, but also contribute to increasing fishermen's income by improving the value of fish caught through hygiene management until the fish is unloaded.
Period	April 2016-end of October 2018
Region of Activity	Senegal
Overview of Business Planned for Commercialization	Local manufacturing and sale of FRP boats aimed at improving safety and incomes of artisanal fishermen through the modernization of the fisheries industry
Intended Effects and Beneficiaries of Development	Improving safety and the value of fish; People employed in artisanal fishery
Details of Activity	- Confirmation of market suitability of FRP boats - Verification of appropriateness of pricing - Evaluation of financing scheme - Linkages with government agencies - Estimation of market scale for commercialization

(2) Background of Survey

Senegal is one of the leading fisheries nations in Africa, with an annual catch of approximately 400,000 tons. Accounting for 12.5% of total exports, fisheries is positioned as an important industry in Senegal. 17% of the population is employed in the fisheries industry, and 90% of those are employed in artisanal fishery (i.e. the BOP bracket).

The number of registered fishing boats was more than 22,000 as at the end of 2017, of which almost 100% are wooden boats. Fishing using wooden boats involves hygiene issues, and does not meet hygiene management standards for export destinations such as the EU. Fish which do not meet these hygiene management standards are an impediment to increasing and stabilizing the incomes of artisanal fishermen, as the value of the fish does not increase. In addition, there are issues in terms of ensuring safety of operation, as many accidents at sea occur due to the lack of strength and stability of Senegalese wooden boats.

In recent years, the scarcity of financial resources in the Senegalese fisheries industry has become a prominent issue. In order to achieve both the maintenance of financial resources in the fisheries industry and increasing/stabilizing the incomes of artisanal fishermen, it is necessary to transition from a quantity to a quality model, in which securing a certain level of income even with a small catch is possible, while working in an environment which provides safety and confidence. As one measure to address this, the Government of Senegal has included in its policy agenda to achieve the PSE (Plan Sénégal Emergent: Plan for an Emerging Senegal) the promotion of transition of small fishing boats to FRP, with a target of completing transition by 2023. The need for the modernization of the artisanal fisheries industry in Senegal is therefore increasing.

(3) Objectives of Survey

If the popularity of FRP fishing boats spreads due to these policies for the modernization of the fisheries industry, then ensuring safety would prevent the loss of human life and assets. In addition, the expenses faced by fishing households would be anticipated to decrease over the long term thanks to lower fuel consumption and maintenance costs. Thirdly, industrial development through human resource development and creation of employment can also be expected thanks to the construction of shipyards and transfer of technology due to the spreading popularity of FRP fishing boats. At the same time, gradually transitioning away from wooden boats will contribute to the preservation of forests.

Yamaha Motor has a track record of over 40 years in the manufacturing, factory operation, and technology transfer of FRP boats. In order to tailor boats to the specifications required in each country, Yamaha Motor has to date transferred FRP boat manufacturing technology to factories in 33 countries, producing a total of 3,000 boats per year and 65,000 boats to date. The combination of Yamaha Motor-made FRP fishing boats with Yamaha outboard motors - which have a market share of more than 90% in Senegal - will work to improve safety, increase speed performance, and reduce fuel consumption. It is therefore expected that the application of Yamaha Motor’s knowhow will contribute to achieving the PSE as well as to resolving the development issues faced by the BOP bracket in the fisheries sector. Based on the above, surveys were conducted as part of JICA’s “Cooperation Preparation Survey” (BOP Business Linkage Promotion) to evaluate the possibilities in the FRP boat manufacture and sale business oriented toward the modernization of the artisanal fisheries industry in Senegal.

(4) Business Model Outline

The initiative aims to promote the transition to FRP boats through construction of FRP boat factories as joint ventures between the Government of Senegal and local distributors. By doing so, as a “business for societal value” it would address social issues by training technicians and creating employment opportunities through technology transfer, increased operational safety, and benefits for artisanal fishermen. At the same time, the initiative aims to expand and increase the efficiency of Yamaha Motor's marine business.

