IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Market Concentration And Diversification Of The Seafood Export Of Kerala In The WTO Phases

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Abstract

Post WTO period witnesses several changes in the field of international trade in commodities, but the change in seafood exporting sector is peculiarly different. This is because of the participation of developed economies for importing the seafood and developing countries are major exporting ones. Therefore, the hegemony of the developed economies in WTO and Codex committees in seafood trade have made bigger impact in trade with several stipulations on seafood trade. This resulted in market diversification and market concentration by most of developing countries. Sometimes it is beneficial and every so often hindering the trade. In this respect, Kerala's trade in seafood is to be evaluated and juxtaposed in a wider ramification. Kerala faced cases of rejection of seafood exports with the explanation that the products do not follow the technical standards prescribed by export markets, which consummates into severe trade distortion in the sector. To capture this, a modelling framework suitable to the seafood trade data of Kerala is the time series model of Arima both additive and multiplicative and other types judged on the basis of an expert modeller. Estimation of the various fitted time series model, as per its suitability in the two periods of the WTO phases illustrate that the marine products exported from Kerala to major markets viz. the USA, EU, Japan, SEA and China clearly show that the traditional markets still constitute as a major importer of Kerala's seafood. There is a change from traditional to new markets in some cases, whereas the US and EU still dominate as major importers of the seafood from Kerala.

Key Words: Market concentration, Market diversification, Time Series, Arima Models, WTO Phases, Seafood Trade.

1. Introduction

The change in the trade regime from GATT to WTO seemed to be favourable for the fisheries trade initially, but the reality is different from the anticipation of the developing fishery exporting countries. WTO stipulations in this respect like the quality assurance standards, SPS, TBT and NTBs may or may not be beneficial to the global trade of fisheries. However, it seems more beneficial to the importing developed economies as they have the hegemony in the standards and Codex committees. The fishery exporting countries simply to follow the standards lest they will lose the markets. Though the TBT hinders the trade of the developing countries, sometimes it my help to promote trade in comparison to the tariff and non-tariff barriers in the pre-WTO period. Nonetheless, TBT can be considered as a restrictive trade practice by the importing countries in the pretext that the products are unsafe and also not meeting the standards. In this respect India-Kerala trade in seafood is to be evaluated and juxtaposed in a wider ramification. India-Kerala faced cases of rejection of seafood exports with the explanation that the products do not follow the technical standards prescribed by export markets, which in consummates into severe trade distortion in the sector. Moreover, the technical stipulations are not unique in the sense that some countries may even fix their own standards so as to restrict trade from the developing countries, depending on the local marine production and even demand for the imported seafoods. There are several cases of such stipulations in the fishery trade history.

In the ambit of this, it is worthwhile to examine the market concentration and market diversification of Kerala's seafood exports trade in the post-WTO period. Several exporting countries acted promptly to overcome the stipulation of the importing countries to mitigate this impasse in the form of technical upgradation of the processing firms in the form of financial help and technical advice. Though this helped to lessen the peril in a certain extent, the tiny exporting firms found difficulty in complying these standards and participating in the seafood trade. The end result is the form of lessoning the market share in the major market and concentrating more to the non-traditional market. Several favourable factors like increasing income and the positive change in the income elasticity of demand of the people in the importing countries *inter alia* globalisation triggered changes in the fishing sector have also helped the exporters.

2. Theoretical Framework and Methodology

The theoretical framework *per se* in the time series modelling in fishery trade is mostly connected with demand framework of the importers and its time-lag, GDP and relative import prices (Fair, 2004). Bronnmann et. al. (2020) analyse the integration of the local market with the global markets by using the local fish markets of Katima Mulilo, Namibia and the Zambezi River in Zambia with the help of market data. This is evaluated with two hypotheses, firstly that the local market is integrated with the global and second is to test price changes generate any positive terms of trade. To test this, they use time series and hedonic models, and on the basis of this it is identified that the market is significantly connected to the global market and this is inferred with the price as it shows that fish traders receive good prices for their product, which retreats further that there is an increase in the global

fish trade. Parvathy and Rajasenan (2012) posit the problems of marine products export from Kerala in the traditional markets of EU and US, but it is imperative to focus on non-traditional markets. Market analysis and forecast based on time series model explains that ASEAN trade agreement could be focussed for a liberalised Trade in Goods Agreement (TIGA) and hence market is be evaluated by giving a preferential treatments and concessions.

The data for the study is amassed from the Marine Product Export Development Authority (MPEDA) database. Time series analysis is used to evaluate the marine product exports from Kerala during the post-WTO phase. To assess this quarterly data from 1996-2020 is used. A comparison is made for two phases, based on data amplitude, after the WTO formation i.e., 1996-2008 and 2009-2020 using time series model. These are done for the major markets viz. Japan, US, EU, China and SEA. The volatility associated with marine products export it is necessary to identify this in modelling framework. Having analyzed different types od time series model in this regard, Expert Modeler is used in the analysis to identify the best fitting model based on the value of marine products exported from Kerala to these markets during the two phases of the post-WTO regime.

3. Results and discussions

3.1 Market-wise evaluation of marine products exports from Kerala using time series analysis

3.1.1 Marine products exports from Kerala to the EU

Though there has been a decline in the percentage share, the EU markets are still the major importers of Kerala's seafood and most of the earnings of the export processing units come from the EU countries. Even though the value of exports reached highest in percentage share during the end of the first phase, the second phase witnessed a gradual decline.

The time series analysis for the value of exports from Kerala to EU markets during the post-WTO phase 1 indicates that Winter's Additive as a suitable model as a suitable one, which is the best fit for model without trend and with seasonal effect and independent of the level of the series. The model statistics in Table 1 (a) have Stationary R-squared of 0.583 and R-squared 0.848. The Ljung-Box statistic value is 18.336 with a significance of 0.245. This confirms model adequacy. Model parameters are presented in Table 2 (a). It is evident from the results that the estimate for the level and trend are statistically insignificant whereas the estimates for seasons are significant. This shows that the value of marine products exports from Kerala to the EU during the first phase of post-WTO regime are influenced by seasonal effects but independent of level and trend. Figure 1 depicts the residual Autocorrelated Coefficient Function (ACF) and Partial Autocorrelated Function (PACF) which have crossed the defined limits in some cases. Figure 2 shows the value of marine products exports to the EU from Kerala during the first phase. The seasonal effect is evident from the results.

In the second phase of exports of marine products to EU from Kerala, Simple Seasonal model is appropriate as the time series has seasonal effect which is constant over time without trend. Model statistics [Table 1 (b)] have a stationary R-squared of 0.249 and R-squared of 0.812. Ljung-Box Q value is 21.500 with significance level of 0.160. Table 2 (b) shows smoothing parameter estimates which are connected both to the level and season. Here, the level value is statistically significant whereas the season value is insignificant. The ACF and PACF (Figure 3) are mostly within the defined limits.

Figure 4 shows the results of the value of exports of marine products from Kerala to the EU during the second post-WTO phase, which clearly shows seasonal effect and lack of trend. Forecast is done using exponential smoothing method. The forecast results implies that the earnings of marine product exports from Kerala to the EU are higher in some quarters.

Table 1 (a) Model Statistics for the post-WTO Phase 1 for EU

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
EUv-Model_1 (Winters' Additive)	0	.583	.848	18.336	15	.245	0

Table 1 (b) Model Statistics for the post-WTO Phase 2 for EU

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
EUv-Model_1 (Simple Seasonal)	0	.249	.812	21.500	16	.160	0

Table 2 (a) Exponential Smoothing Model Parameters for the post-WTO Phase 1 for EU

Model			Estimate	SE	T	Sig.
EUv-Model_1	No Transformation	Alpha (Level)	8.331E-5	.083	.001	.999
		Gamma (Trend)	.001	25.723	3.888E-5	1.000
		Delta (Season)	.300	.112	2.685	.010

Table 2 (b) Exponential Smoothing Model Parameters for the post-WTO Phase 2 for EU

Model			Estimate	SE	T	Sig.
EUv-Model_1	No Transformation	Alpha (Level)	.600	.135	4.440	.000
		Delta (Season)	1.247E-5	.076	.000	1.000

