The impact of fuel price increases on marine fishing operations in Sri Lanka

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Abstract

The motorized fishing fleet of Sri Lanka contributes more than 70% to the total fish production in the country. This fleet comprises of Multi-day Boats (IMUL), In-board Day Boats (IDAY), Out-Board Fiber-Reinforced Plastic Boats (OFRP) and Motorized Traditional Boats (MTRB). The IMUL and IDAY boats use diesel as their fuel while OFRP and MTRB boats use kerosene. The recent increase in diesel and kerosene prices triggered unrest among fishers due to an anticipated steep rise in the operational cost of fishing.

The present study was carried out to examine the impact of fuel price rises on coastal as well as offshore and deep sea fisheries in Sri Lanka. A sample survey was carried out using participatory rapid appraisal methods at three fishery harbours and two fish landing sites. The cost of fuel prior to and after the price hike and Break-Even Catch (BEC) required to cover up fuel cost were calculated and compared for different types of craft/gear combinations.

The average fuel consumption per craft per fishing trip was 45 and 91 liters for coastal and offshore/deep sea fishery, respectively. The average increase in fuel cost per trip in the coastal and the offshore/deep sea fishery were LKR 1,872 and 66,185 respectively. The break-even fish catch needed to meet the increased fuel cost has risen from 23 to 33 kg per trip in the coastal fishery and from 597 to 818 kg per trip in the offshore/deep sea fishery. Hence, the recent fuel price increase will have negative impacts on the profitability of coastal as well as offshore/deep sea fishing operations. This situation in turn can be expected to lead to some deterioration of the socio-economic standards among the fishing community.

Keywords: Coastal fishery, Offshore/deep sea fishery, Fuel price increase, Break-Even Catch

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Introduction

Fisheries sector plays an important role in the national economy of Sri Lanka. The key contributor within the sector is the annual production of fresh fish (384,770 MT in 2011, MFARD, 2012) from the marine sub-sector. Total direct employment in the marine fishery sub-sector was 149,850 of which111,650 and 38,200 were employed in coastal fishery and offshore/deep sea fishery respectively (MFARD, 2010). Moreover, these fishing activities generate a number of forward and backward linkages such as boat building, ice making, net manufacturing, processing, marketing and trade. The total direct employment in the fisheries sector, therefore, exceeds 600,000 and overall, the sector provides fishing and related livelihoods for more than 2.5 million people in the coastal areas (MFARD, 2010).

The primary inputs needed for fishing operations consist of fishing crafts, gear and labour; all mechanized crafts use diesel or kerosene to run their engines. Depending on the nature of the fishing operation, ice and bait are also used by a large number of crafts in the country. Mechanized crafts cannot be operated without fuel, so the price of fuel is an important determinant of uninterrupted fishing operations. Sri Lanka's mechanized fishing fleet comprises of Multi-day Boats (IMUL), Out-board Fiber Reinforced Plastic boats (OFRP) and Motorized Traditional Boats(MTRB), which account for a large share of the annual fish production in the country. Mechanized craft landings accounted for more than 70% of the total fish production in the country in 2010 (MFARD, 2010). Hence, a decrease in the fish catch by mechanized crafts will directly affect not only fishers but also all stake holders along the fish value chain. It is important, therefore, to examine the impact of fuel price increases on the sustainability of fishing operations in the fisheries sector. In February 2012, the prices of a liter of diesel and kerosene increased by 37 and 49 % respectively (CPC, 2012). This led to island-wide protests by fishers, who even abstained from fishing for some days to exert pressure on the government to bring down the diesel and kerosene prices. This study was carried out, therefore, to assess the magnitude of the impact of the fuel price rise on the break-even increase in fish production required to cover up the fuel cost. In this analysis, the Break Even Catch (BEC) signifies the fish catch needed to cover up at least the fuel cost of a fishing operation.

Materials and Methods

Participatory rapid appraisal methods were employed in this study to gather the required information in the field. The landing centers selected for the study were located in Negombo, Beruwala and Kapparathota. A convenience sample of 50 boats from each of offshore/deep sea fishery and coastal fishery was selected. Structured and semi-structured interviews were held to collect data and information. The break-even fish catches prior to and after fuel price hike were calculated.