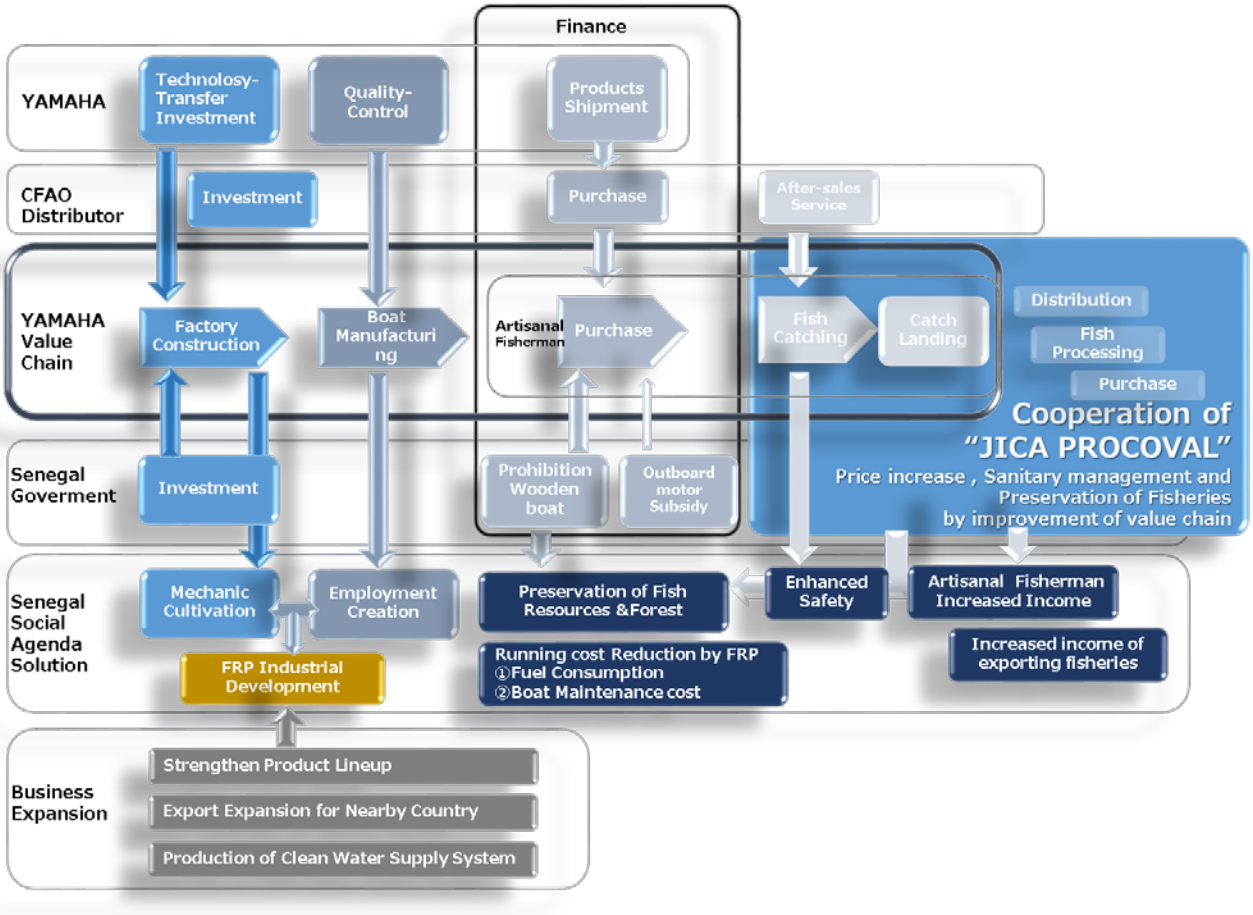


Figure 1 Business Model

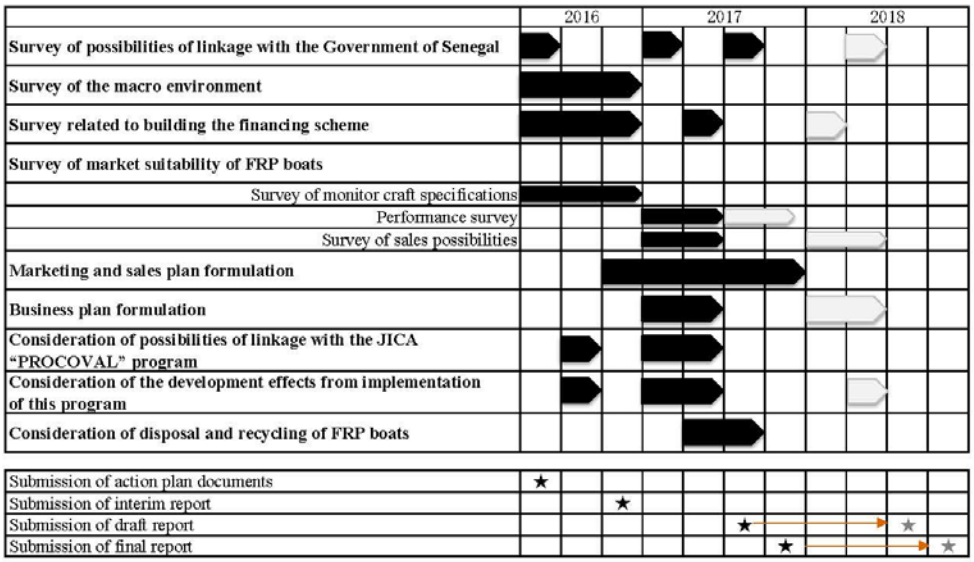
(5) Consistency with Development Issues

A “Sustainable fisheries development program” is part of the Operational Plan in Japan's Country Assistance Policy for Senegal, “Priority Area 1: Support for sustainable economic growth (Development task 1-2 Growth of primary industries).” The stated aims of the Cooperation Program are to realize the addressing of issues and effective assistance in a strategic manner by (1) establishing a model of value chain development including effective fisheries resources management and infrastructure development through human resource development and upskilling in the artisanal fisheries industry in Senegal to support sustainable economic growth and (2) working to establish a sustainable and competitive fisheries industry in which both parties enjoy synergy effects as well as expanding into neighboring regions and countries. Japan's Assistance Policy and the FRP fishing boat transition project in Senegal which Yamaha Motor aims for are in alignment, and in addition, synergy effects are anticipated with JICA’s programs.

1-2. Survey Methods

(1) Overall Survey Plan

Table 2 Survey Plan



■: Initially-planned survey

■: Survey added due to contract extension

*The report submission deadline was also changed due to the extension of the contract period.

(2) Survey Period

The survey period is from April 2016-end of October 2018

(3) Survey Regions

The main region covered by this survey is the M'Bour Département (the Petite Côte area), which is the region covered by the JICA PROCOVAL Project for Fisheries Resources Joint Management Promotion Plan Formulation through Value Chain Development). The survey aimed for synergy effects through the matching of seafood value chain development initiatives and FRP monitor boat implementation. As a result of discussing the survey results with cooperating partner agencies, it was ascertained that conducting surveys of regions with different oceanographic conditions was necessary, and so Saint-Louis, Mboro, and Cayar in the Grande Côte area were added as second-stage survey areas.

