بسم الله الرحمن الرحيم

Ministry of Fisheries and Ocean Resources

Malé, Republic of Maldives

Transforming Fisheries Sector Management in South-West Indian Ocean Region and Maldives Project (Transform, Swiofish5) - P179242

# TERMS OF REFERENCE (TOR)

**Consultancy Firm for Designing New Generation Fishing Vessel**
(Procurement Ref: MV-MOFMRA-489407-CS-CQS-2)

## 1. BACKGROUND

The Government of the Republic of Maldives through the Ministry of Fisheries and Ocean Resources (MoFOR) is implementing Maldives –Transforming Fisheries Sector Management in South-West Indian Ocean Region and Maldives Project (TransFORM) financed by the World Bank. The project will be managed by the Project Management Unit (PMU) set up within the Ministry of Fisheries and Ocean Resources. The project will be implemented in accordance with the Project Implementation Plan (PIP), Project's Procurement Manual, and the Project's Financial Management Manual, all of which are consistent with the World Bank's guidelines and procedures on procurement and financial management.

The aim of the Project to strengthen regional, evidence-based fisheries management in the South-West Indian Ocean Region and to improve competitiveness in the fisheries sector in the Maldives.

## 2. OBJECTIVE

Fishing has been practiced in Maldives for centuries, and over the years fishing vessels have undergone various stages of development. The traditional pole and line fishing vessels used in the Maldives locally referred to as a "*Dhoni*", is vessel design unique to the Maldives. The design and craftsmanship have been mastered by Maldivian boat builders over the years and is quite unique in the sense that large fishing vessels have been built out of wood without a single paper-based drawing or calculation.

It has been well documented that fishing was conducted quite close to the shore often in the vicinity of the islands when the fishery first started. Sailing Dhonis equipped with oars were used initially. Over time fisheries sector has grown considerably and the vessels have undergone several marked development phases. With the advancement of the boat building industry, fishing vessels have grown in size and at present majority of the vessels now have FRP hulls instead of timber framed hulls that were a hallmark of traditional fishing Dhonis.



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**Historical changes to the vessel**

Literature on boat building and fishing vessels is limited in the Maldives. The traditional process of boat building has not been documented thus it is hard to establish the main development stages of the fishing Dhonis. Interviews with experts have been conducted to establish these stages. Following is a short note on the 4 generations of fishing vessels that have been used in the Maldives.

**First generation**

As highlighted, sailing Dhonis were initially used in the pole and line skipjack tuna fishery. In the early 1970s the government of Maldives in collaboration with Food and Agriculture Organization (FAO) started the "mechanization programme" which is effectively the first marked development stage in the design of Dhonis. This programme which was aimed at retrofitting onboard engines on sailing dhonis was a major turning point in the pole and line skipjack tuna fishery of Maldives.

**Second generation**

Expert interviews suggest that the second generation dhonis were mainly an upgrade to the design of sailing dhonis in light of the mechanization process. As mechanization became common, boat builders realized that space was limited on the back deck due to engine hold. To cater for this, the platform on the back deck commonly referred to as the *"kolhufilaa gandu"* was slightly modified in shape and size to allow more fishermen to fish on the back deck. Also, the hull which was previously left open in the middle were closed with removable wooden planks *(malhu)*.

**Third generation**

The third generation of fishing vessels was again a major development phase in the Maldivian fishing industry. This design was led by the Ministry of Fisheries, Marine Resources and Agriculture and this stage is marked by the shift to FRP hulls from timber framed dhonis. This development came about during mid-1990s. Notably these vessels were larger in size compared to the previous generations and the vessels also water-sprays were introduced to the fishery through this development stage.

**Fourth generation**

This generation of fishing vessel brought about a major shift towards larger hulled fishing vessels with more hold space. Notably the fourth-generation vessels have a larger back deck and the engine is pushed further back towards the aft of the vessel to improve efficiency. These vessels have crew cabin space and are also bigger than the third generation of vessels.

**Shortcomings of the Current Vessel Designs**

An assessment of the current vessel designs was conducted through interviews with relevant experts and fishermen by Ministry of Fisheries, Marine Resources and Agriculture. Initially, industry experts and naval architects were engaged to identify issues with vessel design that has to be modified or changed to improve the quality of catch, safety at sea and improve the overall fishing experience for the fishermen involved.