Results and Discussion

The composition of motorized craft and marine fish production

Total number of marine fishing craft operated in 2010 was 45,163, of which 25,973 were motorized fishing craft (MFARD, 2010). Total number of boats using diesel was 4,523, while 21,450 boats used kerosene as operating fuel. Diesel is generally used as their fuel, by multi-day and day boats with in-board engines, while OFRP and MRTB boats use kerosene. Thus, of all operating fishing boats 10% use diesel and 47% use kerosene. The contribution of coastal and offshore/deep sea fishery to the total fish production in 2010 was 202,420 and 129,840 MT respectively (MFARD, 2010). It can be seen that, of the total coastal fish production, mechanized boats using kerosene account for the major share of the catch (Table 1).

Table 1. Types of operating fishing craft, fuel type and contribution to fish production

Type of craft	Mechanized/Non-mechanized	Fuel type	Number of craft	Total Coastal/Offshore	
				Craft	Production
IMUL	Motorized	Diesel	3346	4,523	129,840 MT
IDAY	Motorized	Diesel	1,177		
OFRP	Motorized	Kerosene	18,770	21,450	202,420 MT
MTRB	Motorized	Kerosene	2,680		
NTRB	Non-mechanized	-	19,190	19,190	
Total				45,163	332,260 MT

Source: Fisheries Statistics, 2010, MFARD

Coastal fishery

Table 2.shows the different boats and gear combinations used in the coastal fishery. The fuel cost of coastal fishery depends particularly on the fishing gear used, sailing time and the weather conditions at sea. Sailing time differs according to the type of fishing gear and the targeted fish variety. Moreover, some of the fishing operations need continuous

use of the engine to search for shoals of fish. Fishing by the troll line and surrounding net need more running time and therefore consumes more fuel.

Table 2. Craft-gear combinations and targeted fish varieties

Type of gear	Type of boat	Targeted fish varieties
Small meshed gill net	OFRP/MTRB	Spotted sardinella (*Hurulla*), White sardinella (*Sudaya*), Goldstripe sardinella (*Salaya*)
Small tuna gill net	OFRP/MTRB	Frigate tuna (*Alagoduwa*)
Trammel net	OFRP/MTRB	Lobster (*Pokirissa*)
Medium meshed gill net	OFRP/MTRB	Bigeye scad (*Bolla*) Indian mackerel (*Kumbala*)
Bottom long line	OFRP/MTRB	Rockfish (*Galmalu*)
Troll line	IDAY/OFRP	Frigate tuna (*Alagoduwa*), Kawakawa (*Atawalla*)

Source: Field survey 2011, Socio-economic Division, NARA

Fuel consumption of coastal fishery

The average fuel consumption per operation of OFRP and MTRB boats is given below (Table 3). The highest fuel consumption was recorded in the troll line fishery for travellys and seer fish. Compared to other fishing gear used, bottom long line and troll line fisheries consume more fuel due to the higher sailing time and longer distance from the landing centers. In the coastal fishery, therefore, fuel cost account for more than 90% of the total operational cost and these small scale fishermen are particularly vulnerable to any increase of fuel prices.

Table 3. Average fuel cost per operation by out-board motor craft (OFRP/MTRB)

Fishery	Fuel consumption (liters)	Change of fuel cost (LKR[1])	
		Before	After
Small meshed gill net	20	1,420	2,120
Trammel net	15	1,065	1,590
Average	**18**	**1,243**	**1,855**
Small tuna gill net	40	4,260	6,320
Bottom long line	45	3,195	4,770
Long line	48	3,408	5,088
Troll line (*Sura pannaya*)	45	4,402	6,572
Average	**45**	**3,816**	**5,688**

Source: Field survey (2011 & 2012), Socio-economic Division, NARA

1 US$ = 113 LKR

On average, small meshed gill net fishery consumes 20 liters of kerosene per trip. Apart from small meshed gill nets and trammel nets, operations using all other types of fishing gear shown in Table 3, requires more sailing time and fuel. The largest contributor to the coastal fish production appears to be the gill net fishery (Wijayaratne, 2001), in which the small meshed gill net fishery accounts for the major share. The shore seine varieties (*hurulla, salaya,* and *sudaya*) consist of the catch of small meshed gill net fishery, contributing 71,580 MT to the coastal fish production (MFARD, 2010), this amounts to about 35% of the total coastal fish production.

