



Food and Agriculture Organization
of the United Nations



Economic feasibility analysis of the costs and benefits of a bulbous bow

Workshop on fuel savings in fisheries Sri Lanka

22 May 2024

Outline

- 1 **FAO's work on fishing fleets**
- 2 **Economic performance of the main global fishing fleets**
- 3 **Fishing fleet trends analysis & innovations**
- 4 **Economic performance of multiday fishing vessels in Sri Lanka**
- 5 **Benefits and costs of the bulbous bow**

1. FAO's work on fishing fleets

Fishing fleet statistics collection & analysis

2.5 million motorized fishing vessels

± 67 000 vessels > 24m LOA

± 450 000 vessels 12 -24 m LOA

± 2 million vessel < 12m LOA



FIGURE 27 DISTRIBUTION OF THE WORLD'S FISHING VESSELS BY CONTINENT, 2020

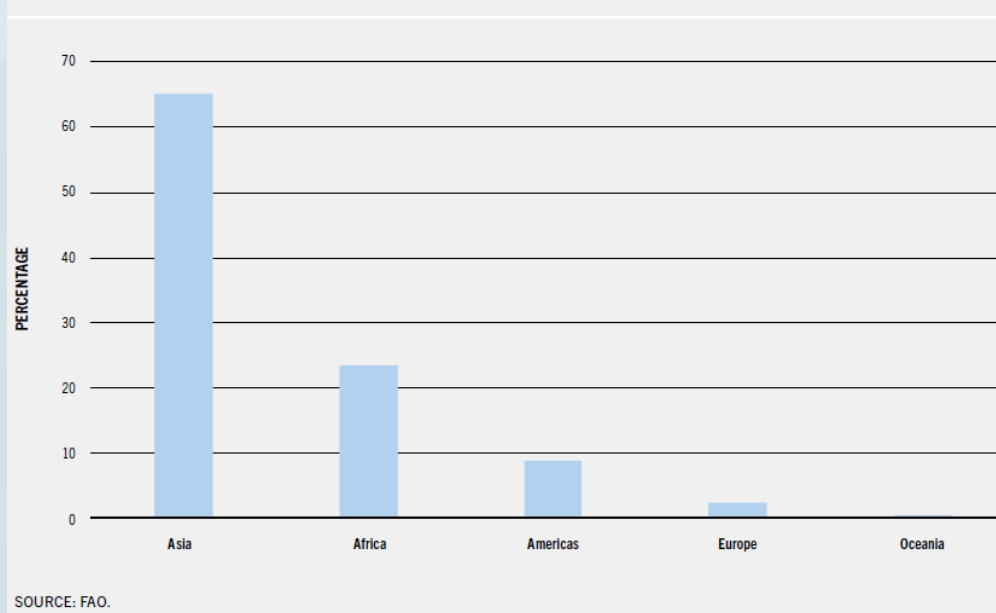
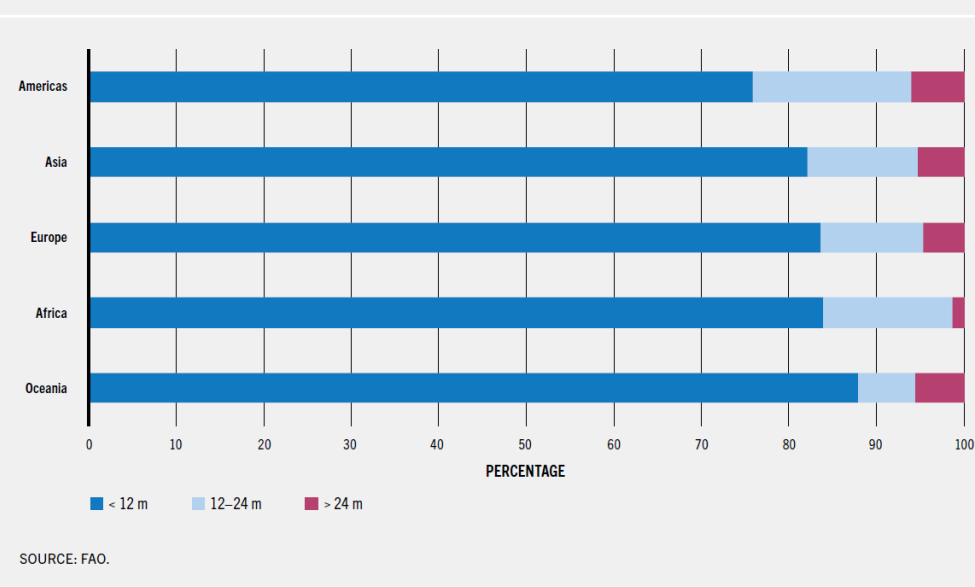


