INTRODUCTION
The dried fish industry in Sri Lanka operates as a cottage level industry (Koralagama and Bandara 2018; Piyasiri et al. 2018) yet plays an important role in the economy with multiple contributions including, a source of animal protein intake, enlarge employment opportunities, utilize idling labors-female in particular and reduce post-harvest losses (Patterson and Ranjith 2009). The popularity of dried fish among lower income deciles in Sri Lanka has been depicted (DCS 2016). Although dried fish was only second to the fresh fish consumption, as the main animal protein source until 2012, it was overtaken by chicken thereafter (DCS 2016). Dried fish consumption is depending on the household income (Koralagama et al. 2021; Lokuge 2018; DCS 2016), with a higher price

ASSESING SEASONAL PRICE BEHAVIOUR OF SELECTED DRIED FISH VARIETIES IN SRI LANKA

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Abstract
Dried fish plays an important role in the national economy in multiple ways including minimizing post-harvest losses of fish providing a source of animal protein, enlarging livelihoods, utilizing idling labor into the production process and as a dish, especially for rural poor. Dried fish prices have increased drastically from 2012 to 2019 compared to fish and chicken. Being the key determinant of demand, price is crucial on consumption, dried fish demand and industry performance: increasing prices, decrease the demand, which adversely effects on dried fish industry from 2012 pushing dried fish consumption to third place. Therefore, this study aims to assess the price behavior of selected dried fish varieties and appropriate price forecasting models that could be feed into policy formulation for reasonable prices and price variation during the year. A quantitative approach was adopted gathering national average price data from secondary sources such as Hector Kobbekaduwa Agrarian and Research Institute, Department of Census and Statistics and other relevant institute. Three dried fish varieties which are highly consumed by the populace were selected representing large pelagic-skipjack tuna (Katsuwonus pelamis) and double-spotted queenfish (Scomberoides lysan) and small pelagic- gold-striped sardinella (Sardinella gibbosa). Average monthly retail price data from January 2007 to December 2019 were considered to analysis. Seasonal price variation and price indices were calculated for the three varieties in terms of real market prices. Analysis revealed highest dried fish prices in June and July months, corresponding with south-west monsoon. In contrast, lower prices have been reported during the north-east monsoon for large pelagic, months of January and February. Gold-striped sardinella indicated the highest price index in middle month of the both monsoon seasons, Highest seasonal price indexes for large pelagic varieties are indicated during May-September following the south-west monsoon. The Real Market Price (RMP) of all three dried fish varieties demonstrated a fluctuating pattern with a slight increment throughout the year. The same fluctuating patterns are observed in relation to moving average price, seasonality impact removed price and seasonality around moving average price of each three varieties separately. However, prices of three varieties are strongly correlated ($r=0.941<$, $p=0.00$) with each other. The cubic price forecasting model is the best fit model of price forecasting for all the analyzed varieties. Besides, the Quadratic model can be used to predict the price of analyzed large pelagic varieties. The ARIMA analysis revealed that ARIMA (2,1,12) is the best fit model for price forecasting of skipjack tuna while ARIMA (0,1,0) for double spotted queen and gold stripped sardinella forecasting. Having a distinct seasonality impact on dried fish prices, the policies need to be focused on price stabilizing mechanisms to assure a certain and stable performances in the dried fish industry in Sri Lanka ensuring affordability to the majority in Sri Lanka.

Keywords: Dried fish, Real market price, Price index, Price forecasting models, Seasonality

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sensitivity (Koralagama et al. 2021). Thus, low income people tend to buy low price dried fish products from village fair and other rural dried fish markets whereas high income earners consumes expensive dried fish varieties with innovative and attractive packages under a specific brand name from hypermarkets (Faruque et al. 2012).

Production and consumption

Double-spotted queenfish (Scomberoides lysan), skipjack tuna (Katsuwonus pelamis), smooth-belly sardinella (Amblygaster clupeoides), seer fish (Scomberomorus commersoni), and giant catfish (Arlus thalassinus) are the main marine dried fish varieties produced in Sri Lanka (MFARD 2019; DCS 2016). Local production satisfies only 65% of the local demand thus, dried fish varieties such as sprats, skipjack tuna, smooth-belly sardinella and shark are being imported, which accounts for about 35% of the local demand (MFARD 2019). Consumption pattern of several dried fish varieties are different based on the type- small and large pelagic varieties (DCS 2016).

Accordingly, Skipjack tuna (113.15g), double-spotted queenfish (74.82g) and shark (84.19g) are the highest consuming large-pelagic varieties whereas sprats (487g), smooth-belly sardinella (76.41g), gold-striped sardinella (43.69g) and trenched sardinella (22.85g) are the highly consuming small pelagic varieties (DCS 2016). Despite the lower production, sprat is highly consumed by Sri Lankan hence the local demand is fulfilled by the imported sprats that accounts for 72.2%; approximately 23,232 Mt in 2006-2018 (MFARD 2019). The monthly expenditure on the highly consumed dried fish varieties are given in Table 1. Sprat importation has increased by 36% in 2018 compared to 1995. Other dried fish varieties have decreased by 70.3% (MFARD 2019). Skipjack tuna and double spotted queen fish are the highest and second highest expenditure dried fish varieties representing large pelagic group while smooth-belly sardinella is the third highest expenditure and consumed variety representing small pelagic group (DCS 2016). Selection of the three

Table 01: Monthly household expenditure of the mostly consumed dried fish varieties (Rs.)