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At a later stage, fishermen were interviewed to identify their needs and brainstorm on ideas on how the vessel design can be improved. Key areas for design improvement identified through this methodology are given in Annex 1. After the interviews it was identified that there is a huge need for a new Fishing Vessel to cater the current demands of the fishermen.

Under the World Bank TRANSFORM project one of the key components of the project focus on increasing competitiveness and private sector participation in the fisheries sector. In order to increase the competition in the fisheries sector one area that has been emphasised in the project is improving efficiency of fishing vessels by decreasing fuel usage through introducing modern technology and modern de-carbonization mechanism of the fisheries sector.

Fuel efficiency in fishing vessels is a critical consideration for the sustainability and economic viability of fishing operations. Currently, fuel contributes to over 80% of the total cost of fishing operation. Thus, it is essential to develop advanced and innovative solutions for more cost effective, efficient and environmentally friendly fishing vessels.

Some key factors and technologies that may contribute to improving fuel efficiency in fishing vessels include engine efficiency (upgrading to more fuel-efficient engines with advanced combustion technology and electronic controls), modern propulsion technology such as waterjet propulsion systems and variable-pitch propellers and optimizing hull design to reduce drag and contribute to better hydrodynamics.

The new generation of fishing vessels will address the modern-day challenges to the fishing industry. These challenges include concerns raised by the processing industry about the quality of fish landed, and handling of fish on board. The new vessels will also improve the efficiency of fishing operations through automation and the use of renewable energy. They will enable multiday pole and line and handline tuna fishing operations and allow fishing in offshore areas near the border of the EEZ. Additionally, they will make the overall fishing experience better and more attractive for young people who want to take up fishing as a profession.

In addition, investing in the latest technological innovations in fishing gear, fish finding, and data analytics can provide a competitive edge to the fishers. Real-time data and analytics can assist in making informed decisions about fishing locations, avoiding bycatch, and optimizing overall fleet management. The current fish offloading process is difficult and time consuming and a mechanical solution needs to be introduced to ease the offloading operation.

Therefore, there is a critical need to invest in the development of Maldives fishing fleet to bring a major overhaul in terms of the vessel design, mechanical changes, modern equipment and technology used in the fishing operation.

TransFORM project funded by World Bank is currently seeking to engage a consultancy firm for designing the new Generation Fishing Vessel which would cater to current requirements of the fishing industry.



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## 3. SCOPE OF THE ASSIGNMENT

The consultant shall conduct a thorough analysis and prepare design(s) and detailed drawings for the construction of a new-generation fishing vessel that can be utilized in the handline and pole and line fishery. The primary purpose of the new design should be to conceptualize a new vessel design that is more fuel efficient (through changes to the design or other means) and improve the overall quality of the fish landed through changes that may improve onboard processes to improve handling and time taken to offload the fish at the processing facilities. The changes foreseen should not negatively impact on the economic efficiency of the vessel. This assignment will be guided by a series of stakeholder consultations, including those of the fishers and the industry experts.

The Consultancy Firm shall undertake following duties:

1. Design Considerations:
   - Identify shortcomings and improvements based on current demands from fishermen and other stakeholders through assessment and consultation process.
   - Address the design improvement including but not limited to those outlined in Annex 1.
   - Designs shall be geared towards optimizing productivity and fuel efficiency
   - Designs shall include on board fish handling and fish chilling systems
   - Designs shall give due considerations to minimize dependency on fossil fuel and explore renewable energy options to reduce operational costs of the vessel.
   - Designs shall give due consideration to crew comfort and ergonomics in the vessel design.
   - Designs shall give due consideration to operate in extreme weather conditions.
   - Designs shall give due consideration to integrate digital systems such as Vessel Monitoring Systems, Electronic Observer Systems, and remote diagnostics.

2. Design Development:
   - Prepare conceptual designs and share with the ministry for initial feedback.
   - Prepare detailed designs based on the feedback including construction drawings, Bill of Quantities (BOQ), and other necessary documents required by boatyards and classification societies.
   - Develop initial and conceptual designs for a multi-day pole and line tuna fishing vessel.
   - Convert conceptual designs into 3D drawings that can be used to generate photo-realistic images and videos for enhanced visualization.