Figure 1 Residual ACF and Residual PACF for the post-WTO Phase 1 for EU

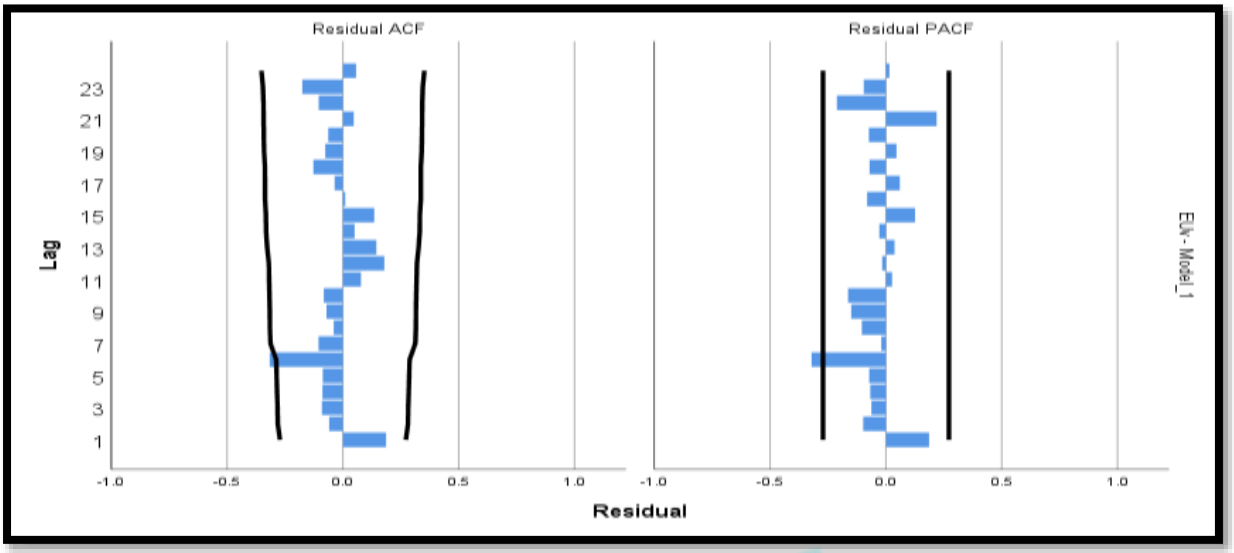


Figure 2 Export of marine products from Kerala to the EU during the post-WTO Phase 1

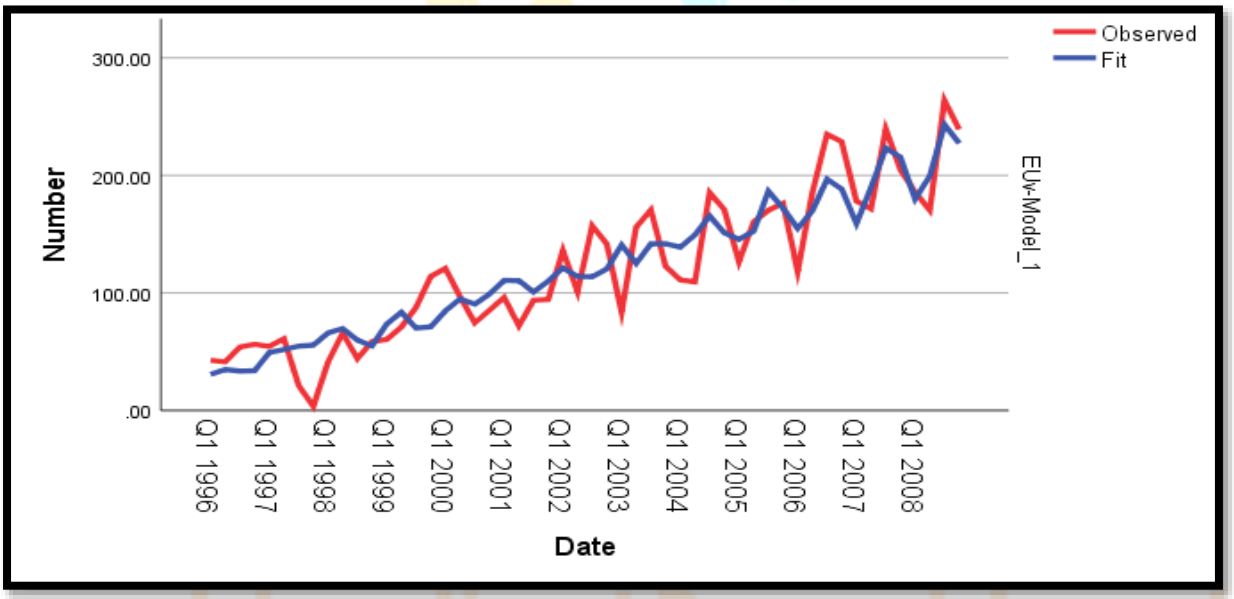


Figure 3 Residual ACF and Residual PACF for the post-WTO Phase 2 for EU

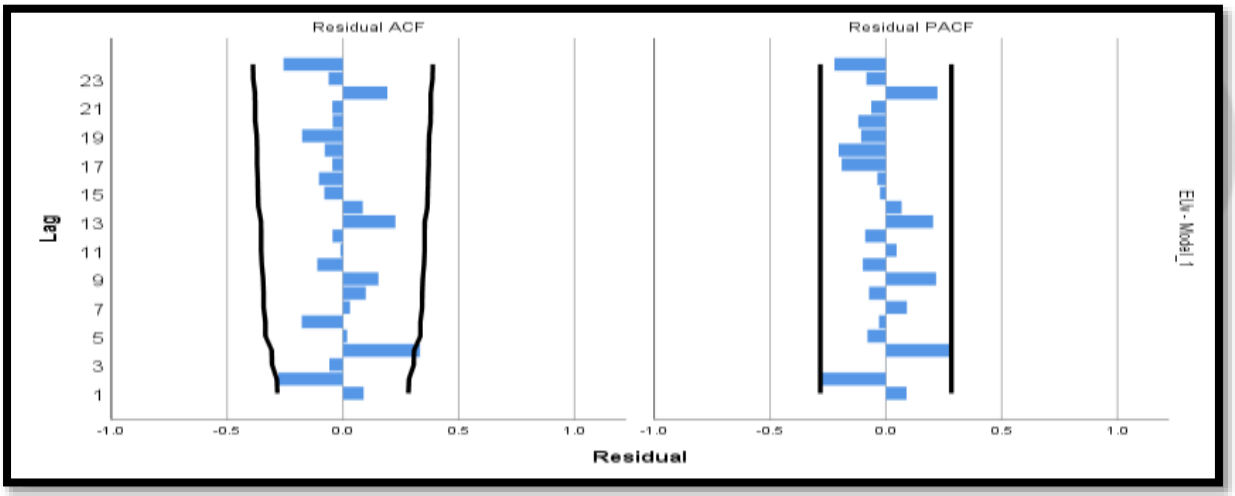
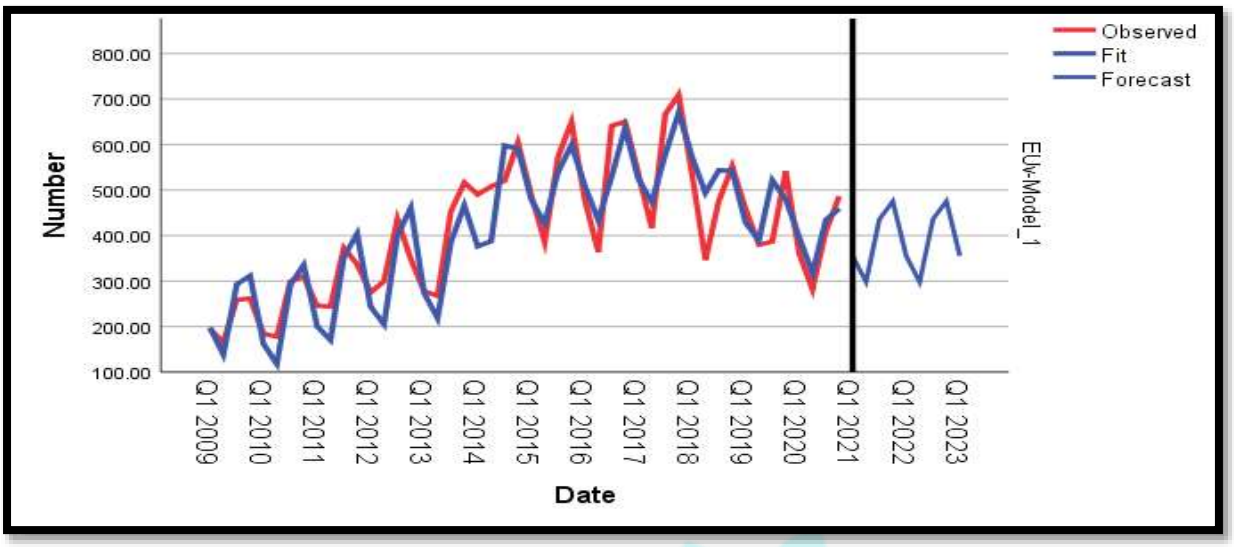


Figure 4 Export of marine products from Kerala to the EU during the post-WTO Phase 2



A comparison of two phases of post-WTO for the EU markets shows that the earnings from the exports to the EU from Kerala have come down. But, identified trend is not visible in the second phase. There might be several responsible factors and, in this sense, stricter regulations imposed on the exporters is one of the reasons. Another hurdle in this regard is the entry of Vietnam into the EU markets as the costs are lower owing to the trade agreement which came into force during 2019. However, the EU still dominates to be a major importer of Kerala's seafood and forecasts, in this respect, show that EU markets will continue to be a major market for the Kerala's export despite the stringent barriers imposed on technical and quality grounds.

