

## PRELIMINARY RESULTS OF THE IMPLEMENTATION OF THE FAO MATRIX APPROACH FOR THE CHARACTERIZATION OF SELECTED IOTC FISHERIES

PREPARED BY: IOTC SECRETARIAT, LAST UPDATED: 24 NOVEMBER 2022

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### Introduction

[IOTC current definition](#) of artisanal and industrial fisheries is mainly driven by the categorisation of fishing vessels by their length overall (LOA) and area of operation. Acknowledging the limitations of the current definition, IOTC Artisanal fisheries are regarded as the major contributors to catches of IOTC species in the Indian Ocean, accounting for more than 55% of total annual reported catches in recent years.

Nevertheless, there is a general lack of knowledge on artisanal fisheries in the IOTC that affects the quality of reported fisheries data, the structure and composition of the fleets, as well as the proper characterization of the concept of artisanal or 'small-scale fishery' per se.

At the 2021 meeting of the IOTC Working Party on Data Collection and Statistics (WPDCS), FAO presented paper [IOTC-2021-WPDCS17-23](#), "Towards a statistical definition of small-scale fisheries", to assist national management and enable inter-comparability of data and information on small-scale fisheries.

The proposed [approach](#) seeks to avoid misleading or inappropriate characterizations of fisheries as small-scale or large-scale, which can sometimes occur when a single criterion, such as vessel length or area of operation, is emphasized (as in the case of IOTC).

On these grounds, the [WPDCS](#) debated on the following points:

- IOTC current categorisation of fishing vessels as artisanal or industrial
- To test the matrix-based approach developed by FAO, to help refine the characterization of fisheries in IOTC at the national and regional level
- The interested expressed by several CPCs including Indonesia, Kenya, Maldives, Pakistan and Sri Lanka.
- The Scientific Committee should thoroughly discuss and present to the Commission the possibility of revising this definition, considering the implications for a number of compliance and scientific-related CMMs.

## Materials and Methods

The Secretariat request to the CPCs who expressed their interest in participating in this exercise to compile one fisheries characterization matrix for each fishery for which information on nominal catches has been reported to the IOTC Secretariat for the years 2017-2021, including those fisheries identified as industrial with respect to current IOTC definitions.

The procedure to apply the matrix is described in [IOTC-2022-WPDCS18-INF03](#) as follows:

### **Step 1:** Determine the fishing unit

To effectively use the matrix, users should score a fishing unit. This unit may be defined differently depending on local needs and available information. For example, the fishing unit may be:

- An individual fisher or vessel
- A relatively homogenous group of fishing activity
  - *For example, the user may choose to score all 'pole and line' vessels as a unit.*
  - *If large groups of vessels within a single fishing unit display distinct different characteristics (for example vessel size), this may indicate the need for further subdivision into distinct groups – smaller and more homogenous fishing units - for scoring purposes.*

It is important to note that for the successful completion of a comparative analysis, more than one fishing unit should be assessed, and ideally all fishing units in a country/region for which information is available.

### **Step 2:** Assess each individual fishing unit through application of the matrix

For each category (row) within the matrix, select the option which most closely describes the fishing unit, selecting only one option per category.

### **Step 3:** Calculate the total assessment score

Assign a value from 0-3 for each response given according to the column heading. Calculate the total assessment score for each fishing unit by adding up all responses. The total assessment score should be between 0 and 39.

### **Step 4:** Compare results

Compare the total assessment score of each fishing unit assessed and determine if there is a clear cut-off between small-scale and large-scale fishing activity.

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## Results

Indonesia, Maldives, Pakistan, and Sri Lanka provided responses to the matrix questionnaire with different levels of detail and according to the complexity of their fisheries, resulting in data for 26 fishing units in total being received by the Secretariat (**Table 1**).

### Indonesia

The eight fishery units identified by Indonesia scored from 16 to 27 with the lower values associated to Danish seine, hand line and troll line fisheries, while the highest scored was obtained for the coastal longline fishery. The matrix categories for which the Indonesia fisheries reported more differences were Fishing gear and Mechanization (**Table 1**).

### Sri Lanka

Small scale longlines and gillnets fisheries and ring nets fisheries were originally identified at two levels, while longlines and gillnet fishing units were split in three different levels. The final scores suggest a distinction between two groups: a first one of composed by 4 fishing units with scoring values of 13, 14 and 17, and a second with scores of 22, 26 and 30. For both groups the values on the matrix categories were mostly homogeneous with a few exceptions. (**Table 1, Fig 1**).

### Pakistan

Pakistan identified eight fishing units obtaining a broad range of scored values from 8 to 34. The diversity of the Pakistani fisheries is reflected in the values assigned to the matrix categories for which twelve of the thirteen categories were represented with 3 different values of the matrix scale. (**Table 1, Fig 1**).