FIGURE 31 SIZE DISTRIBUTION OF MOTORIZED FISHING VESSELS BY CONTINENT, 2020

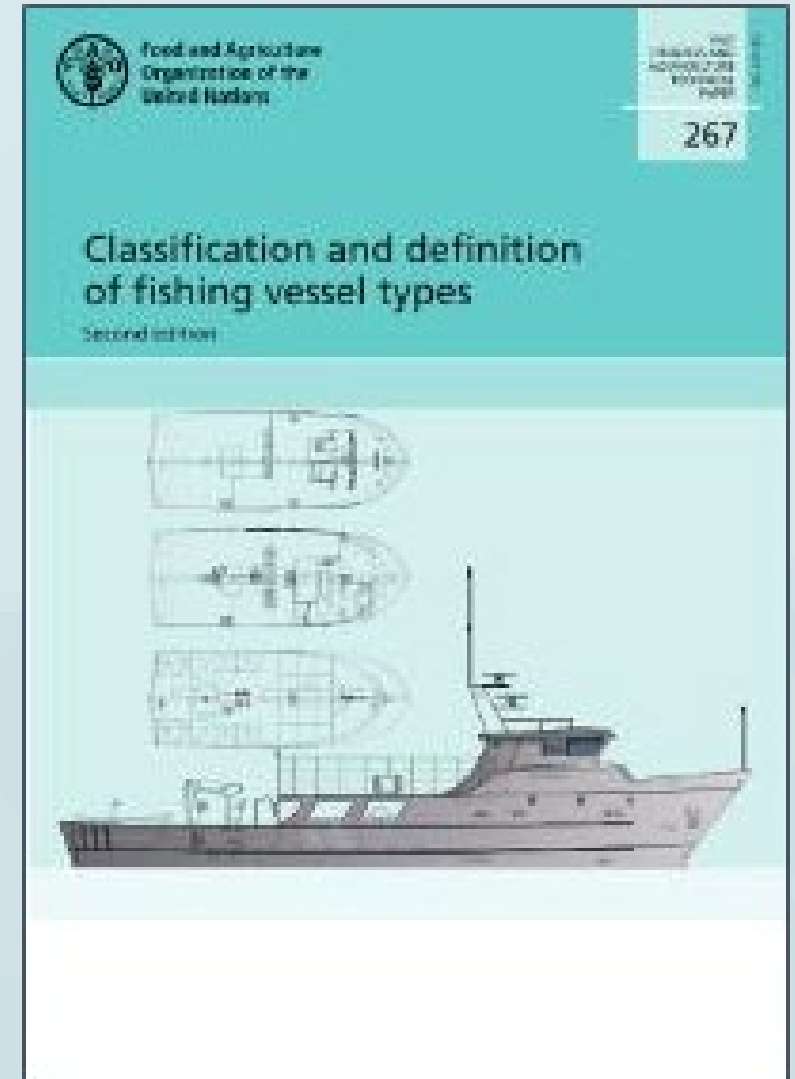


1. FAO's work on fishing fleets

Fishing fleet statistics collection & analysis

Improve data collection by vessel type:

International Standard Statistical Classification of Fishery Vessels by Vessel Types (ISSCFV)