While evaluating the first phase of WTO formation, the period of 1997-98 experienced a sharp fall in marine products exports to the EU markets due to the introduction of various non-tariff barriers including the TBT and ban on marine products exports from the country to the EU markets with non-compliance of stipulations. Subsequently, the ban was revoked after inspection was carried out in the export processing units of Kerala and India during the same period. The exports to the EU markets have recovered after the first phase. Seasonality variable shows an increase in exports during this phase. The total exports from Kerala to EU markets have been increasing year-to-year during the second phase apart from seasonality factors. 2018-19 witnessed a fall in the total export's year-wise to the EU. The testing requirements for seafood export consignments from India to EU were hiked from 10 percent to 50 percent leading to delay at importing ports. This has been kept at 10 percent for exporters from other countries. This facilitated higher demurrage cost resulting in Increased price of Indian shrimp. Overall barriers imposed by the EU have more or less increased at the same rate during the period. However, a sudden tightening of existing stipulations has an impact on the seafood exports to the EU. Preferential treatment given to Vietnam exporters due to trade agreement between EU and Vietnam has also further accelerated to the fall. The outbreak of Covid-19 has further contributed to a downward movement in the export earnings. After 2018, a fall has clearly been visible in the export of marine products from Kerala to the EU markets.

3.1.2 Marine products exports from Kerala to the US

In terms of value, US is the second major market of seafood exporters from Kerala as per the 2020-21 data. For Phase 1, ARIMA (1,0,0) (0,0,0) is identified as the best fitting model. Here, the series is stationary and autocorrelated. Model statistics are shown in Table 3 (a) (stationary R-squared of 0.234 and R-squared of 0.275). The significant value for Ljung-Box Q is 0.796 with statistics of 12.070. Table 4 (a) shows the ARIMA model parameters. Estimates for constant and AR are statistically significant. Residual ACF and PACF are within the defined limits which is evident from Figure 5. Figure 6 shows the value of marine product exports from Kerala to the US during the phase 1 of post-WTO period. It is inferred that auto regressive forces and lagged values (lag 1) influence the exports of seafood from Kerala to the US during the initial phase of WTO. The first phase after the WTO witnessed a fall in terms of share of value of seafood exported from Kerala to the US out of the total seafood exports from the state on an annual basis. Imposing of trade barriers like anti-dumping duties, bioterrorism act, stringent SPS regulations are quite often cited as important reasons.

The Phase 2 for the US witnessed a recovery in percentage share and during the end of second phase, the US reached to the second place in terms of value of marine products exported from Kerala. In the second post-WTO phase, Winter's Additive model is found suitable as it is the best fit for the model without linear trend and has seasonal effect devoid of the level of the series. Model statistics are depicted in Table 3 (b). The Ljung-Box shows statistics of 14.426 not significant at level 0.493. Stationary R-squared values are 0.576 and 0.913, respectively. Table 4 (b) shows the smoothing parameters, which are connected to the level, trend and season.

The residual ACF and residual PACF are shown in Figure 7 and in some cases, values have exceeded the defined limits. Figure 8 shows the export data of marine products from Kerala to the US and its forecast during the second phase Forecast shows seasonal effect as both the actual and forecast move in the same pattern. The forecast data show that peak production months during the peak production quarters generate high export earnings.

Table 3 (a) Model Statistics for the post-WTO Phase 1 for US

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
USv-Model_1 [ARIMA (1,0,0) (0,0,0)]	0	.234	.275	12.070	17	.796	0

Table 3 (b) Model Statistics for the post-WTO Phase 2 for US

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
USv-Model_1 (Winters' Additive)	0	.576	.913	14.426	15	.493	0

Table 4 (a) ARIMA Model Parameters for the post-WTO Phase 1 for US

					Estimate	SE	t	Sig.
USv-Model_2	USv	Natural Logarithm	Constant		3.702	.069	53.863	.000
			AR	Lag 1	.480	.123	3.893	.000

Table 4 (b) Exponential Smoothing Model Parameters for the post-WTO Phase 2 for US

Model			Estimate	SE	T	Sig.
USv-Model_1	No Transformation	Alpha (Level)	.499	.132	3.777	.000
		Gamma (Trend)	1.994E-6	.070	2.868E-5	1.000
		Delta (Season)	2.586E-5	.125	.000	1.000

Figure 5 Residual ACF and Residual PACF for the post-WTO Phase 1 for US

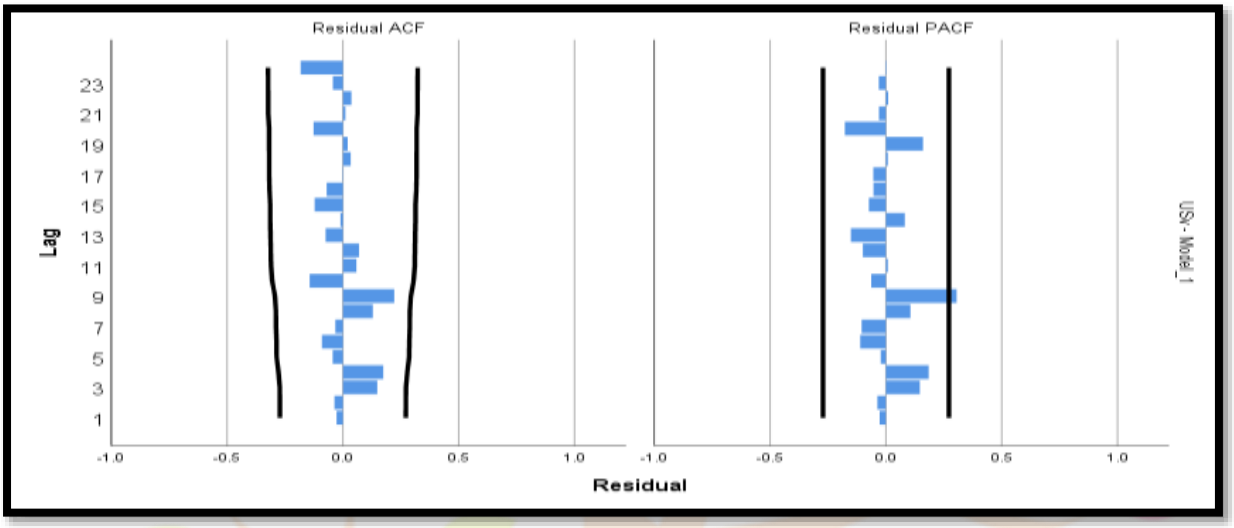


Figure 6 Export of marine products from Kerala to the US during the post-WTO Phase 1