### Maldives

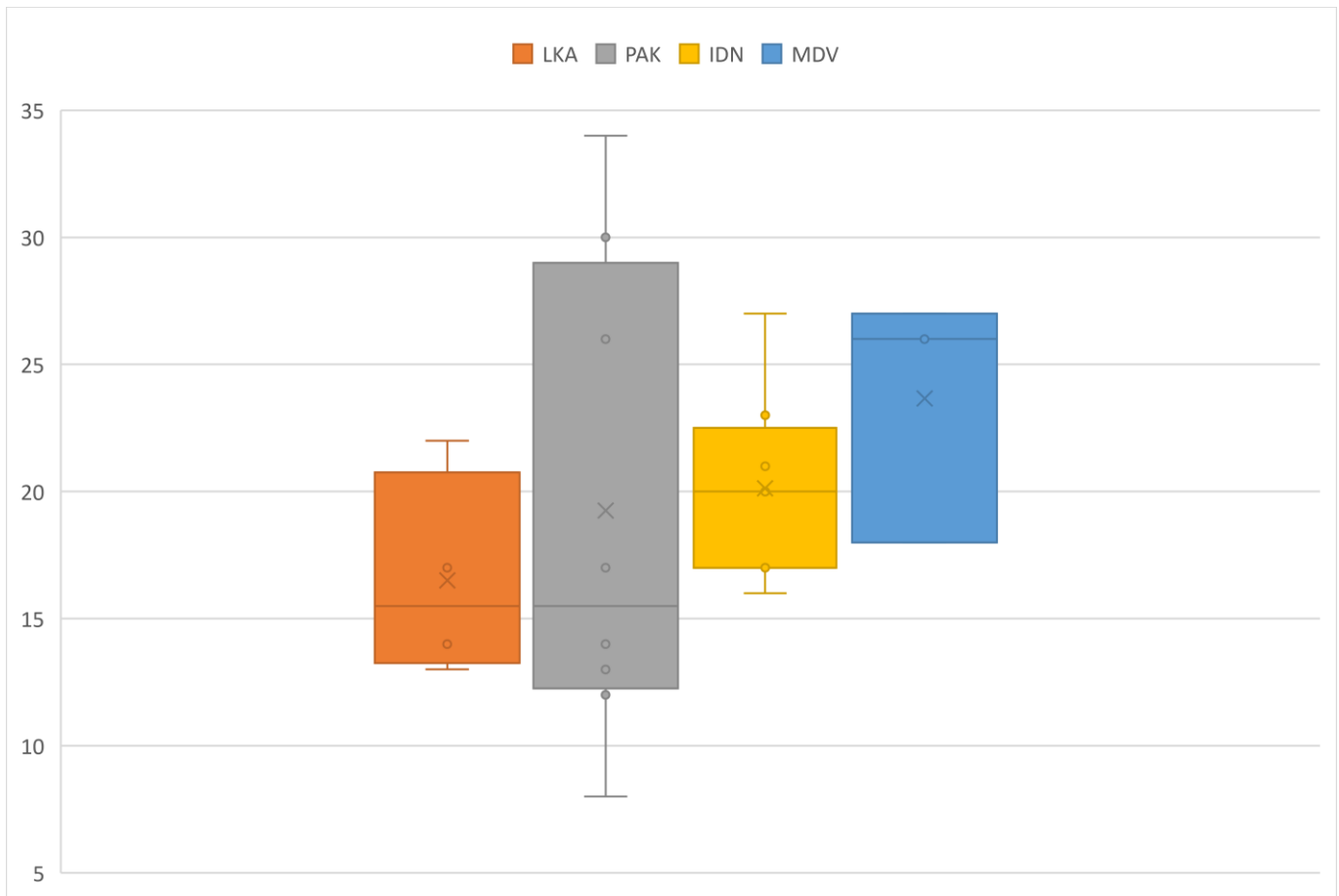
Three fishing units were identified by Maldives with scoring values of 18, 26 and 27. Since the three reported fishing units looks generally more homogeneous for the values assigned in the matrix categories the lower scored shows differences in *ownership, time commitment, daily / multi-day trip, fishing grounds, disposal, and utilization of catch*. (**Table 1, Fig 1**).

Although the four values for the size of fishing vessels and GT category included in the matrix cover most vessels which occur globally, two CPCs found difficulties to reflect the most appropriate value to identify their fishing units. Similar comments were received for the *motorization* category in regards of the *horsepower* and *engine* relationship.

Table 1 Scoring table for the twenty-six fishery units reported in the FAO matrix test by Indonesia, Sri Lanka, Pakistan and Maldives.