3. Construction Standards & Costs:
   - Identify construction standards and costs associated with the development of new generation vessel with modern technology and automation as well as, ensuring compatibility with pole and line fishing operation.
   - Provide an estimate of the potential impacts on the operational cost of the fishing vessels for the changes proposed in the new design.



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- Investigate the costs and implications of building the vessel to class standards set forth under the boat building code and entering classification post-delivery with a recognized classification society familiar with the region.

4. Safety and Environment Regulations:
   - Assess the need to upgrade safety and environment (pollution, emissions and waste management) regulations for fishing vessels and identify key provisions suitable for Maldives regulations.

5. Intellectual Property:

All reports, drawings, designs, data, and other outputs produced under this assignment shall be the sole and exclusive property of the Ministry of Fisheries and Ocean Resources, Government of Maldives. The Consultant shall have no rights over such materials, and they shall not be used or disclosed for any purpose outside the scope of this assignment without prior written permission from the Ministry.



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## 4. DELIVERABLES AND TIMELINE

| Deliverable | Timeline |
|---|---|
| Inception report (Initial Assessment Report)<br>• An inception report which includes stakeholder engagement work outlining consultations held with stakeholders and identified design changes and estimates of the impacts on the operational cost of the fishing vessel. The report shall identify proposed solutions and options to resolve the challenges identified by stakeholders. | Within **45** calendar days from the date of the contract |
| Conceptual Designs<br>• At least three (3) conceptual designs (PDF, CAD files) with a presentation for feedback | Within **30** calendar days after finalization of inception report |
| Detailed Design<br>• Detailed designs (PDF, CAD files, and two hardcopies).<br>• Detailed bill of quantity (BOQ)<br>• Design Report including engineering calculations, design rationale, feasibility report and construction feasibility | Within **45** calendar days, following approval of the Conceptual Design of the final Vessel |
| Finalization of the design, based on feedback by the Ministry of Fisheries and Ocean Resources. | Within **30** calendar days, following approval of Detailed Design |



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## 5. PAYMENT SCHEDULE

| Deliverable | Payment |
|---|---|
| Inception report | 15% of the Contract price upon submission of the Inception Report |
| | 10% of the Contract price upon acceptance of the Inception Report by the Ministry |
| Conceptual Designs | 15% of the Contract price upon submission of the Conceptual Designs |
| | 10% of the Contract price upon acceptance of the Conceptual Designs by the Ministry |
| Submission of detailed design, required reports, engineering calculations and BOQ | 20% of the Contract price upon submission of the detailed design, required reports, engineering calculations and BOQ |
| | 15% of the Contract price upon acceptance of the detailed design, required reports, engineering calculations and BOQ by the Ministry |
| Finalization of detail design | 15% of the Contract upon acceptance of the detail design by the Ministry |

## 6. QUALIFICATION AND EXPERIENCE

### 6.1 The Requirement of the Consultancy Firm

6.1.1 The firm must have a minimum of three (3) years of proven experience in designing Maldivian sea-going vessels. The entity should have successfully designed 1 Maldivian sea-going vessels (preferably Maldivian tuna fishing vessels) that have been commissioned and are now in operation.

6.1.2 Foreign entities with relevant experience in boat/ship/vessel design and building (preferably tuna fishing vessel), without the required local experience (mentioned in 6.1.1) may qualify by partnering with a Maldivian company that specializes in fishing vessel building/design and demonstrating successful collaboration on comparable vessel design projects in similar operating environments. In such cases, firms with reduced direct Maldivian experience may be considered, provided they can demonstrate technical competence, relevant project history, and a credible partnership arrangement with a locally experienced entity.



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6.1.3 The Consultancy Firm must form a dedicated team of experienced professionals capable of completing the range of tasks outlined in these terms of reference. The team should be led by a Team Leader, who will ensure the timely delivery of outputs and oversee the team's performance and professional conduct. This Team Leader will also act as the primary point of liaison between the Consultant and the Project.

6.1.4 Excellent interpersonal skills and demonstrated ability to facilitate multisectoral stakeholder engagement sessions in both public and private sectors.