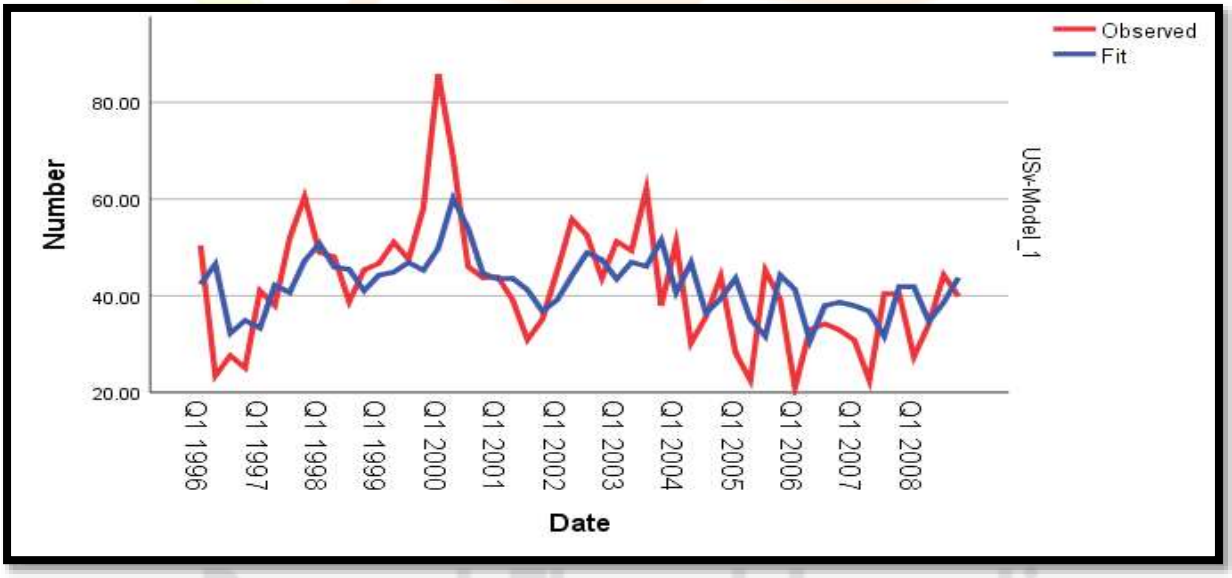


Figure 7 Residual ACF and Residual PACF for the post-WTO Phase 2 for US

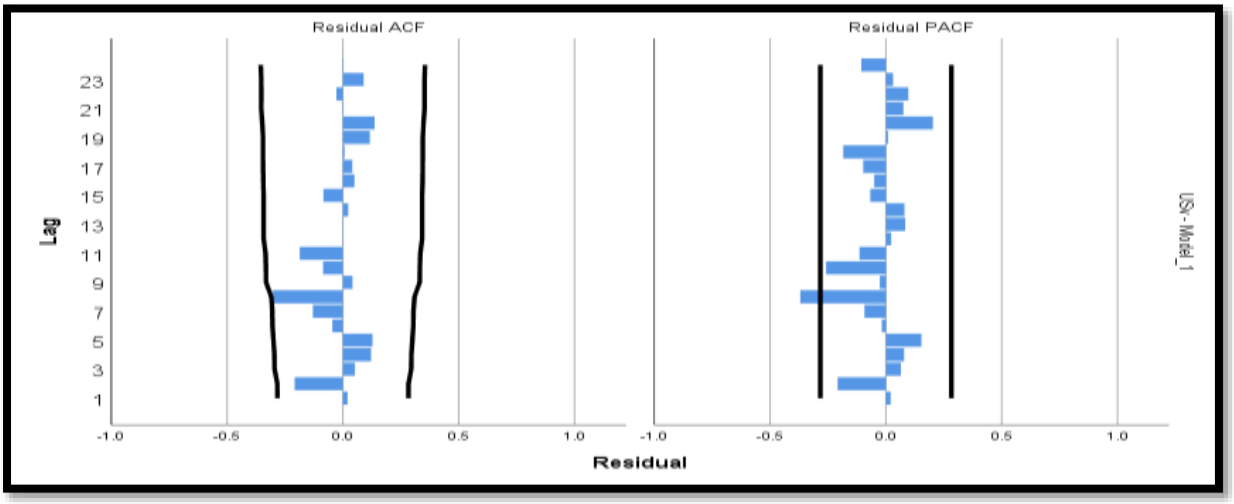
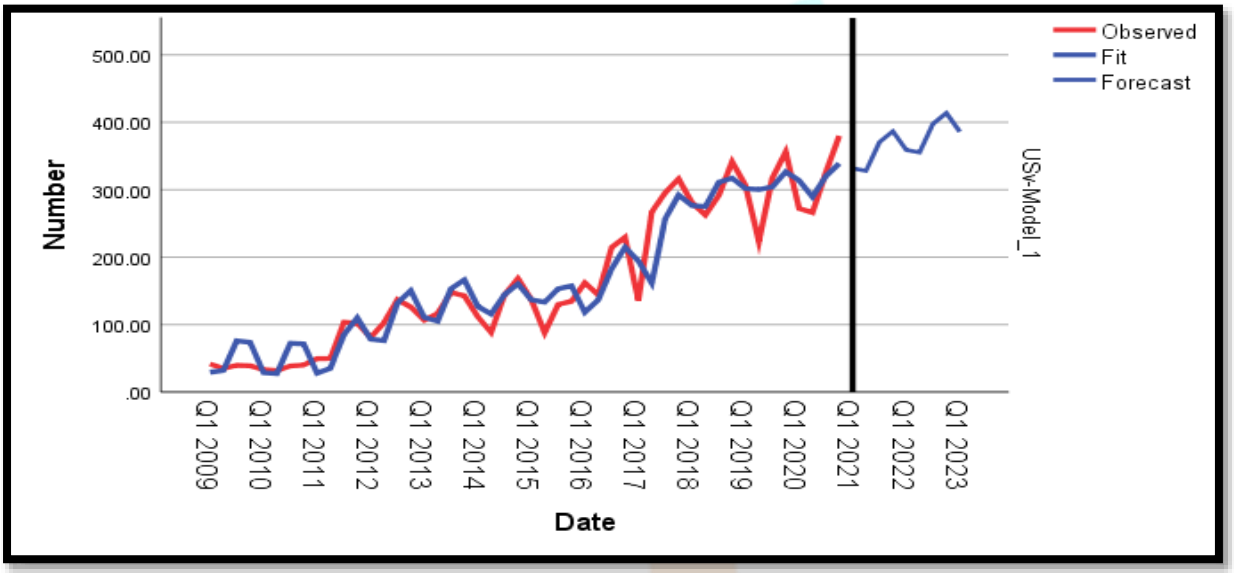


Figure 8 Export of marine products from Kerala to the US during the post-WTO Phase 2



The marine products exports to the US have been increasing since the WTO formation especially during the second post-WTO phase. After 2005-06, a fall is seen due to the imposition of stringent trade barriers and specific stipulations (anti-dumping duty on shrimp and US Bioterrorism Act) which came into force in 2000s. After 2010, the stipulations and duties have been relaxed which resulted in a spike in seafood exports in the second phase. The marine product exports from Kerala to the US during the post-WTO phase are impacted by several factors and in this result, it could be anti-dumping duties on shrimp, bonding requirements, labelling to indicate the country of origin, Bio-terrorism Act etc. In the background of these indirect barriers, the Indian consignments are rejected by the US causing huge financial burden to the export processing units in the state. The processing units in the state are responded forthwith by introducing technical know-how by the already well positioned firms and others have reorientation to less stringent markets.

3.1.3 Marine products exports from Kerala to Japan

Along with the EU and US markets, Japan was yet another long standing and prominent market for the Kerala's marine products export during the pre-WTO period. During the post-WTO phase, the share of Japan has come down. In fact, both in quantity and value terms Japan has the lowest CAGR in export of fishery products from Kerala. The model generated for the post-WTO phase 1 is Simple Seasonal, which indicates the seasonal component is constant over time without any trend. Table 5 (a) shows the model statistics. The Ljung-Box shows statistics of 20.512 not significant at level 0.198 which confirms model adequacy. Stationary R-Squared and R-squared values are 0.498 and 0.353, respectively. Level and season are the smoothing parameters [Table 6 (a)]. It is evident from the results that level is statistically significant whereas season is insignificant. This shows that the reduction in export to Japan in the first phase of post-WTO regime is not conditioned by seasonal effects but by level of the series. The residual ACF and residual PACF are shown in Figure 9 and values are within the defined limits indicating adequacy of the model. Figure 10 shows the export data of marine products from Kerala to Japan during the first phase.

Simple Seasonal model is the best fit for evaluating the marine products exports from Kerala to Japan during the second phase of post-WTO regime due to the constant nature of seasonal component without any trend. Table 5 (b) shows the model statistics. Stationary R-square and R-square are 0.511 and 0.583. Ljung-Box Q statistics is 24.731 with a p value of 0.075. As per the exponential smoothing model parameters [Table 6 (b)], the level is significant whereas trend is insignificant. Hence, it is retreated that there is no effect of seasonal component on the exports of marine products from Kerala to Japan during the second phase of WTO regime, whereas level of the series has an impact on the same.

Figure 11 shows the residual ACF and PACF results which are within the adequate limits. The results of value of marine products exported from Kerala to Japan during phase 2 of post-WTO regime are shown in Figure 12. Data and the model analysis based on this show that the exports to Japan are coming down. Issues relating to certification are discouraging the exporters from Kerala to ship the products to the Japanese markets. This will be further assessed based on the reduction in exports to the Japanese markets and how far it is reoriented to the SEA and Chinese markets to make levelling up process.