Break Even Catch (BEC)

Table 4.shows BEC of coastal fishery defined as the 'fish catch (kg) that would meet the cost of fuel of the fishing operations'. The BEC in the small-meshed gill net fishery was estimated to be 11 kg, which was an increase from the 7 kg, prevailed prior to the recent increase of fuel prices. The BEC of other coastal fishing units had similarly increased from 15 to 23 kg per fishing trip.

Table 4. Change in Break Even Catch (BEC) of coastal fishery following increase in fuel price

Fishery	**Prior to price increase**		**Following price increase**	
	Fuel cost per trip (LKR)	BEC per trip (kg)	Fuel Cost per trip (LKR)	BEC per trip (kg)
Small meshed gill net	1,420	10	2,120	14
Trammel net	1,065	5	1,590	8
Average	**1,243**	**7**	**1,855**	**11**
Small tuna gill net	4,260	21	6,320	32
Bottom longline	3,195	16	4,770	24
Longline	3,408	11	5,088	17
Troll line *(Sura pannaya)*	4,402	22	6,572	33
Average	**3,816**	**15**	**5,688**	**23**

Source: Field survey (2011 & 2012), Socio-economic Division, NARA

Offshore/deep sea fishery

One day in-board boats (IDAY) and multi-day boats (IMUL) are the two craft types engaged in offshore/ deep sea fisheries. However, the operation of IDAY boats is limited to offshore waters within Sri Lanka's Exclusive Economic Zone (EEZ) while multi-day boats operate both within and beyond the EEZ. The trip duration of the multi-day boats normally exceeds two weeks, depending on the capacity of the boat. There is a range of fishing gears used in offshore/deep sea fishery (Joseph *et al.*, 1985, Samaraweera and Amarasiri, 2004). The target fish varieties in the offshore/deep sea fishery are given in Table 5. (Maldeniya and Amarasooriya, 1998).

Table 5. Craft-gear combinations and target fish varieties in the offshore/deep sea fishery

Type of fishing gear	**Type of craft**	**Targeted fish variety**
Troll line	IDAY	Frigate tuna (*Alagoduwa*),& Kawakawa (*Atawalla*)
Large meshed gill net	IMUL/IDAY	Yellowfin tuna (*Kelawalla*), Skipjack tuna (*Balaya*) & Bill fishes
Tuna longline	IMUL/IDAY	Yellowfin tuna (*Kelawalla*), Bigeye tuna (*Kenda*) & Bill fishes
Surrounding net	IMUL	Indian scad (*Linna*)

Source:Maldeniya and Amarasooriya, 1998 and Field survey (2011 & 2012), Socio-economic Division, NARA

Fuel consumption of the offshore/deep sea fishery

The fuel cost of offshore and deep sea fishing operations depends on the length of the craft, the horse power of the engine and the trip duration. In addition, use of net and line haulers (winches) increase the fuel consumption of multi-day boats. The cost of fuel, ice, food and bait are the main components of the operational cost of offshore/deep sea fishery. The trip duration is the most influential factor on the fuel cost; the longer the trip undertaken, the higher is the fuel cost and vice versa. Amarasinghe (2001) found that, when the price of a litre of diesel was LKR 27.50, the fuel cost of a multi-day boat was 20% of the total operational cost. In a later study, Amaralal (2011) found that the fuel cost accounted for 40% of the total operational cost, when the diesel price had increased to LKR 73 per litre. Currently the price of a litre of diesel is LKR 115 and the fuel cost accounts for 65% of the total operational cost. These values clearly show the direct relationship between fuel price and the operational cost in offshore/deep sea fishing.