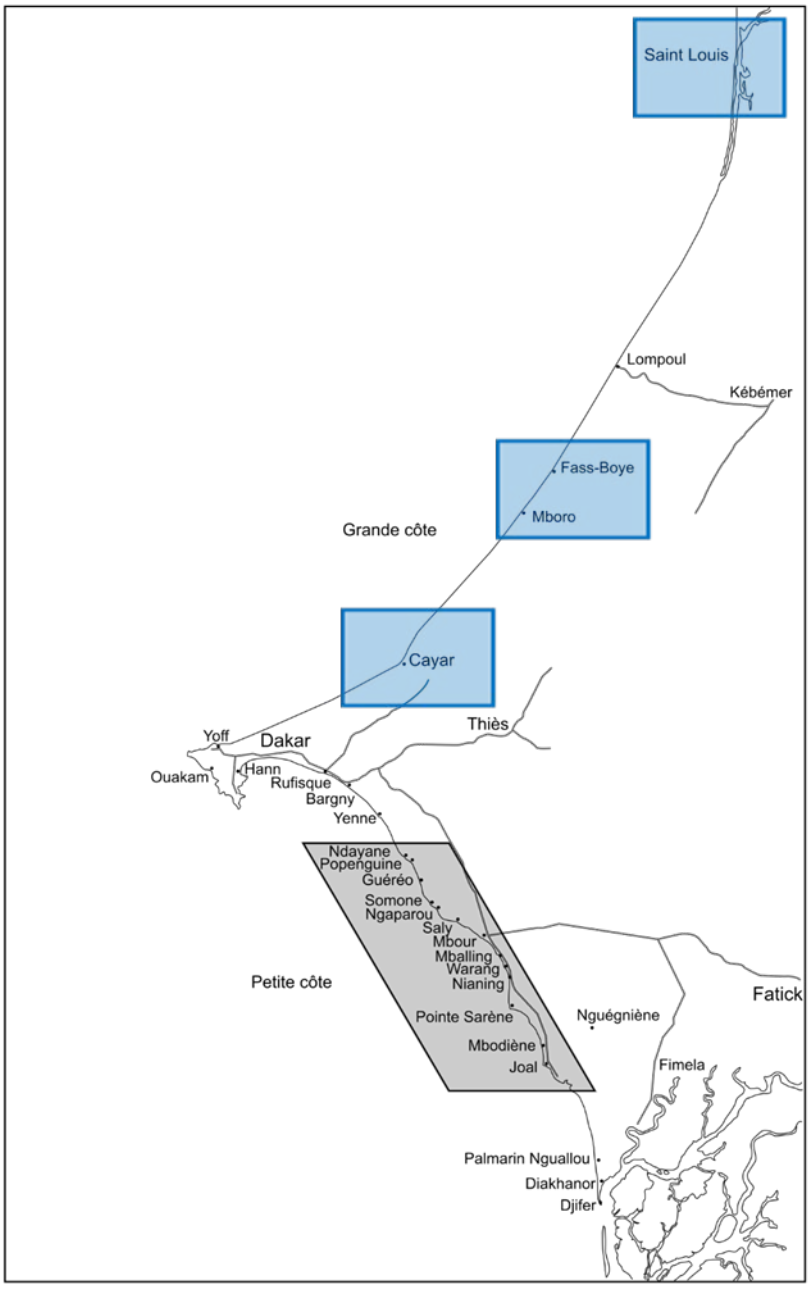


Figure 2 Fishing Villages on the Senegal Coast

Areas in gray were covered by the first stage of the survey

Areas in blue were covered by the second stage of the survey

(4) Survey Structure and Roles

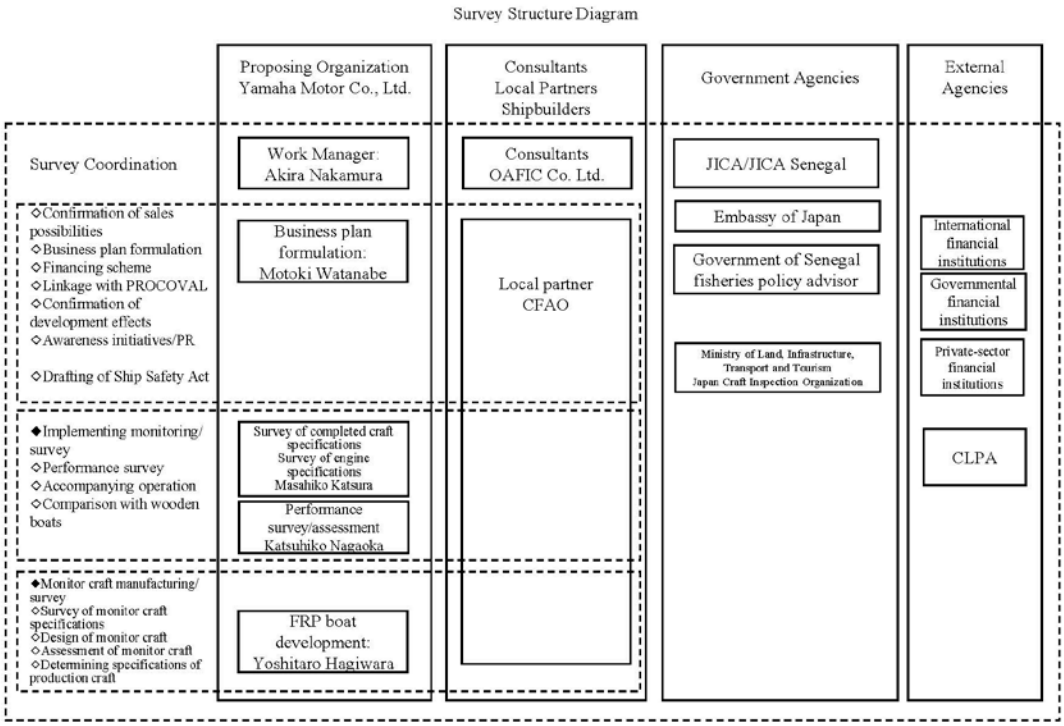


Figure 3 Survey Structure Diagram

(5) Evaluation Items

Table 3 Recap of Evaluation Items and Monitoring Survey Period

Items	Methods	Covering	Period
A. Market suitability of FRP boats	Monitoring operation by fishermen: Fishermen actually operate two monitor craft Assessment through questionnaires and interviews	First stage of the survey: Southern region (M'Bour Département) Second stage of the survey: Northern region (Saint-Louis, Mboro, and Cayar)	First stage of the survey: October 2016 – April 2017 Second stage of the survey: July-September 2017
	Confirmation of the possibility of drafting laws to ensure FRP boat safety Deliberation by Government committee	Government committee within the Ministry of Fisheries and the Maritime Economy (MPEM) related to the transition to FRP boats	April 2016-August 2018
B. Appropriateness of pricing	Fishermen's ability to pay and payment simulation - Survey of fishermen's incomes - Trial calculations for products planned for sale - Financing hypothesis	Fishermen in M'Bour Département	January-July 2017
C. Building the financing scheme and its effectiveness	Survey of the actual conditions of fishermen, checking of their demands, interviews with financial institutions, consideration with related government departments	Fishermen in M'Bour Département International financial institutions, governmental financial institutions, local banks, microfinance organizations, DPM, ANAM, SIRN	April 2016-August 2018
D. Linkages with government agencies (Government of Senegal, JICA, etc.)	Government: Establishing a committee within the Ministry of Fisheries and the Maritime Economy International institutions (donors) to attend committee meetings	Vice‐minister, technical advisors, DPM, CEP, DITP, DPSP, ANAM, SIRN, etc.	April 2016-August 2018
E. Estimation of market scale necessary for commercialization	Data analysis of registered fishing boats	Total number of fishing boats registered in Senegal	January 2017-August 2018 Boats currently being registered

First stage of the survey (Southern region)

	Monitoring Period	Monitoring Locations	Fishing Villages of Operation
1	October 17-December 2, 2016	Ngaparou	Somone, Ngaparou, Saly Ndayane, Popenguine, Guereo
1	December 5, 2016-January 6, 2017	M'Bour	M'Bour
3	January 9-January 27, 2016	Mbaling	Mbaling, Warang
4	January 30-February 17, 2017	Nianing	Nianing
5	February 20-March 17, 2017	Pointe-Sarene	Pointe-Sarene, Mbodiene
6	March 20-April 21, 2017	Joal	Joal

Second stage of the survey (Northern region)

	Monitoring Period	Monitoring Locations	Fishing Villages of Operation
7	July 1-July 31, 2017	Cayar	Cayar
8	August 1-August 31, 2017	M'boro	M'boro, Fass-Boye
9	September 1-September 30, 2018	Saint Louis	Saint Louis

1-3. Evaluation Results

(1) Feasibility of Commercialization