Table 5 (a) Model Statistics for the post-WTO Phase 1 for Japan

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
JapanV-Model_1 (Simple Seasonal)	0	.498	.353	20.512	16	.198	0

Table 5 (b) Model Statistics for the post-WTO Phase 2 for Japan

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
JapanV-Model_1 (Simple Seasonal)	0	.511	.583	24.731	16	.075	0

Table 6 (a) Exponential Smoothing Model Parameters for the post-WTO Phase 1 for Japan

Model			Estimate	SE	t	Sig.
JapanV-Model_1	No Transformation	Alpha (Level)	.500	.125	4.011	.000
		Delta (Season)	4.965E-5	.192	.000	1.000

Table 6 (b) Exponential Smoothing Model Parameters for the post-WTO Phase 2 for Japan

Model			Estimate	SE	t	Sig.
JapanV-Model_1	No Transformation	Alpha (Level)	.399	.124	3.223	.002
		Delta (Season)	4.529E-5	.083	.001	1.000

Figure 9 Residual ACF and Residual PACF for the post-WTO Phase 1 for Japan

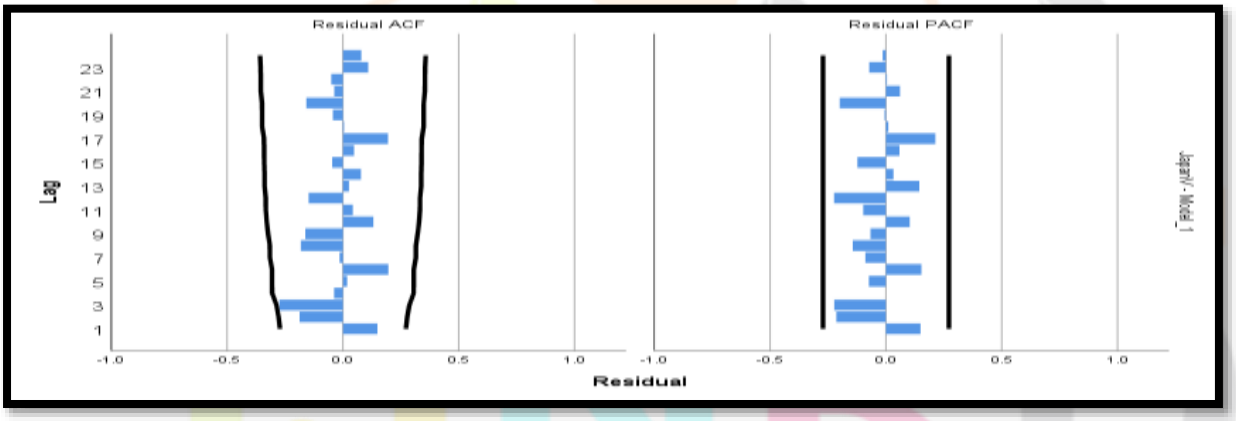


Figure 10 Export of marine products from Kerala to Japan during the post-WTO Phase 1

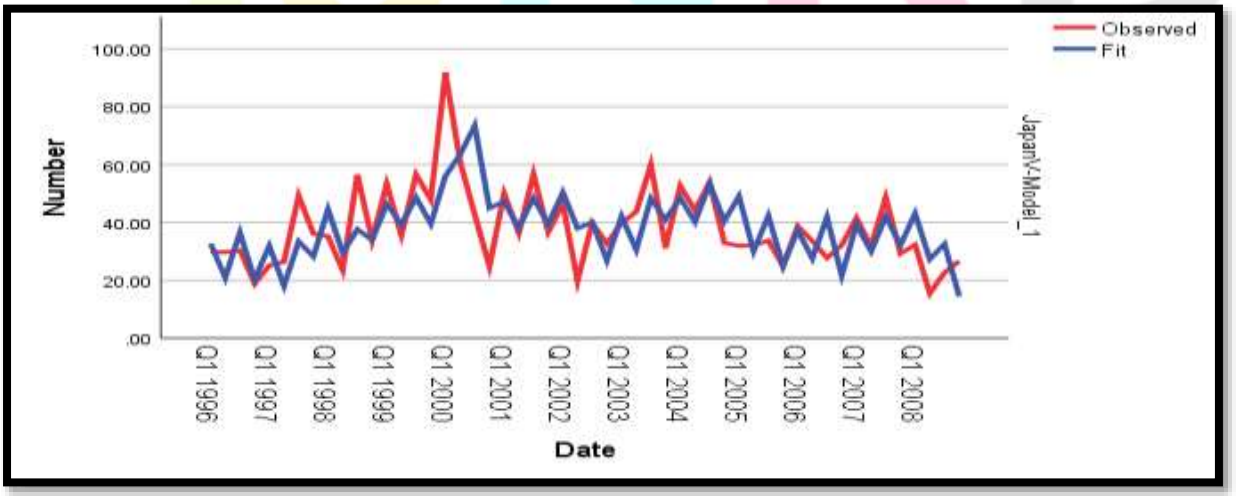


Figure 11 Residual ACF and Residual PACF for the post-WTO Phase 2 for Japan

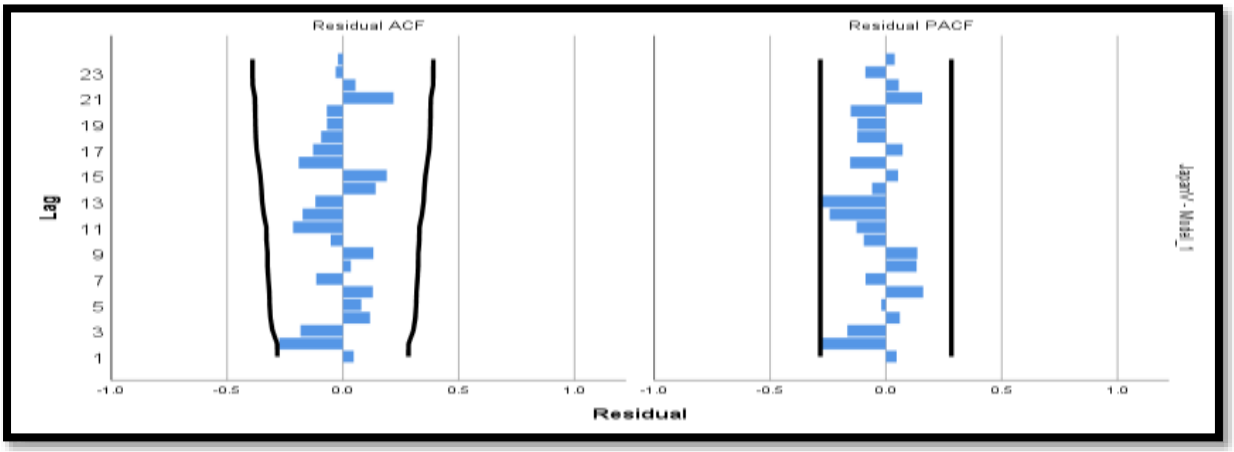
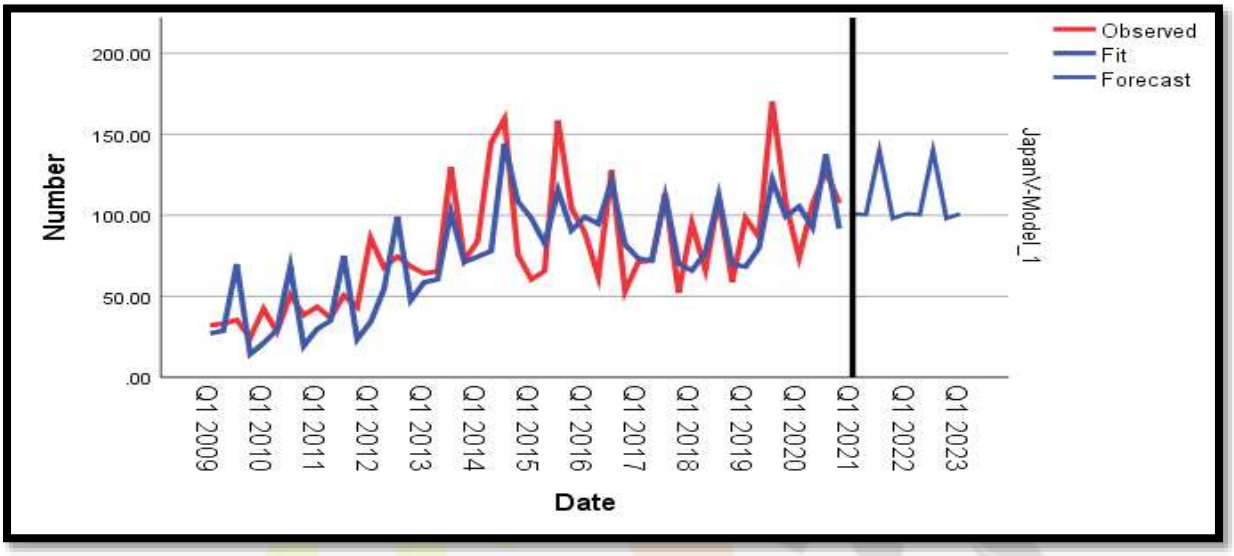


Figure 12 Export of marine products from Kerala to Japan during the post-WTO Phase 2



The marine product exports from Kerala to Japan have been falling since the early 2000s showing oscillations year-to-year. No specific upward trend is seen in the exports during the first phase. The quality standards imposed by the Japanese markets are very less compared to the other importers. However, certification requirements are very strict in Japan *inter alia* high competition from other countries.

3.1.4 Marine products exports from Kerala to SEA

Though the exports to the traditional markets like Japan have shown a decline in the post-WTO phase, the share of emerging markets of SEA like Vietnam are on an increase compared to the pre-WTO phase, before this period these markets were insignificant. The percentage share of SEA in terms of value of seafood exported from Kerala has increased significantly and SEA is the third largest importer of Kerala's seafood in value terms during 2020-21.