2. Economic performance of the main global fishing fleets

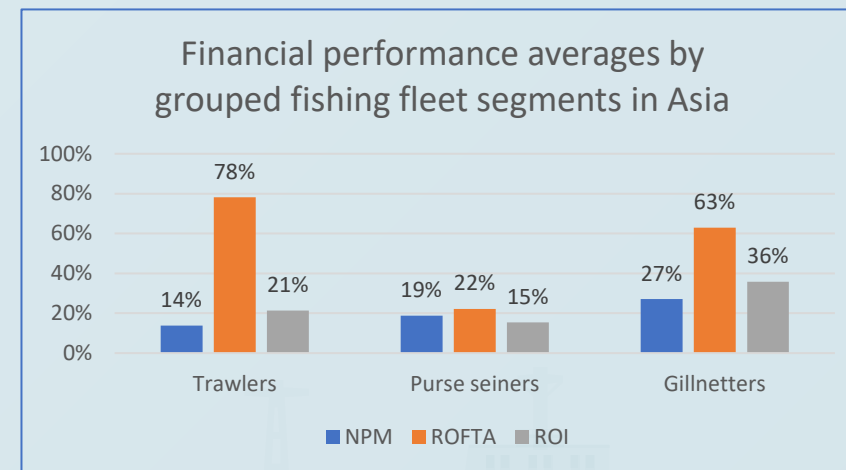
TABLE 8
Financial and economic performance averages of aggregated fishing fleet segments

Fleet segments	NPM (%)	ROFTA (%)	ROI (%)
Bottom trawlers small (20)	14%	78%	21%
Bottom trawlers medium (14)	19%	22%	15%
Bottom trawlers large (7)	27%	63%	36%
Pelagic trawlers (6)	> 20%	> 20%	> 20%
Purse seiners (18)	> 20%	> 20%	> 20%
Longliners (10)	< 0%	< 0%	< 0%
Gillnetters (4)	> 20%	> 20%	> 20%
Squid jiggers (4)	> 20%	> 20%	> 20%

Note: The number of fleet segments included in the analysis are indicated in brackets.

Legend:

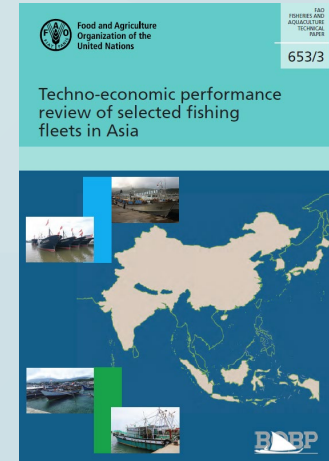
< 0%	negative results = loss-making fishing operations
> 0% to ≤ 5%	slightly positive results = limited economic viability of the fishing operations; high risk of loss-making
> 5% to ≤ 10%	moderate results = income from fishing operations is sufficient to cover depreciation costs, interest and loans repayment, but may not be enough for justifying re-investment in new vessels, equipment and quota.
> 10% to ≤ 20%	good results = profitable fishing operations
> 20%	very good results = highly profitable fishing operations



Source: FAO FTP No. 654 (2021)

3. Fishing fleet trends analysis & innovations

1. Global increase in fishing capacity (in terms of vessel length, tonnage and power), while the number of vessels shows some reduction.
 - **Larger vessels** - increase in the gross tonnage of individual average vessels in nearly all industrial fishing fleets world-wide.
 - **Increases in overall average length and engine power are fast in several Asian fishing fleets.**
2. Transition from wooden to FRP and steel hull vessels in (semi-) industrial fleets in Asia: India, Indonesia and China.



4. Economic performance of multiday fishing vessels in Sri Lanka

Initial capital investment in a multiday vessel – longliner of 49ft

	Age (years)	Cost of original investment LKR	Depreciation rate (%)	Book value (Depreciated value) LKR
Vessel (hull)	8	32,0267,000	5	19,216,000
Main engine	8	5,632,000	6	2,929,000
Equipment on deck (winches, drums)	8	420,000	4	286,000
Electronic devices (navigation, VMS, GPS and communication)	5	1,995,000	10	998,000
Total investment		40,074,000		23,429,000