Table 6. Average fuel cost of multi-day craft according to boat length and trip duration

Boat Length (m)	**Average per trip**			**Total cost of fuel**		Increase in fuel cost/trip (LKR)
	Duration (days)	Fuel usage (Litre)	Fuel usage/day (Litre)	Prior to increase prices (LKR)	After increase in prices (LKR)	
9-11	14	1,220	87	102,480	140,300	37,820
12-13	23	2,075	90	174,300	238,625	64,325
14-15	33	3,110	94	261,240	357,650	96,410
Total average	**23**	**2,135**	**91**	**179,340**	**245,525**	**66,185**

Source: Field survey (2011 & 2012), Socio-economic Division, NARA

The trip duration of the multi-day fishery and fuel consumption per boat trip are given in Table 6. On an average, 91 liters of diesel are consumed by a multi-day boat per day. Due to the increase in diesel price, the fuel cost has increased from LKR 37,820 to LKR 96,410 per trip, depending on the craft length category and the average trip duration. It is evident that the increase in diesel price has had a very strong impact on the operational cost of the multiday fishery.

The calculated BEC in multiday fisheries is shown in Table 7. It can be seen that, on an average, multiday crafts of length categories 9-11 m, 12-13 m and 14 - 15 m needed to increase their catch by 37%, 37% and 27%, respectively, just to cover up the additional cost of fuel.

Table 7. Break Even Catch (BEC) of multi-day boats

Boat length (m)	Avg. trip duration (days)	Prior to price increase		After price increase	
		Total cost of fuel (LKR)	BEC (kg)	Total cost of fuel (LKR)	BEC (kg)
09-11	14	102,480	342	140,300	468
12-13	23	174,300	581	238,625	795
14-15	33	261,240	870	357,650	1,192
Total average	**23**	**179,340**	**597**	**245,525**	**818**

Source: Field survey (2011 & 2012), Socio-economic Division, NARA

Barriers to improving the BEC

The increase in BEC has resulted in a decrease in the income of both owners and crews from the fishing operation. The average catch per craft per day in the coastal fishery in 2012 was estimated to be 22 kg (MFARD, 2012). Since the BEC for coastal fishery had increased to 23 kg per day with the increase in fuel prices, it is clear that coastal fishers are unable to even cover up the fuel cost of a fishing operation. The increasing number of operating fishing craft in the coastal fishery had already affected the catch per craft. The increase in fuel prices worsened the situation by increasing the BEC beyond what the coastal fishers can catch.

The catch per craft per day in the multi-day fishery was in the range of 65-96 kg depending on the craft length. The 9 to 11 m and 12 - 13 m boats needed to catch 33 and 36 kg, respectively, per day to cover up the cost of fuel. The adverse impact of fuel price increases was greater for the 9-11 m than for the 13 to 15 m multiday boat (MFARD, 2012). In addition to fuel, the cost of ice, food and bait has also to be covered. Due to high fuel cost, the fishers are reluctant to travel to distant and international waters. An efficient fishing ground forecasting service together with improved fish handling and storage facilities and efficient marketing systems can help to reduce the BEC and improve income of fishers.

Conclusions

The increases in diesel and kerosene price have adversely affected the operations of all types of motorized fishing crafts engaged in coastal and offshore/deep sea fisheries. Estimations of BEC show that fishers need to catch more fish to cover up their operational cost of fishing. Furthermore, such increases are difficult as historical data has shown a declining trend of catch per craft per year for both coastal as well as offshore deep sea fisheries. The decline of catch per craft per year in coastal fishery was higher than that of offshore and deep sea fishery. Coastal fishers, therefore, are more vulnerable to the effects of a fuel price increase compared to offshore/ deep sea fishers. The multi-day fishers, however, use the more expensive diesel as fuel for their fishing operation; the fuel cost now accounts for about 65% of their operational cost of fishing and has increased from the 40% prevalent prior to recent fuel price increase. This group of fishers also needs to be considered, therefore, for some kind of fuel price relief to enable them to continue their fishing operations beyond the BEC.

Recommendations

- Additional cost incurred for fuel after price increase should be used as the base for calculating subsidies.
- A large number people are supported by coastal fishery, which use kerosene as an operational input. Considering the intensity of fishing operations, and contribution to the national fish production, priority should be given to those fishing units using the small meshed gill net. Therefore, it is recommended to grant a higher subsidy to such fishing units than those engaged in offshore/deep sea fisheries.
- The mechanism of disbursement of a fuel subsidy should be worked out in consultation with all relevant stakeholders and experts in the industry.
- Suitable policy measures to address barriers to achieve BEC should be formulated and implemented as a sustainable solution to meet the operational cost of fishing by increasing the overall efficiency of fishing operations.

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