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A quantitative analysis of fishery industry in modelling of production, trade dynamics, and COVID-19 impact estimation

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Sri Lanka, being an island, is granted an immense maritime boundary. The fishery industry is a prominent and significant part of the Sri Lankan economy, contributing around 1.5% of the Gross Domestic Product. The objectives of this research are to identify the factors affecting fish production, analyse the Net Trade Balance (cost difference between import and export of fishery products) in the fishery industry, and estimate the impact of COVID-19 on fish production. The monthly data from 2015 to 2022 is taken from the Statistics unit of the Ministry of Fisheries, Sri Lanka. This data is analysed, and the findings revealed that fish production in the country had decreased significantly over time, and thereby, it has impacted the import quantities as well. Further, almost 80% of the total fish production of the country is contributed by marine fish production and 20% by inland fish production. The variations in fish production are largely caused by the inland fish harvest; that is marine fish production has monotone dynamics. Concerning the seasonal pattern, less production is visible during May and June due to the monsoon. However, a clear upward trend in the inland fish harvest is visible during this time due to the renewal of freshwater. According to a recent survey in the Indian Ocean, the decrement in the fish population and habitats contributed to the lower harvest of fish production. Further, it has been identified the factors of fuel prices, fishing gear costs, ice cube prices, and unauthorized fish catch by foreign fishermen, as the other affecting factors in fish production. Concerning fisheries export, Tuna fish and prawns play a vital role in the export market. Despite the marine resources, Sri Lanka still imports fisheries products by spending foreign remittances. The Net Trade Balance (NTB) of fisheries products in Sri Lanka is investigated in this research and modelled by multiple linear regression models (net trade balance as the response variable, and harvest of 10 fish types as independent variables, based on significance) for pre and post, COVID-19 pandemic conditions. Further, the models can accurately predict the NTB (Pre-COVID model $R^2 = 72.4\%$, post-COVID model $R^2 = 80.6\%$). This model can be used in policy and strategy analysis by respective authorities such as the Ministry of Fisheries, Sri Lanka. Using the time series methods (Moving Average, Exponential Smoothing, and SARIMA), fish production is analysed. Combining these models, the impact of the COVID-19 pandemic on fish production from February to August 2020 is estimated at 15.81%. In conclusion, this research identified the fish production patterns, COVID-19's impact on production, and a model to estimate NTB, which also can be an analytical tool for the policymaking of the fisheries industry.

Keywords: Export, Import, Inland, Marine, Regression Analysis