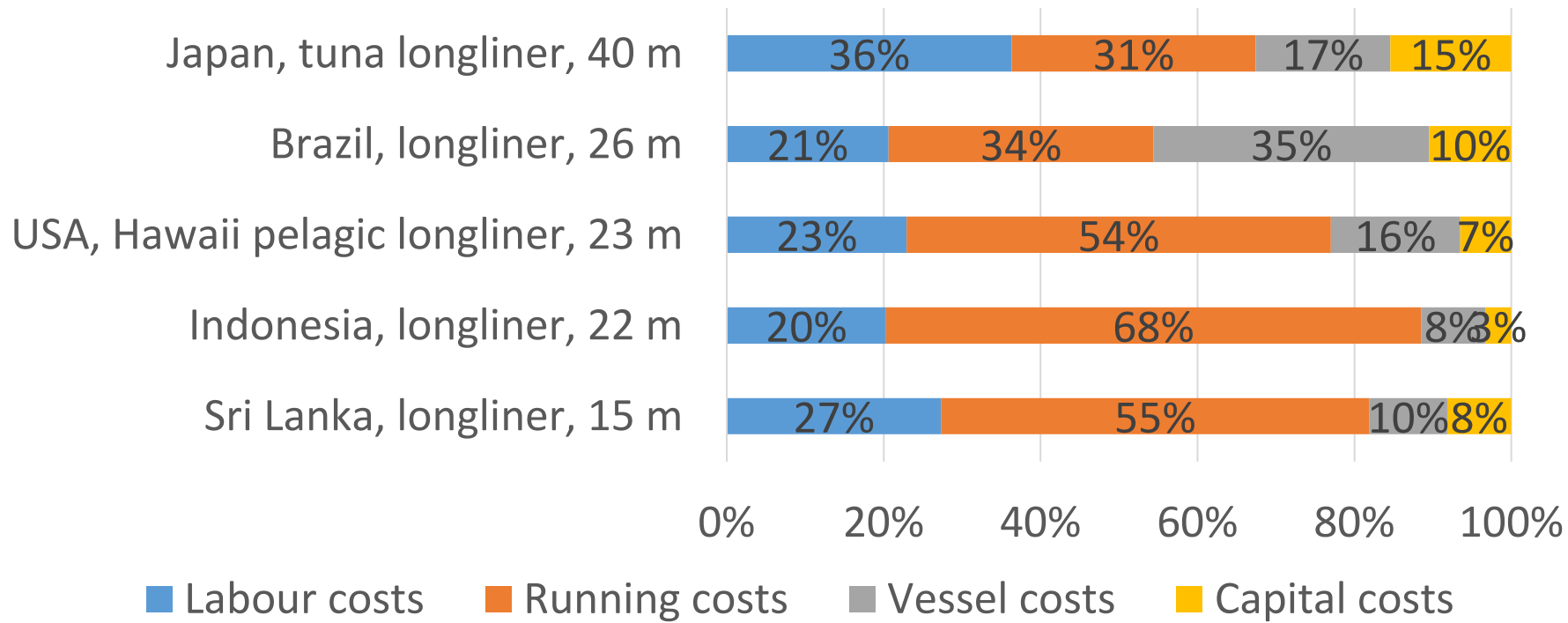
Source: average figures of 5 interviews with vessel owners – Mr Premalal

Annual depreciation: 2.5 million LKR

4. Economic performance of multiday fishing vessels in Sri Lanka

Costs categories and average earnings of a multiday longliner (2023)

Costs structure of average vessels in various longliner fleets



Average estimated earnings in 2023: sale of fish per vessel

38 million LKR

Range 5 to 68 million LKR
large differences between vessels

Large variation in price per kg received for

- Yellowfin tuna
- Bigeye tuna
- Swordfish
- Marlin

Average total gross costs (running + labour+ vessel costs) for 1 year: 27 million LKR

4. Economic performance of multiday fishing vessels in Sri Lanka

Costs of a multiday longliner (2023)

Category	Item	LKR
Earnings	Fishing revenue (gross value of landings)	38,233,200
	Income from sale of fishing rights, licenses, permits and quotas	0
	Subsidies and grants	0
	Other vessel income (from tourism, charters, etc.)	0
Total revenue		38,233,200
Running costs	Fuel	13,068,000
Running costs	Lubricants/oil/filters	399,900
Running costs	Harbour dues and levies	0
Running costs	Ice	1,240,000
Running costs	Bait	800,100
Running costs	Salt	349,500
Labour	Food, stores and other provisions	1,599,900
Running costs	Water	459,900
Running costs	Materials (packaging, boxes)	0
Labour	Crew travel	84,000
Running costs	Other operating costs	800,100
Labour	Labor share and wages	6,880,000
Total operating costs		25,681,400