As a result of the surveys, it was determined that commercialization is possible. However, the final decision will be made after beginning a pilot operation oriented toward commercialization. The basis for deciding to begin a pilot operation are as follows.

A. Market suitability of FRP boats

Trial operation was undertaken using two monitor craft with different specifications (BLC40 and J26), and assessments provided by the fishermen of sailing/cruising performance and operability/maneuverability. As well as quantitative assessment by requiring questionnaires to be filled out after each voyage and GPS units to be fitted, individual and group interviews were also conducted, and the assessment results collated.

- The overall assessment of the monitor craft was highly favorable.
- Compared to traditional wooden boats, the monitor craft are highly stable in sailing, operation, overnighting, and waiting for favorable wind.
- They have good seaworthiness, providing peace of mind even for fishing on the open ocean.

In addition, the requests for improvement regarding the monitor craft could almost all be condensed and can be implemented, and so the prospective production specifications have come into view.

Based on the above results, FRP boats were determined to indeed have market suitability. However, while the J26 received a highly-favorable assessment of its basic performance, issues were pointed out regarding the balance between its length and breadth when maneuvering (that it is too wide), and it has been removed from the list of candidates for local production.

B. Appropriateness of pricing

Checking of the appropriateness of pricing was conducted via fishermen's income and a simulation of payments.

The summary of the survey examples is as follows.

(Income)

Customer A. Years of fishing experience: 42

Wives: 2. Total number of family members: 21

Total number of crew when fishing: 5 (the customer, two sons, two cousins)

Wooden boat in use: 10m, fitted with a 15hp outboard motor

Table 4 Simulation of Payments

	Annually[*1]	Monthly Average
Income from fishing work (one boat)	8,093,650	674,471
Fuel/running costs	2,094,652	174,554
Allocations (to other crew members)	2,999,499	249,958
Owner income[*2]	2,999,499	249,958
Living expenses	899,850	74,988
Improvement in costs through the transition to FRP[*3]	317,465	26,455
Surplus	2,417,114	201,426

*1: 2016 data, obtained from monitoring data and interviews
*2: Income from fishing work is split eight ways among fishing gear, the boat, the outboard motor, and the five crew, of which the owner takes four portions
*3: Improvement in fuel consumption volume of 10% and improvement in repairs and maintenance costs to the boat

(Simulation of Payments)

Financing trial calculation: With the price of an FRP boat tentatively set at 6,000,000FCFA, if finance is arranged at 17% interest over 60 payments, the monthly payment is 149,115FCFA

Customer A's income is above the averages in the PROCOVAL survey, and based on the income and payments simulation, it is determined that the possibility that fishermen can purchase FRP boats is high. In addition, Customer A has family working in Europe who can send remittances to supply funds in the event of purchasing expensive items. Other local fishermen are in a similar situation.

