

## A Statistical summarization of fish import to India

India is the third largest producer of capture fisheries and second largest producer of aquaculture fisheries in the world contributing 6.3% of global fish production. Fish production has increased from 41.57 lakh tonnes (24.47 lakh tonnes for marine and 17.10 lakh tonnes for inland fisheries) in 1991-92 to 107.90 lakh tonnes (35.8 lakh tonnes for marine and 72.10 lakh tonnes for inland fisheries) in 2015-16. The fisheries sector contributes to 1.1% of the GDP and 5.15% of the agricultural GDP. In 2015-16, India also has exported 945892.00 tonnes of fisheries products worth Rs.30420.83 crore which is about 0.9% of the National Gross Domestic Products (GDP) and 5.17% to the agriculture GDP (Annual Report 2016-17, DAHDF, Govt. of India). At present, the aquaculture production has witnessed an increasing trend compared to marine production (Joshyet *al.*, 2017). At the same time, India is also importing fish from different parts of the world to meet the requirements of consumers and industry. In 1993, the import of fresh and chill stored fish was 74.386 tonnes, which increased to 3797.146 tonnes in 2016. The respective trade value was Rs. 32.41lakhs in1993 and Rs. 76.69crores in 2016. India has imported 0.382 tonnes of frozen fish worth Rs.1.945 lakhs in 1993 and the same was increased to 11213.68 tonnes worth Rs.74.604 crores in 2016. During this period, the quantity of fish imported has undergone structural changes. Therefore, an attempt was made to summarize the time series data on fish import during the period 1993 to 2016. The secondary fish import data on fresh and chill stored fish and frozen fish were collected in tonnes from the database <https://comtrade.un.org/data/> (A trade Statistics compiled and maintained by Department of Economic and Social Affairs, United Nations, Rome).

The changes in trend of quantity of fish imported during 1993 to 2016 are depicted in Figure 1. and corresponding trade value is given in Figure 2. The quantity of imported fresh and chill stored fish showed an increasing trend up to1998 and then decreasing trend for the next five years up to 2003. From this point, it again showed an increasing trend for almost one decade up to 2012, and then again a decreasing trend. The trade value of imported fish also showed the same trend during this period. The quantity of imported frozen fish showed mild increasing trend up to 2009 except in 2005 where 1827 tonnes of frozen fish was imported. The time series data then showed an exponential trend with 11213.68 tonnes of frozen fish in 2016. The trade value of frozen fish imported also showed an exponential trend during the period 1993-2016.

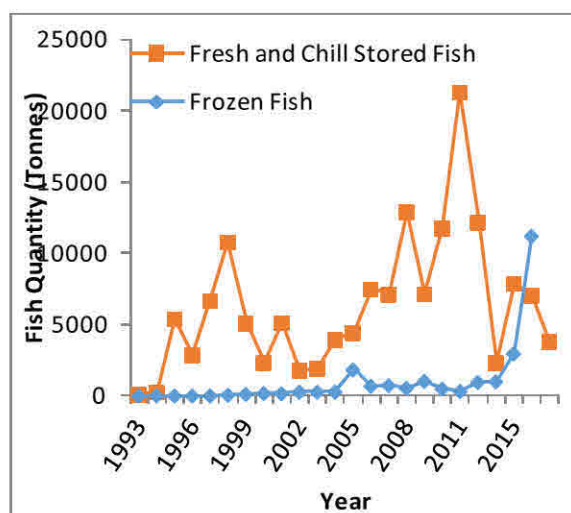
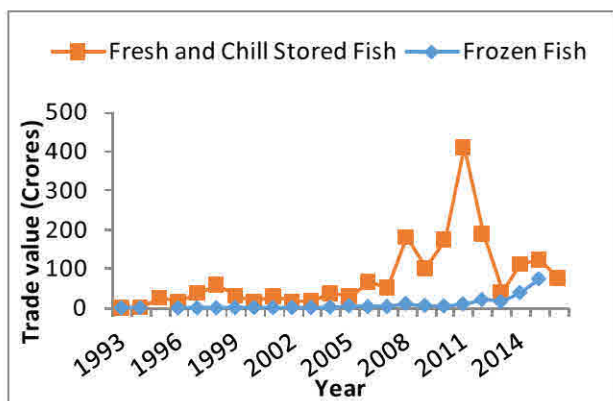


Fig. 1. Trend of imported fish quantity

**Table 1. Future predicted values of fish import**

Year	Fresh and chill stored fish		Frozen fish	
	Lower 95% Confidence limit	Upper 95% Confidence limit	Lower 95% Confidence limit	Upper 95% Confidence limit
2017	1136	16672	17381	11311
2018	1572	19420	18670	9154
2019	1465	19452	19585	9215
2020	1837	19832	20757	10131
2021	2107	20103	22194	11488
2022	2405	20401	23840	13109
2023	2695	20692	25649	14911
2024	2988	20984	27591	16850
2025	3280	21276	29647	18906



**Fig. 2. Trend of trade value of imported fish**

Time series analysis of available fish import data on fresh and chill stored fish and frozen fish was carried to see the possible trend and forecasting of fish import. Linear trend model with auto regressive moving average model (ARMA-1,1) was fitted to the time series data (Montgomery *et al.*,

2008) on fresh and chill stored fish. The root mean square error of resultant model was 3644 and the same was used to predict the future values of import of fresh and chill stored fish. Quadratic trend model with auto regressive moving average model (ARMA-1,1) was fitted to the time series data (Montgomery *et al.*, 2008) on frozen fish with less root mean square error value of 1398. This fitted model was then used to predict the future values of import of frozen fish. The 95 % lower and upper confidence limit for forecasted values of fish import to India is given in Table 1.

Based on the predicted values, the quantity of fresh and chill stored fish import to India is continue to produce a non-decreasing trend for fresh and chill stored fish, whereas, the quantity of frozen fish import to India is continue to produce exponential trend.

**References**

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