Category	Item	LKR
Vessel costs	Fishing licenses, permits and quota (only annual costs) + VMS lease	420,000
Vessel costs	Insurance (vessel, employers, equipment)	0
Vessel costs	Purchase of fishing rights (quotas)	0
Vessel costs	Gear replacements, repairs & maintenance	1,280,100
Vessel costs	Vessel repairs & maintenance	1,400,100
Vessel costs	Other fixed costs (accountancy, audit and legal fees, general expenses, subscriptions, etc.)	12,000
Capital costs	Depreciation (vessel, engine, equipment, and gears that last more than 3 years)	2,559,000
Capital costs	Interest	0
	Investments	0
	Taxes on profit	0
Capital costs	Amortization of intangible assets (fishing permits, licences, etc.)	0
Total vessel owner costs		5,671,200

Source: average figures of 5 interviews with vessel owners – Mr Premalal

4. Economic performance of multiday fishing vessels in Sri Lanka

Profitability indicators for a multiday longliner (2023)

Net profit margin: 23%

Return on Investment: 22%

>20% = highly profitable fishing operations

GVA to Revenue: 49%

Source: average figures of 5 interviews with vessel owners – Mr Premalal

Financial Indicators	Code	Value LKR
<u>Revenue from landings</u>	A	38,233,200
Labour costs	B	7,313,500
Running costs	C	16,317,400
Vessel Costs	D	3,112,200
<u>Total gross cost (E) = B + C + D</u>	E	26,743,100
<u>Net Cash Flow (F) = A - E</u>	F	11,490,100
Depreciation	G	2,559,000
Amortization	H	0
<u>Gross profit (I) = F - G - H</u>	I	8,931,100
Interest	J	0
<u>Net profit before taxes (K) = I - J</u>	K	8,931,100
<u>Net profit margin (L) = K/A</u>	L	23%
Value of tangible assets	M	40,074,000
<u>ROFTA (N) = K/M</u>	N	22%
Value of intangible assets	O	0
<u>ROI (P) = K/(M + O)</u>	P	22%
<u>GVA (Q) = F + B</u>	Q	18,803,600
<u>GVA to revenue (R) = Q/A</u>	R	49%

4. Economic performance of multiday fishing vessels in Sri Lanka

Gross value added (GVA) = net cash flow + labour costs

GVA indicator = important figure for fisheries policy and decision-makers. It shows what fishing vessel operations contribute to the economy and is useful for making decisions on future fisheries sector investment and expenditure.

Gross Value Added per multi-day longline vessel in 2023:

18.8 million LKR

2658 longliners contributed 50 billion LKR to the Sri Lankan economy

4. Economic performance of multiday fishing vessels in Sri Lanka

Labour productivity

$$\text{Labour productivity} = \frac{\text{Gross value added (= net cash flow + labour costs)}}{\text{Number of crew (FTEs)}}$$

On average 5 crew are full-time employed on a 49ft longliner

Labour productivity = 3.8 million LKR per crew member

Average labour productivity in Sri Lankan in Agriculture, Forestry and Fisheries (2019) = 2 million LKR (in services sector = 3.8 million LKR)