During the first phase of post-WTO regime, ARIMA (0,0,0) (0,1,1) is the best explained model for evaluating the value of marine products exports from Kerala to SEA. As Ljung-Box Q [Table 7 (a)] is insignificant with a statistic of 16.929, model adequacy is confirmed. 0.339 is the stationary R-squared and 0.610 is the R-squared value generated. The model has one seasonal difference and an MA component which is seasonal [Table 8 (a)]. Hence, it could be inferred that the value of marine product

exports from Kerala to SEA during phase 1 is not independent of current and lagged values of seasonal random shocks. The estimates of MA seasonal component are 0.739 which is significant. The model adequacy is evident from the residual ACF and PACF results shown in Figure 13. Figure 14 shows the export of marine products from Kerala to SEA during phase 1.

The second phase of post-WTO regime in SEA is best explained by simple seasonal model, which exhibits without any trend but with a constant seasonal effect over a period of time. An insignificant Ljung-Box Q with a model statistic of 16.089 confirms the adequacy of the mode [Table 7 (b)]. Level and season are the smoothing parameters for the model, estimates of which are shown in Table 8 (b). Season estimates are statistically insignificant, whereas the estimates of level are significant. The residual ACF and PACF results shown in Figure 15 shows that the values are within the defined limit and hence the model is adequate. And hence the value of marine products exports to SEA during the second phase are not influenced by seasonal components but by level or mean quantity. Figure 16 shows the export of marine products from Kerala to SEA during phase 2.

Table 7 (a) Model Statistics for the post-WTO Phase 1 for SEA

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
SEAv-Model_1 [ARIMA (0,0,0) (0,1,1)]	0	.339	.610	16.929	17	.459	0

Table 7 (b) Model Statistics for the post-WTO Phase 2 for SEA

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
SEAv-Model_1 (Simple Seasonal)	0	.333	.759	16.089	16	.447	0

Table 8 (a) ARIMA Model Parameters for the post-WTO Phase 1 for SEA

					Estimate	SE	T	Sig.
SEAv-Model_1	SEAv	Natural Logarithm	Constant		.098	.025	3.978	.000
			Seasonal Difference		1			
			MA, Seasonal	Lag 1	.739	.129	5.709	.000

Table 8 (b) Exponential Smoothing Model Parameters for the post-WTO Phase 2 for SEA

Model			Estimate	SE	T	Sig.
SEAv-Model_1	No Transformation	Alpha (Level)	.800	.149	5.358	.000
		Delta (Season)	2.512E-7	.175	1.432E-6	1.000

Figure 13 Residual ACF and Residual PACF for the post-WTO Phase 1 for SEA

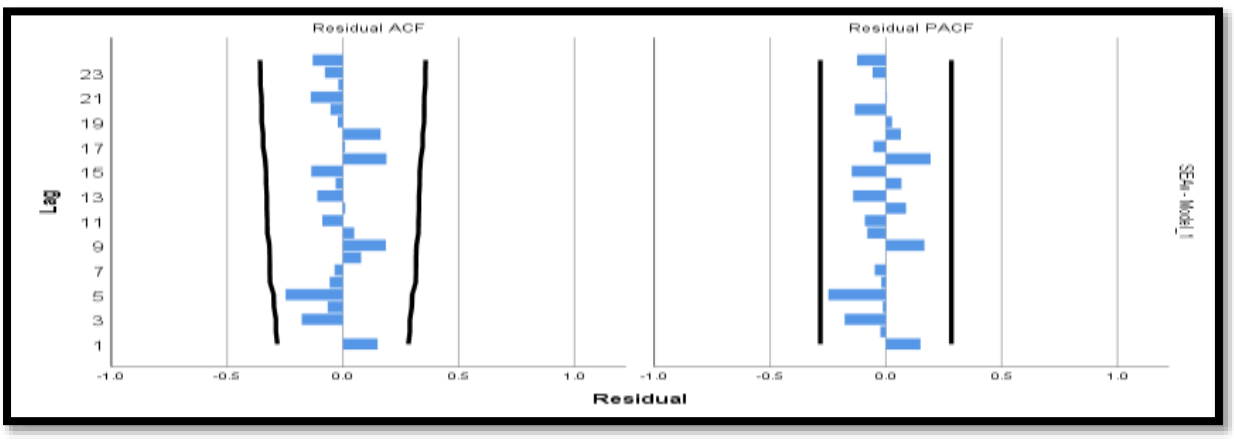


Figure 14 Export of marine products from Kerala to SEA during the post-WTO Phase 1