C. Building the financing scheme and its effectiveness

Based on interviews with governmental, international, and general financial institutions as well as microfinance organizations, the possibility of building low-interest and long-term finance was judged to be high.

There were many requests from fishermen for a favorable finance scheme. In addition, the passing of the Ship Safety Act and ensuring the effective application of the Act are also necessary to form the foundation for the spread of safe FRP boats and the development of the FRP boat manufacturing industry. It has been determined that creating arrangements whereby only boats conforming with the Ship Safety Act are eligible for favorable finance would be an effective way forward. The spread of inferior FRP boats and copycat boats which do not ensure safety would significantly diminish the benefits of the FRP transition.

D. Linkages with government agencies (Government of Senegal, JICA, etc.)

It has been determined that the possibility of linkages with government agencies (Government of Senegal, JICA, etc.) is high.

The Government of Senegal has laid out the “Plan for an Emerging Senegal” (Plan Sénégal Emergent: PSE), and following this, the “Fisheries and Aquaculture Development Policy Agenda 2016-2023” (Lettre de Politique Sectorielle de Développement de la Pêche et de l’Aquaculture: LPSDPA) has been drawn up. In the “Fisheries and Aquaculture Sector Investment Framework 2017-2023” (CISPA) action plan based on the latter, the Ministry of Fisheries and the Maritime Economy (MPEM) has established a government committee for the modernization of the fisheries industry; led by the Minister, it aims for completion in 2022. As the FRP transition of artisanal fishing boats is being promoted, initiatives to form linkages with the Government of Senegal - principally MPEM - are being implemented.

A “Sustainable fisheries development program” is part of the Operational Plan in Japan's Country Assistance Policy for Senegal, “Priority Area 1: Support for sustainable economic growth (Development task 1-2 Growth of primary industries).” One specific initiative based on this program was the “Small Ship Safety Act for Fisheries Industry Modernization” country-specific JICA training held through linkage with JICA PROCOVAL in FY 2017 In addition, the drafting of the Ship Safety Act was advanced while obtaining suggestions from JICA fisheries policy advisors. As at August 2018, options are being explored for linkages between this survey and the currently-underway “Information Gathering and Confirmation Survey regarding Illegal, Unreported and Unregulated (IUU) Fishery Countermeasures and Prevention of Accidents at Sea.” Looking ahead, the possibilities of linkages in the implementation of projects regarding fisheries resources management and value chain, IUU fishery countermeasures, and prevention of accidents at sea etc. are likely to increase.

E. Estimation of program scale necessary for commercialization

The total number of boats in the target class planned for production in the pilot operation reaches approximately 72% of the total number of registered boats.

Table 5 FRP Boat Sales Targets Compared to the Number of Registered Fishing Boats by Boat Length and Region

Length \ Area	Dakar	Fatick	Kaolack	Louga	St Louis	Thiès	Zig	Subtotal	Number of Target Boats
～4,99	225	68	50	8	2	96	207	656	
5,00～5,99	32	64	27	0	2	21	279	425	
6,00～6,99	49	165	23	0	17	19	583	856	
7,00～7,99	246	357	20	0	17	99	811	1,550	① 4,593
8,00～8,99	1,110	189	10	1	131	859	743	3,043	
9,00～9,99	736	229	13	14	635	1,738	355	3,720	② 6,766
10,00～10,99	318	332	2	74	866	1,032	422	3,046	
11,00～11,99	119	200	3	75	329	583	217	1,526	③ 3,150
12,00～12,99	173	168	6	13	313	199	150	1,022	
13,00～13,99	184	182	7	1	132	59	37	602	
14,00～14,99	75	112	2	1	73	28	31	322	
15,00～15,99	68	138	1	0	20	41	24	292	
16,00～16,99	37	74	0	0	68	70	34	283	
17,00～17,99	31	96	0	1	25	77	28	258	
18,00～18,99	35	77	3	0	94	99	92	400	
19,00～19,99	23	30	0	0	62	52	60	227	
20,00～20,99	43	17	0	0	215	69	41	385	
21,00～21,99	65	5	0	0	146	83	24	323	
22,00～22,99	129	5	0	1	351	200	83	769	
23,00～23,99	63	1	0	1	151	79	30	325	
24,00～24,99	2	3	0	0	25	11	4	45	
25,00～25,99	3		1		3	3	1	22	
26,00～							1	2	
	3,766	2,512	168	190	3,677	5,517	4,257	20,099	14,509

Source: Edited DPM data

With idle boats removed from the target and an anticipated replacement cycle of six years, annual demand would be 1,935 boats. Estimation of competitors is problematic, but it is judged that sales of half of annual demand, being 968 boats, is possible.

