A comparative study on the effectiveness of gillnet and longline fishing methods used by multi-day fishermen in Matara fisheries district

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Introduction

The fisheries sector of Sri Lanka is a primary source of animal protein production. According to the high rate of population growth in Sri Lanka, fish food demand is increasing. To fulfill this increasing demand, there should be an effective fishing method for high rate of exploitation and exploited resources should be high quality and high value for the better utilization. In the late 1980s, Sri Lankan state introduced multiday offshore fishing vessels for the development of Sri Lankan offshore fisheries (Kariyawasam, 2010). The gillnet fishery and the longline fishery is the common fishing methods used in the deep sea fishing in Sri Lanka. According to the DFAR statistics in 2013, Matara fisheries district is one of the districts which provide high fish production to the nation. The gillnet fishery is most commonly used fishing method in multiday boats fishermen in Matara fisheries district and they do not engage in longline fishery very much. The identification of the suitable fishing methods is important to increase production level, quality of the production and income of the multiday fishermen. Therefore the present study is focused on comparison of the effectiveness of gillnet fishing and longline fishing methods as a deep sea fishing method used by multiday fishermen in Matara district.

Materials and Methodology

The data were collected from multiday fishing boats in "Dondra" fisheries harbor from 1st of May to 14th of June 2014. The sample size was determined by "Moving average method" and the total landings and fishing methods of 66 multiday boats were collected accordingly. Catch and effort data, income of the fishermen and quality of the landing were collected using prepared data sheets. The catch and effort data collection sheet was consisted of data regarding the duration of the fishing, the fishing techniques (gear) used in the trip, total catch per day, the species composition of the catch in number and/ or weight, gear information (length of net, mesh size, number of hooks per long line, soaking time,) vessel information (storage facilities, hauling technique, length of boats). The income data collection sheet was consisted of species composition, total weight of each fish species and price of the fish in particular day. Organoleptic survey has been done in order to determine the quality of the fish yield of each boat. According to the organoleptic evaluation, nature of the fish skin, nature of the gill, eye appearance and consistency of flesh were evaluated. The quality of the fish has been evaluated by scoring them according to the level of quality. Then mean of the score of the quality parameter was calculated to determine quality of the harvest in each multi-day boat. The collected data have been analyzed by using "Microsoft excel-2010" and compared with "One-way ANOVA table" by using "Minitab 16" software.

Results and Discussion

According to the study, there were 3 types of main fishing methods which were used by multi-day fishermen in Matara fisheries district. They are, gillnet, longline and combination of gillnet and longline fishing methods. There were 39.4% multiday fishing boats which used only gill net, 22.7% multiday fishing boats which used only long line and 37.8% fishing boats which used a combination of gillnet and long line. Mainly tuna and tuna like species were targeted in the study. The total catches of the different fishing gears were taken as weight of harvest per boat day. According to the results, the mean catch per boat day of the gill net, long line and combination of the longline and gill net were 133.7 kg, 94.2 kg, and 165.1 kg respectively. Therefore the multiday boats which used combination of gillnet and longline fishing method gained significantly higher yield than that of gillnet and longline fishing methods. The lower mean catch per boat day was gained by the longline fishing method.

When considering main fish species which were caught by each fishing gear, the mean catches per boat day of Skipjack tuna (*Katsuwonus pelamis*) were 62.11 kg, and 64.76 kg respectively for gill net, and combination of the gill net and longline. In Matara fisheries district there were no multiday fishermen who used longline fishing method to catch skipjack tuna. The mean catches per boat day for yellow fin tuna (*Thunnus albacares*) were 7.05 kg, 79.39 kg and 70.56 kg respectively for gillnet, longline and combination of gillnet and long line. Similarly the mean catches per boat day of frigate tuna (*Auxis thazard)* were 12.29 kg, and 70.56 kg in gillnet, and combination of gillnet and longline respectively. There was no frigate tuna catch in long line fishery. According to this result, mainly long line fishing gear was used to harvest yellow fin tuna. The skipjack tuna and frigate tuna were harvested by using gillnet fishing method.

When considering income of the multiday fishermen, the mean of the total income of multi-day fishermen who harvested fish using gill net, longline and combination of gillnet and longline is Rs 300,577.00, Rs 1,251,567.00 and Rs 1,068,474.00, respectively. The highest income was gained by the multi-day fishermen who used longline fishing method and the lowest income was gained by fishermen who used gillnet fishing method, among the three fishing methods.

According to the organoleptic survey data, the quality of the fish in gill net, long line and combination of gill net and long line fishing methods were 1.99 □ 0.41,2.32 □ 0.31 and 2.04 □ 0.39,respectively. The quality of the fish was high in fish which were harvested by longline and quality was low in fish which were harvested by gillnet.

In the ANOVA test, there was not significant different between gear categories and the total catch per boat day ($P>0.05$). But, there was a significant different between gear categories and catch per boat day of tuna and tuna like species ($P<0.05$). Similarly, there were significant differences between gear categories and income of the fishermen and also gear categories and quality of fish ($P<0.05$). According to these result, it shows gear categories are not significantly affect on the total catches per boat day but it significantly affect for the catches of tuna and tuna like species, income of the fishermen and quality of fish.

According to the above results, the gillnet fishing method has recorded, high catch, low income and low quality fish and long line fishing method has recorded low catch, high income and high quality fish while combination of gillnet and long line fishing method has recorded high catch, medium income and medium quality fish.

But the ANOVA result showed total catch per boat day was not significantly affected by fishing gear categories. Therefore, though they have similar amount of fish harvest, multi-day boat fishermen who used longline fishing method has had high income and high quality fish than other two types of fishing methods. The analysis of catch composition of tuna and tuna like species showed that long

line fishing method is much more species selective fishing gear than other two types of fishing methods. It is used to catch only target fish species which having high commercial value. And also, the amount of fish discarded by the longline is less than that of gillnet due to harvest of high quality fish in longline fishing method. The reason is that the fish remain alive for much longer period when hooked than when gilled (Santos*et al.*, 2002). Because of that reason, the quality of the fish that harvested by longline is higher than gillnet fishing method. Because of their high quality, the value of the fish increases and fishermen obtained higher income with the longline fishing method.

Conclusion

When considering all these aspects, it can be suggested that the longline fishing method is an effective fishing method for multi-day fishermen in deep sea fishing at Matara fisheries district comparatively. And the longline fishing method can be used to harvest other targeted fish species by changing bait types and hook size.

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