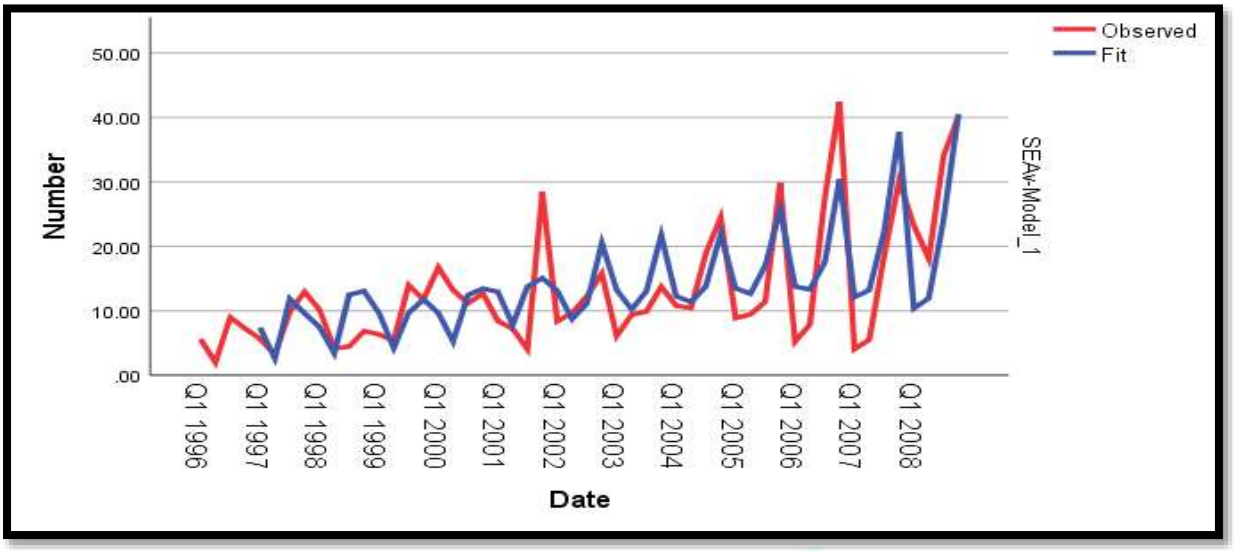


Figure 15 Residual ACF and Residual PACF for the post-WTO Phase 2 for SEA

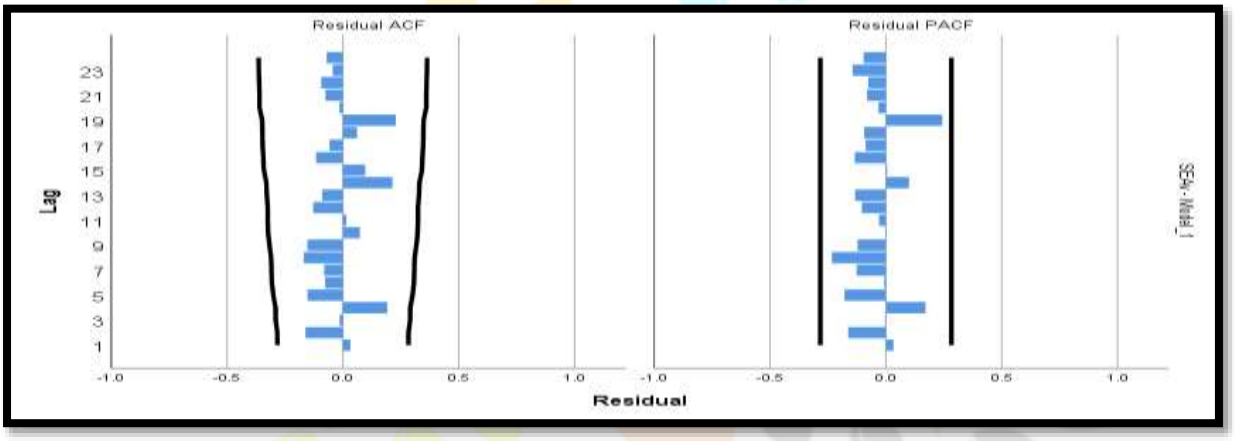
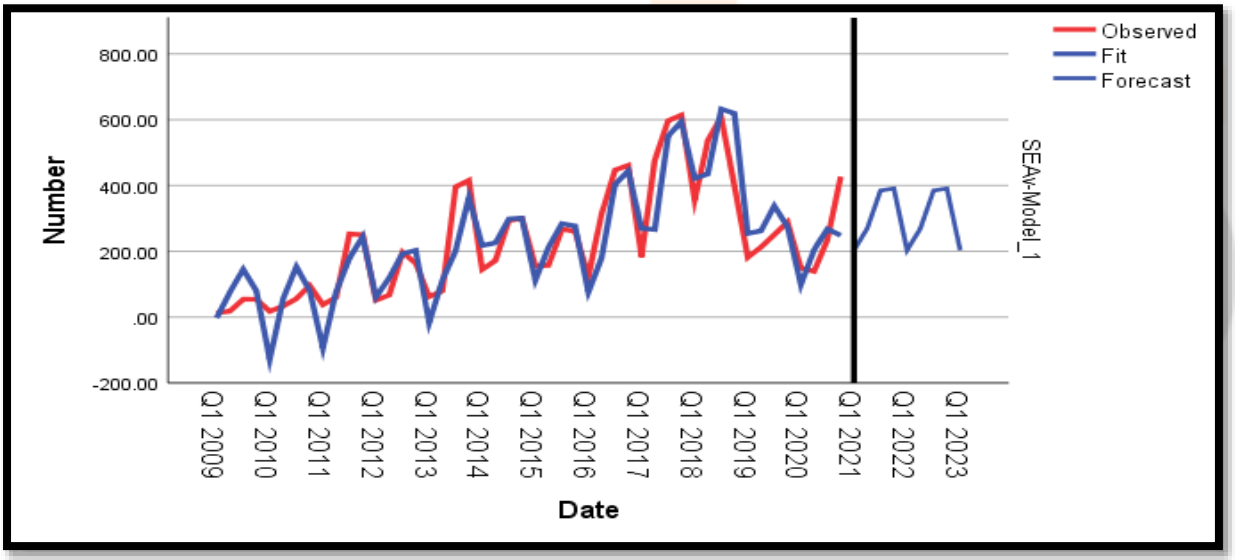


Figure 16 Export of marine products from Kerala to SEA during the post-WTO Phase 2



Ban on imports, strict stipulations, rejections etc. imposed by the traditional markets have resulted in diversion to the non-traditional markets like the South East Asian region. This is more visible during the period after 2011 i.e., during the post-WTO phase 2 which has shown a sharp increase in exports based on value. During 2011-12, the quantity of seafood exported from Kerala to SEA is close to that of the EU markets. But in value terms, EU is the leader. Countries like Vietnam have been importing seafood from Kerala and re-exporting to the EU and other traditional markets.

3.1.5 Marine products exports from Kerala to China

The market share of China in terms of value of seafood exported from Kerala has increased during the post-WTO phase. China is now one of the major importers of marine products from Kerala. The fish thus imported by China is reprocessed and exported resulting in value addition. Value addition in fishery products and exports is one of the objectives of MPEDA and hence India in general and Kerala in particular are making good efforts to penetrate the market for value added products abroad.

During the Phase 1 of post-WTO regime, the best fitted model obtained is Simple Seasonal. The model is best suited for series which are not exhibiting any trend but have seasonal effect which is constant over a period of time. The model statistics are depicted in Table 9 (a) which have generated a stationary R-squared of 0.520 and R-squared of 0.401. Ljung-Box Q statistics value is 36.961. Level and season are the smoothing parameters for the model [Table 10 (a)]. The results of the smoothing model parameters show that Alpha or level is significant, whereas Delta or season is statistically insignificant. Hence, one can conclude that the value of marine products exported from Kerala to China are independent of seasonal effects but influenced by mean value. Figure 17 shows that residual ACF and PACF have crossed the defined limits. Figure 18 depicts the value of marine products exported from Kerala to China during the post-WTO phase 1. Winters' Multiplicative model has emerged as the best fit model based on expert modeller for the second phase. This is suitable for series with linear trend and seasonal effect which depends on level of the series. Model statistics shown in Table 9 (b) are not statistically significant at it has a value of 0.680. stationary R-squared and R-squared values are 0.432 and 0.861. Table 10 (b) shows the Exponential Smoothing model parameters. For level, trend and season, the estimates obtained are 0.570, 0.585 and 0.100 and all three estimates are statistically significant. The results indicate that level, trend and season influence the value of marine products exported from Kerala to China during the second phase of post-WTO regime. Also, ACF and RACF are within the defined limit as per Figure 19. The results of value of marine products exported from Kerala to China and its forecast during the post-WTO phase 2 is illustrated in Figure 20. Along with seasonal effect on a quarterly basis, a sudden spike is seen, after which during 2020, the value of exports has come down. Forecast values also showed a fall. Overall, the prospects of China as a major importer of Kerala's seafood remain robust which is evident from the fact that level, trend and season have an effect on marine product exports from Kerala to China for the period after 2008.

During the second post-WTO phase, i.e., after 2010, export to China has shown an increase of the seafood from Kerala. The NTBs and TBT stipulations imposed by China have been the lowest. This has made it easy for the seafood exporters to export to the Chinese markets with basic processing and cleaning. The Chinese firms process further and re-export the value-added products to US and EU. The pandemic, the geopolitical situation, ban on Chinese product and the border tension prevailing with China and India has its own impact on the sea food trade with the sole protection of Covid-19 virus in

India's export consignments to China[1]. This will have more severe implications on the quantity and value of seafood exported from India to China. Since the Covid-19 pandemic, the barriers imposed by China are more stringent than any other importers of seafood across the globe, which has been creating disappointment to the seafood exporters. As an alternative to this, seafood exporters from India are exploring the markets that have high demand for value added fishery products. This shows that the first and second phase of WTO formation witnessed a shift from traditional to newer markets like SEA and China, the threats from China owing to stringent stipulations as result of the new pandemic conundrum is forced Indian exporters to search for emerging markets for more value-added products for survival. At the firm level, value addition helps the exporters to earn higher price for their products. At the global level Chinese hegemony for value added products is reduced. The implications of these developments on the fisheries exports of India in terms of market diversification can be identified with a further temporal evaluation of the data.

Table 9 (a) Model Statistics for the post-WTO Phase 1 for China

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
ChinaV-Model_1 (Simple Seasonal)	0	.520	.401	36.961	16	.002	0

Table 9 (b) Model Statistics for the post-WTO Phase 2 for China

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
ChinaV-Model_1 (Winters' Multiplicative)	0	.432	.861	11.993	15	.680	0

Table 10 (a) Exponential Smoothing Model Parameters for the post-WTO Phase 1 for China

Model			Estimate	SE	T	Sig.
ChinaV-Model_1	No Transformation	Alpha (Level)	.600	.134	4.475	.000
		Delta (Season)	8.936E-5	.123	.001	.999

Table 10 (b) Exponential Smoothing Model Parameters for the post-WTO Phase 2 for China

Model			Estimate	SE	T	Sig.
ChinaV-Model_1	No Transformation	Alpha (Level)	.570	.078	7.265	.000
		Gamma (Trend)	.585	.173	3.378	.002
		Delta (Season)	.100	.019	5.295	.000

[1] https://m.economictimes.com/news/economy/foreign-trade/india-china-shrimp-row-all-set-to-turn-political/articleshow/84904089.cms

Figure 17 Residual ACF and Residual PACF for the post-WTO Phase 1 for China

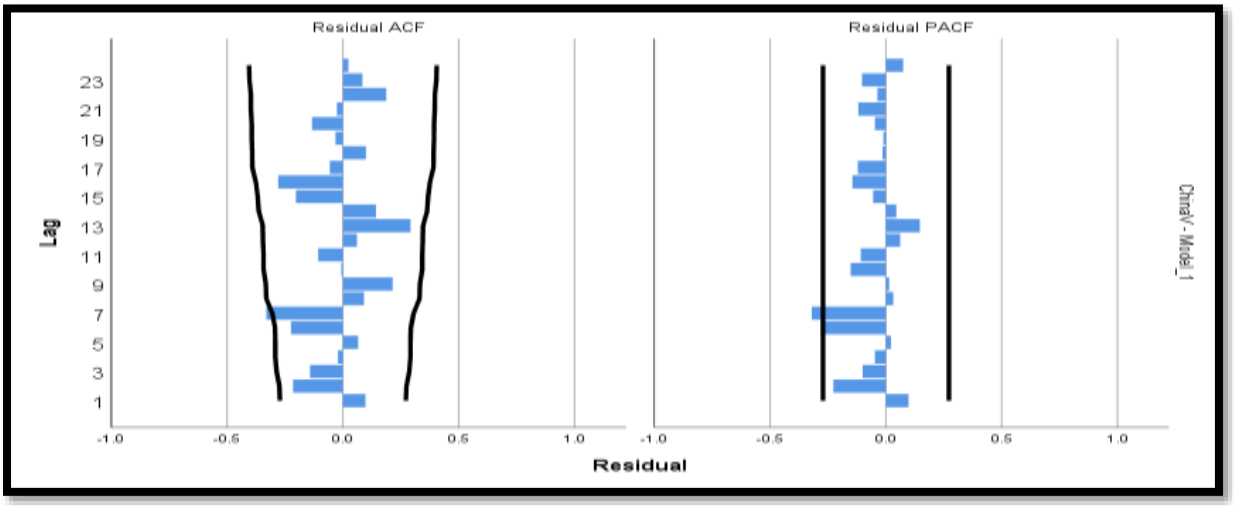


Figure 18 Export of marine products from Kerala to China during the post-WTO Phase 1