Table 6 Annual Demand and Forecast Unit Sales for Each Type of FRP Boat Planned for Production

Production Boats	Target Units	Idle (20%)	Number of Operational Boats	Annual Demand (Six-Yearly Replacement)	Forecast Sales (50%)
(1) 8.5m class	4,593	919	3,674	613	307
(2) 10m class	6,766	1,353	5,413	902	451
(3) 13m class	3,150	630	2,520	420	210
Total	14,509	2,902	11,607	1,935	968

(2) Evaluation Results and Basis for Determining the Feasibility of Commercialization

The pilot operation involves constructing small-scale production facilities, management, and boat manufacture/sale.

The following aspects will be evaluated as part of the pilot operation in order to formulate the business plan and make the final decision regarding commercialization.

① Criteria for determining market suitability of the boats manufactured in the pilot operation

- Performance qualities: Compliance with the newly-passed Ship Safety Act
- Appearance qualities: Cracks, warping, incomplete hardening, air bubbles, lack of coloring, staining, scratches, burrs, chips
- Operational qualities: Based on interview records during monitoring

② Criteria for determining business viability

- Manufacturing of the planned number of boats within the plan period (achievement rate)
- Raw material yield (vs. plan)
- Factory operational cost (vs. plan)
- Factory labor retention rate (vs. plan)
- Based on the above, securing viability which enables continuity (simulation)

(3) Business Model Aiming for Commercialization

Sharing one-stop procedures - from fishermen's purchase application to registration - with the Government of Senegal, the business model aimed for is as follows.