5. Benefits and costs of the bulbous bow

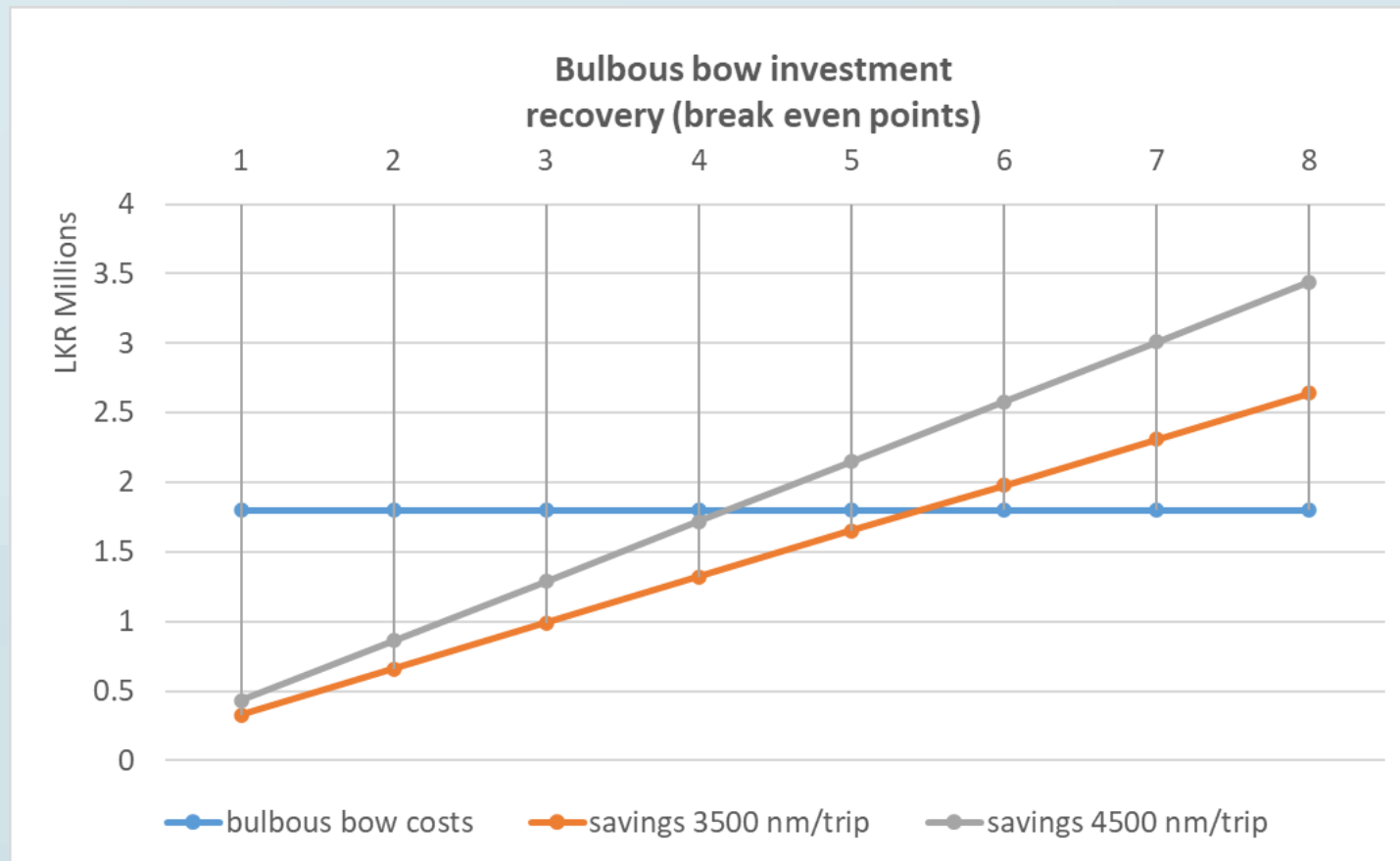
Common costs per fishing trip	Savings per fishing trip with the bulbous bow
Average fishing trip length = 3500 to 4500 nm	± 11 % to 14 % in fuel savings
Costs of fuel = LKR 333/liter (May 2024)	
Diesel use 2.5 litres per nautical mile	± 0.31 litres/nautical mile saved
Average fuel consumption per fishing trip = 8750 litres to 11250 litres	Average fuel consumption saved per fishing trip = ± 1000 to 1300 litres
Average fuel costs per fishing trip = 2.9 million to 3.7 million LKR	Average fuel costs saved per fishing trip = 0.33 million to 0.43 million LKR
Total average fuel costs per year (4 trips) = 11.6 million to 14.8 million LKR	Average fuel savings per year (4 trips) = 1.3 million to 1.7 million LKR

5. Benefits and costs of the bulbous bow

Bulbous bow construction costs	LKR
Bulbous bow construction & fitting	1,500,000
Slipping the vessel + up-to waterline surface prep	300,000
Total	1.8 million

You recover your investment in a bulbous bow in 1 to 1.5 years.

Save 13 million to 17 million LKR in 10 years!



5. Benefits for the national longliner fleet

Data per vessel	For the whole fleet (2600 longliners)
Fuel consumption = > 35 000 litres fuel per vessel/year	>91 million litres/year
Fuel costs 11.6 million LKR/year	30,300 million LKR/year
Fuel savings 1.3 million LKR/year	3,380 million LKR/year

Average longliner **net profit margin (NPM)**:
now **23%** -> + bulbous bow **27%**

Average longliner **return in investment (ROI)**:
now **22%** -> + bulbous bow **25%**



Do you take the step to invest in a bulbous bow?

FAO is there to assist technically until 30 June!

Thank You

any questions?

For more information, please contact:

Raymon.vananrooy@fao.org