SCORING TABLE			Vessel		Gear		Storage Preservation	Employment/Labour			Operations		Use of catch			SCORE
CPC	MATRIX FISHING UNIT	IOTC FISHERY	Size of fishing vessel	Motorization	Fishing gear	Mechanization	Refrigeration/ storage	Labour/Crew	Ownership	Time commitment	Daily trip/Multi-day	Fishing grounds / zone / distance from shore	Disposal of catch	Utilization of catch, value adding, Preservation	Integration into economy and/or management system	
IDN	Danish seine	DS	2	2	0	0	1	1	0	2	1	2	2	1	2	16
IDN	Drifting gillnet	GI	2	1	1	1	2	1	0	2	3	3	2	1	2	21
IDN	Hand Line	HL	1	1	0	0	1	1	0	2	3	3	2	1	2	17
IDN	Coastal Longline	LLCO	2	2	1	2	2	3	2	2	3	3	2	1	2	27
IDN	Lifnet	OTH	2	2	1	1	1	1	0	2	2	3	2	1	2	20
IDN	Pole and line	PL	2	2	0	0	2	1	0	2	3	3	2	1	2	20
IDN	Small purse seine	PSSS	2	2	2	1	2	1	0	2	3	3	2	1	2	23
IDN	Troll line	TL	1	1	0	0	1	1	0	2	3	3	2	1	2	17
LKA	Small scale longlines and gillnets	LLCO	1	1	0	0	1	3	0	1	2	2	1	0	2	14
LKA	Small scale longlines and gillnets	LLCO	2	1	0	0	1	3	0	1	2	2	2	1	2	17
LKA	Ring Nets	PSRN	1	1	0	0	1	3	0	1	2	2	1	0	1	13
LKA	Ring Nets	PSRO	2	2	1	0	2	3	1	1	3	2	2	1	2	22
LKA	Long lines and gill nets	LLFR	1	1	0	0	1	3	0	1	2	2	1	0	1	13
LKA	Long lines and gill nets	LLFR	2	2	1	1	2	3	1	3	3	3	2	1	2	26
LKA	Long lines and gill nets	LLFR	3	3	1	1	2	3	2	3	3	3	2	2	2	30
PAK	Tuna gillnet vessels	GI	3	3	1	3	3	2	2	3	3	3	3	3	2	34
PAK	Gillnet Rach Boat	GI	2	2	1	3	2	1	1	3	3	3	2	1	2	26
PAK	Trawlers Gujja boats	TL	2	2	3	3	2	1	1	3	3	3	2	3	2	30
PAK	Seining Boats	OTH	1	1	0	0	0	1	0	1	2	2	2	3	1	14
PAK	Hora or Rachin Boats	GI	1	1	1	1	1	1	0	1	2	1	1	1	1	13
PAK	Fiberglass boats	GILL	1	1	1	0	0	1	1	1	1	2	2	1	0	12
PAK	Doonda Boat	GILL	1	1	1	1	1	1	1	1	3	2	2	1	1	17
PAK	Hori or Katti	GILL	1	1	1	0	0	0	0	1	1	1	1	1	0	8
MDV	PL	PL	3	2	0	0	2	3	2	3	2	3	2	3	2	27
MDV	PL	PL	2	2	0	0	2	3	0	3	1	2	1	0	2	18
MDV	PL & HL	PL_HL	2	2	0	0	2	3	2	3	2	3	2	3	2	26

The preliminary results of this study on applying the FAO matrix to describe the IOTC fisheries have some limitations as the approach has been applied to a limited number of selected fisheries only. According to the mandatory statistical data provided yearly to the secretariat, some fisheries were not reported through the matrix and not included in this assessment. The inclusion of more fisheries, particularly those identified as *industrial* with respect to current IOTC definitions is necessary to understand if there is a clear cut-off between distinctly small-scale fisheries and large-scale ones. Furthermore, this cut-off (or threshold) might be specific to the region, as it will depend on the overall picture that emerges from the range of the fishing units assessed according to their nature and complexity.



**Figure 1** Range, mean and median scored values for the 26 units identified by Sri Lanka (orange), Pakistan (grey), Indonesia (yellow) and Maldives (blue).

The needs for a review of the characterization of fisheries in IOTC have been widely discussed and agreed. The application of the FAO matrix approach with further testing and development, together with the proposed updates to the definitions of fisheries presented in this meeting are promising tools for a better characterization of the IOTC fisheries and to support the CPCs reporting of statistical data to the IOTC.

## References

IOTC. 2021. Towards a statistical definition of small-scale fisheries. IOTC, Virtual meeting. Available from [Towards a Statistical Definition of Small-Scale Fisheries | IOTC](#)

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IOTC.2022. Proposed updates to the definition of fisheries in support to the reporting of statistical data to the IOTC. IOTC, Virtual meeting. Available from [Proposed updates to the definition of fisheries in support to the reporting of statistical data to the IOTC | IOTC](#)

IOTC.2022. FAO matrix for the characterization of fishing activities. IOTC, Virtual meeting. Available from [FAO matrix for the characterization of fishing activities | IOTC](#)