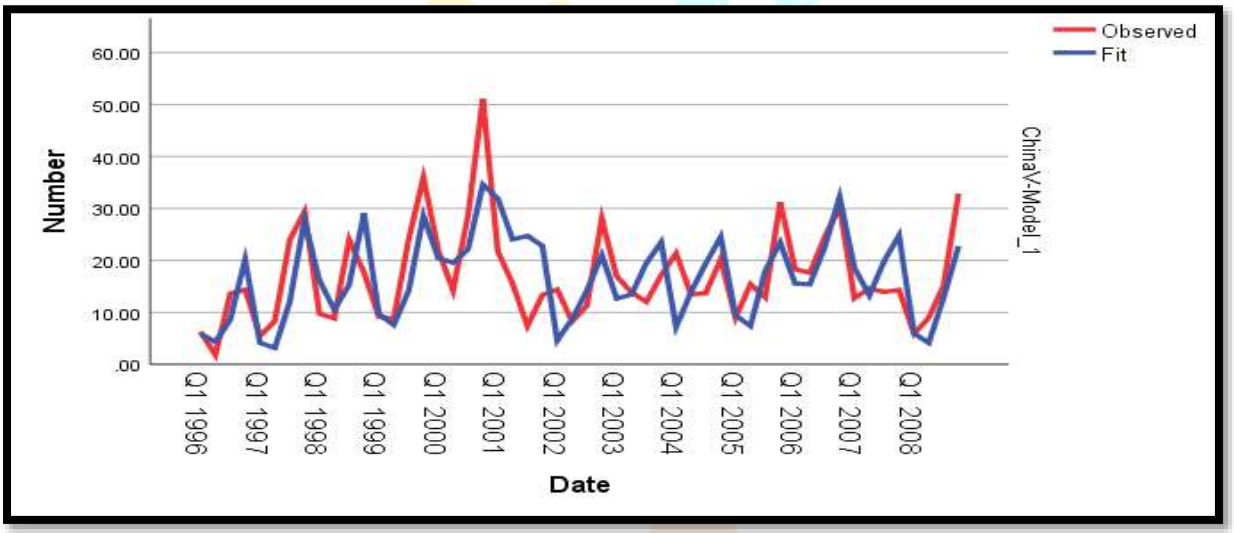


Figure 19 Residual ACF and Residual PACF for the post-WTO Phase 2 for China

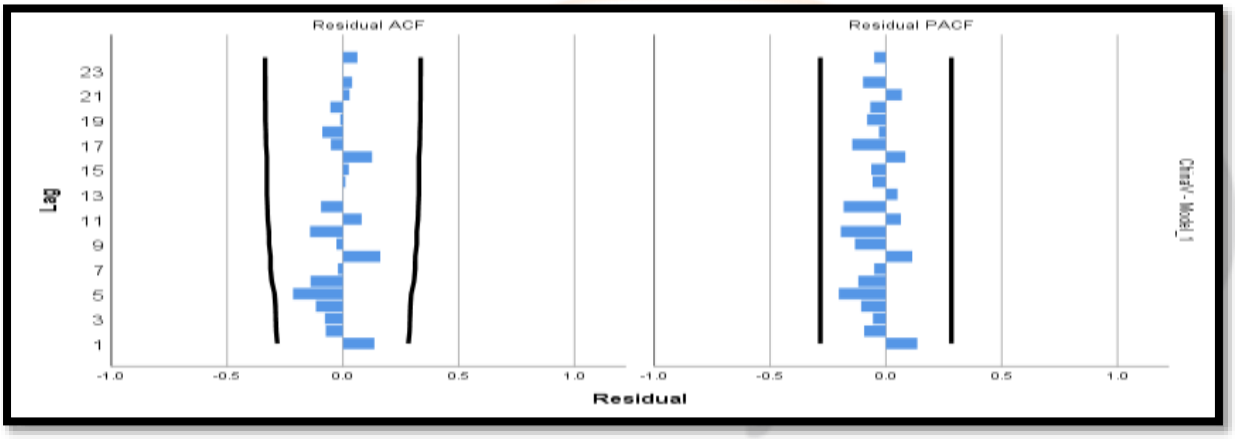
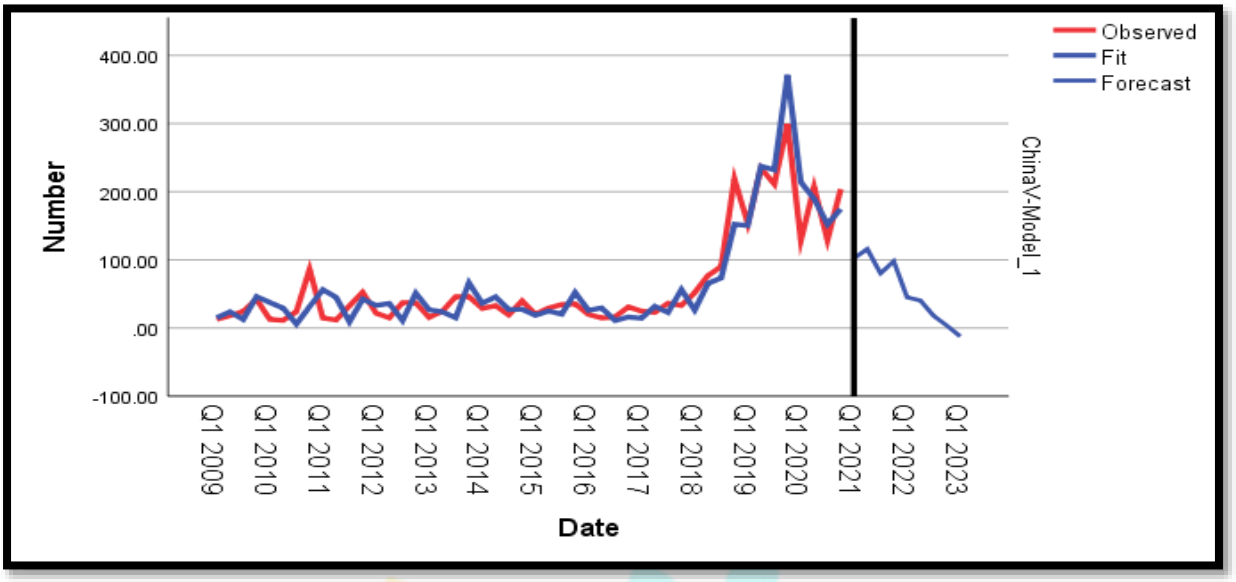


Figure 20 Export of marine products from Kerala to China during the post-WTO Phase 2



4. Conclusion

Though several models are used to explain the seafood trade and its oscillation to a market-to-market basis, time series Arima model and seasonality models well explain the situation. Estimation of the various fitted time series model as per its suitability in the two periods of the WTO phases exemplify that the marine products exported from Kerala to major markets viz. the USA, EU, Japan, SEA and China clearly show that the traditional markets still constitute as a major importer of Kerala's seafood, the new markets are also performing well and the exports are increasing. There is a change from traditional to new markets in some cases whereas the US and EU still dominate as major importers of the seafood from Kerala. The identification of newer markets is positive, one issue is that importers like China import the seafood from India and reprocess it and market it as their seafood in the global market. The paper gives a clear indication that seafood trade is meant for mutual benefit both for the importers and exporters. This seems to be the main agenda that the global trade is meant to gain from the trade and hence the GATT is replaced with WTO and several deliberations have been done to make the free flow of global seafood trade beneficial to the participating countries. However, the stipulations are less in the beginning in comparison to GAAT, soon newer stipulations have been introduced by most of the developed importing countries as these countries have more members in the WTO and Codex committees. These in the case of seafood are TBT, NTB, SPS and several interlinked stipulations. In the Case of Kerala Shrimp holds good market and demand, as it is mainly depending on the harvest sector. Nonetheless, the value earnings from Indian seafood export irrespective of regions or countries is mainly from shrimp, despite the anti-dumping duties on the part of the US and some of the EU countries.

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