6.1.5 The Consultant's team must include, at a minimum, the following key experts, each possessing the required qualifications as specified

### 6.2 Qualification and Experience Requirement of Key Personnel

| Key personnel | Qualification & Experience |
|---|---|
| Vessel Construction Expert | - Experience in designing or construction of at least 2 fishing vessels. Should have boat builder (*Maavadiya*) certificate approved by the Ministry of Transport and Civil Aviation of Maldives or from a similar institution abroad.<br>- Should have project management and leadership skills.<br>- Candidate should provide reference letters on completed jobs or related projects of fishing vessel development<br>- Experience in undertaking stakeholder engagements |
| Naval Architect | - Bachelors of Engineering degree or a Master's degree in Naval Architecture.<br>- Experience in designing of Maldivian tuna fishing vessels for a minimum of 2 years.<br>- Minimum 5 years of experience in vessel design.<br>- Should be able to use the latest CAD and modelling software to enable optimization in design.<br>- Should have experience in investigative work where existing vessels have experienced problems with seaworthiness, handling or directional stability, the ability to produce clear and well-presented drawings and plans.<br>- Analytical skills to interpret technical information and drawings.<br>- candidate should provide information on completed jobs or related projects in fishing boat design. |
| Fisheries Expert | - Minimum 5 years of experience in pole and line tuna fisheries industry |
| - The Consultant shall not replace any key personnel without prior written approval from the Ministry. Any replacements must have equal or better qualifications. | |



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* The Vessel Construction Expert and Naval Architect may be the same person, as the proposed individual possesses specified qualification and experience in both fields

## 7. REQUIRED DOCUMENTS

- Letter of expression of interest
- Company Registration certificate
- Company profile
- Evidence of firm capacity to meet the requirements stipulated in section 6.1, including:
    - A detailed list of similar assignments conducted
    - Reference letters, work completion letters/certificates or signed contracts successfully concluded as a firm.

**Note:** Based on the evaluation of the submitted EOI, only the selected firm(s) will be invited to submit the Technical and Financial Proposal. A maximum of 8 firms will be shortlisted. If the number of eligible firms exceeds this limit, the selection will be based on a comparative assessment, primarily considering the number and relevance of completed assignments in the field of vessel design, particularly those relevant to Maldivian sea-going vessels.

## 8. SUBMISSION

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## ANNEX 01: PROPOSED DESIGN IMPROVEMENTS FOR THE NEW GENERATION FISHING VESSEL

The next generation of fishing vessels should be designed to tackle the challenges we face in the tuna fishing industry. New design should also address the growing concerns of the processing industry with regards to the quality of fish and should also address the difficulties faced by the fishermen during the fishing operations. Any modifications should enhance the overall fishing experience, making it more efficient and comfortable for fishermen. This in turn could help attract more young people to the industry in the future.

The table below briefly describes a non-exhaustive list of shortcomings that the Ministry have identified through engagement with fishermen and industry personals.

| Shortcomings | Details |
|---|---|
| Poor arrangements for preservation of fish on board | 1. Improving onboard handling of fish – improved fish storage tanks and improved technique for transfer of fish to storages.<br>2. Improved ice storages and ice loading process.<br>3. Use of RSW or onboard chiller systems or another fish preservation technique.<br>4. Possible modification of back deck so that fish can be easily transferred to fish storage tanks. |
| Damage to fish during the harvesting process | 1. Modify the back deck to ensure that the force of impact on the deck is minimized. |
| Difficulties in offloading catch | 1. Improved design to enable easy offloading of fish from vessel storage tanks at the landing ports |
| Limited technologies to improve the efficacy of the fishery and vessel | 1. Use modern technology to locate schools of fish<br>2. Use of bird radars, image stabilizing binoculars and similar technologies to support targeting free swimming schools and potentially contribute towards improved catches.<br>3. Introducing modern technologies and machineries that are more energy efficient and would make the fishing operation more efficient in terms of fuel consumption.<br>4. Use of vessel tracking devices with internet connectivity to enable real time reporting of catches and to improve overall safety at sea. |
| Issues with the survival rates of bait | 1. Improved bait tank design to increase the survival rates of the bait. |



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| | |
|---|---|
| High fuel usage, low steaming speeds and limited storage space | 1. New hull design to improve fuel efficiency and the steaming speed of the vessels whilst contributing towards additional storage space for fuel, ice and other amenities so that fishing vessels can cut down on travel time back and forth for provisioning |



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