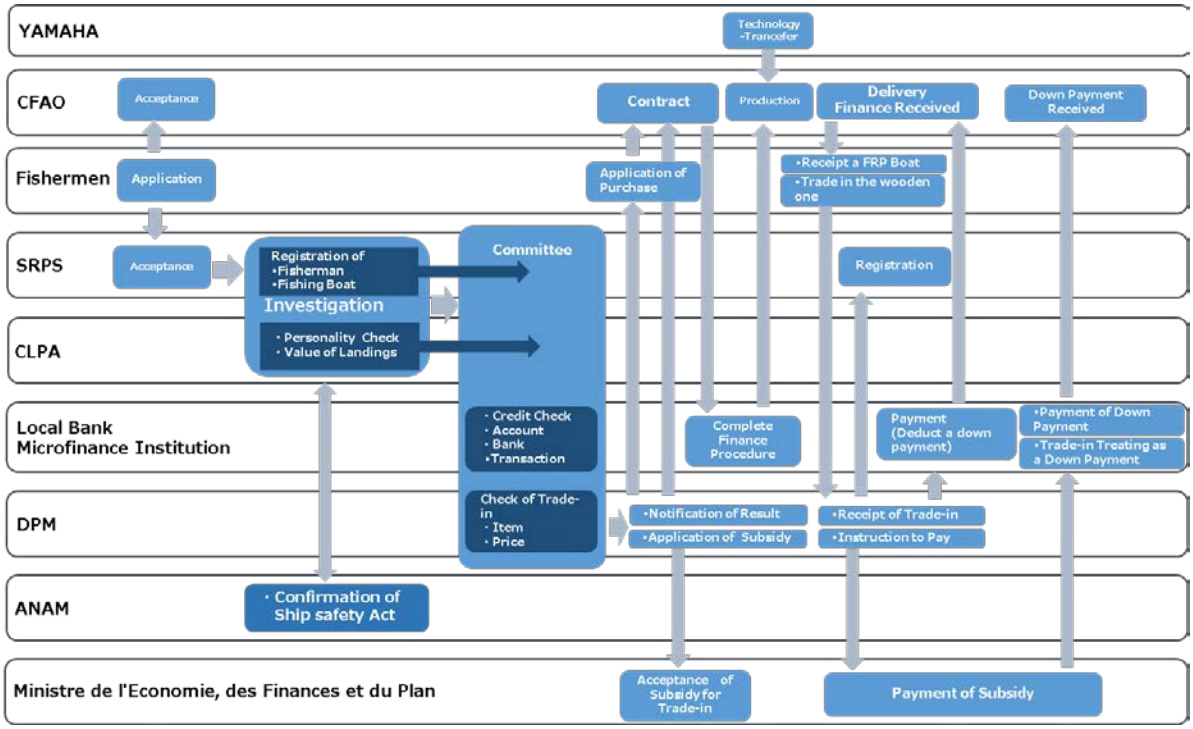


Figure 4 Business Model Regarding Purchase of FRP Boats

(4) Remaining Tasks and Measures Moving Forward

Table 7 Remaining Tasks and Measures Moving Forward

Items	Remaining Tasks	Measures	Period of Measures
Procurement	- Procedures for tax exemption of raw materials	- Approach to President's office	Currently being addressed
Manufacturing	- Market suitability of locally-produced FRP boat quality - Viability of local manufacturing, anticipated production efficiency	- Quality checking in pilot operation - Monitoring by fishermen - Checking business viability via pilot operation	November 2018
Distribution	- Spread of "safe FRP" boats	- Drafting of Accredited Inspection Workshop Act - Adherence to the Ship Safety Act	2019 onwards
Sales and marketing	- Sales promotion of FRP boats	- Monitors established on locally-produced boats - Building a favorable finance scheme	2019 onwards

The main tasks working toward commercialization are the market suitability of locally-manufactured FRP boats, business viability, building a low-interest and long-term finance scheme, and the drafting of the Ship Safety Act.

- Market suitability of locally-manufactured FRP boats:

As confirmation of the quality and performance of locally-produced FRP boats is necessary, confirmation will be made and improvements implemented after the pilot operation has commenced. Quality and performance will be checked both by Yamaha Motor and operation by fishermen. Approaches have been made to the government, and discussions are underway about purchasing the first fiscal year's production and allocating the boats to 37 artisanal fishery regional committees (CLPA) nationwide.

- Financial viability:

Simulations of unit costs have been made, but production efficiency in actual operation requires evaluation of worker proficiency and plan vs. results.

- Building a low-interest and long-term finance scheme:

As a result of interviews with governmental, international, and general financial institutions as well as microfinance organizations, the possibility of building low-interest and long-term finance was judged to be high. A governmental guarantee is required for building a low-interest and long-term finance scheme, and approaches have been made to the relevant government agencies working towards securing the guarantee.

- Drafting of Ship Safety Act:

There are no ordinances promoting FRP boats in Senegal, and they must be created afresh. Normally, drafting for each of ships and institutions, safety equipment and rigging, sailing, boat inspections, and accredited workshop systems etc. would be desirable. However, given the situation and staff structures in Senegal, we have proposed the starting point of a bill regarding a minimal Ship Safety Act to the government committee for the modernization of the fisheries industry, covering aspects such as regulating the strength, stability, and unsinkability of boats, as well as regulating safety equipment and accredited workshops. The Minister instructed ANAM to draw up the actual bill, and the ordinance was issued in June 2018 after receiving approval from the Minister.

Moving forward, we plan to make approaches to the Government concerning issuing of ordinances regarding accredited workshops and boat inspections.

There is also the more fundamental problem of the staff of relevant Government agencies in Senegal not sufficiently understanding the structure and features of FRP boats. To address this, the “Small Ship Safety Act for Fisheries Industry Modernization” country-specific JICA training held in FY 2017 through linkage with PROCOVAL included training for five such staff incorporating experience at a FRP boat factory, experience of boat inspections, and discussions of the structure of the Ship Safety Act. However, the small number of participants in the training meant that its effects were limited. Therefore, it is necessary to continue holding training at JICA in Japan as well as establish an educational institution to enable training locally and develop instructors.

(5) Plan until commercialization

The outline of the plan working toward commercialization is as follows.

Table 8 Commercialization Plan Overview

Fiscal Year	Details of Implementation	Specific measures
2018	Pilot Factory Construction and Operation Begins	Constructing a pilot factory utilizing the land and buildings of the OUAKAM FRP boat factory
	Building a financing scheme	- Obtaining Government guarantee - Launch of financial institution and fund
	Drafting of Ship Safety Act:	Issuing of ordinance regarding accredited inspection workshops
2019	Pilot factory operational Monitoring begins at every CLPA Feasibility of commercialization determined within the fiscal year	Monthly production of 12 x 8.5m, 10m boats Monitor craft allocated to 37 CLPAs. Approaching Government regarding them purchasing the monitor craft Business plan formulation
2020	Pilot factory operational Preparing to construct new factory if commercialization decided on	
2021	Pilot factory operational New factory operational	New factory: 2021 production of 400 boats Models produced: 7m, 8.5m, 10m, 12m
2022	New factory operational Pilot factory engages in research and development and manufacturing of other products	2022: 640 boats
2023	New factory operational	2023: 990 boats
2024	New factory operational	2024: 1,080 boats