| Dried fish varieties | 2006 | 2009 | 2012 | 2016 |
|----------------------|------|------|------|------|
| **Small pelagic**    |      |      |      |      |
| Stolephorus sp. (sprats) | 127.14 | 184.62 | 246.96 | 296.04 |
| Amblygaster clupeoides (smooth-belly sardinella) | 23.78 | 27.49 | 51.22 | 50.37 |
| Sardinella gibbosa (gold-striped sardinella) | 9.07 | 13.01 | 17.79 | 18.04 |
| Amblygaster sirm (trenched sardinella) | 7.42 | 10.38 | 17.89 | 12.23 |
| **Large pelagic**   |      |      |      |      |
| Scomberoides lysan (double-spotted queenfish) | 29 | 49.89 | 66.46 | 75.43 |
| Katsuwonus pelamis (skipjack tuna) | 50.58 | 62.32 | 70.12 | 84.31 |
| Carcharhinus sp. (shark) | 26.25 | 47.77 | 58.3 | 75.42 |
| Carangoides fulvoguttatus (yellow-spotted trevally) | 3.1 | 3.02 | 3.92 | 4.22 |
| Arlus thalassinus (giant catfish) | 13.6 | 24.86 | 28.36 | 29.44 |
| Lates calcarifer (giant Sea Perch) | 0.42 | 0.78 | 1.72 | 1.07 |
| Scomberomorus commersoni (narrow-barred spanish mackerel) | 2.86 | 3.69 | 3.88 | 3.97 |

(Source: DCS 2016)

*Hereafter, this article uses the common names of the dried fish varieties instead of the scientific name*
varieties for the price analysis is based on this table and the data availability at the HARTI.

**Pricing and trading**

Despite the impact of the imported dried fish to the local production, the dried fish supply is seasonal following the seasonality in fisheries (Koralagama and Bandara 2018; Murray and Little 2000). Spotted sardinella (Amyblygaster sp), skipjack tuna, yellowfin tuna (Thunnus albacares), Spanish mackerel (Scombroromorus commersoni), and double spotted queenfish are comparatively lacking during the south-west monsoon (May-September) whereas rockfish (Lithinus sp.), white sardinella, spotted sardinella (Amyblygaster sp), anchovy (Anchoa commersoni) and bony flying fish (Hirundichthys coromandelensis) for the north-east monsoon (December-February) (Koralagama 2009; MFARD 2019). Prices of fresh fish, particularly skipjack tuna, double spotted queenfish and white sardinella are relatively high during the south-west monsoon season (MFARD 2019).

Prices of dried fish products are mainly depending on the availability of the products in the market places (Carlucci et al. 2015). Besides, dried fish prices are important to monitor industry development and market functions (Adenegan and Bolarinwa 2010). Prices have been identified as the sign of the relative scarcity or abundance of a given product; prices also serve as incentive to direct the allocation of economic resources and to a large extent they determine the structure and rate of economic growth (Aswathy and Abdussamad 2013). Information on prices is important to producers, traders and consumers to understand the market trend and better planning for policy decisions (Murray and Little 2000; Ravallion 1986). Despite the market prices follow the demand and supply theories, many scholars have researched on few other variables that influence on the pricing mechanism including the variety, market type, importation, seasonal variation of production, transport mode and quality are another paramount (Hirimutugoda et al. 2014; Hosseini et al. 2012; Shamsuddoha 2007).

Further, dried fish prices also vary based on the geographical area, marketing systems and the number of intermediaries and product availability (Hasan et al. 2016; Weerahewa and Kodithuwakku 2013). However, due to one or multiple factors, the dried fish prices have being increasing from 2012 pushing down the consumption to the third place from the animal protein sources. Increasing prices and declining demand affects the industry performance (Koralagama et al. 2021), affecting both processors (Koralagama and Bandara 2018) and rural consumers (DCS 2016), where both ends are marginalized. In this regard, price behavior analysis and forecasting is important on dried fish. Although the fresh fish market is fully backed by the local production, the dried fish demand is compensated by the imported dried fish varieties. However, dried fish prices are increasing (HARTI 2019; MFARD 2019).

Thus, this study explores the price behavior of the mostly consumed dried fish varieties by analyzing the impact of seasonality on the prices. Further, the study attempts to calculate a seasonality index to detect the percentage share of variation/fluctuation for better forecasting and prediction that would enable for price controlling mechanism in the future for efficient policy decisions. The next section of this paper briefs the methodology carried out in data collection and analysis, which is followed by the results and discussion zooming into seasonality variations and price indices. Finally the paper concludes by highlighting the price behavior of dried fish and pragmatic solutions for the variations.

**MATERIALS AND METHODS**

**Varieties and data sources**

Hector Kobbekaduwa Agrarian Research Institute (HARTI) maintains price data of eight dried fish varieties on giant catfish (Arlus thalassinus), skipjack tuna (Katsuwonus pelamis), double-spotted queenfish (Scomberoides lysan), giant sea perch (Lates calcarifer), sting ray (Dasyatis sp.), shark (Carcharhinus sp), gold-striped sardinella (Sardinella gibbosa), imported sprats (Stolephorus sp.) and narrow-barre Spanish mackerel (Scomberomorus commersoni). Out of these varieties, skipjack...
tuna, double-spotted queenfish and gold-striped sardinella were considered as the highly consumed dried fish varieties in Sri Lanka (DCS 2016) representing locally produce large pelagic and small pelagic varieties (see table 01). Weekly retail price data, particularly market price data for the period of 2007-2019 available at the Hector Kobbekaduwa Agrarian Research and Training Institute of Sri Lanka, which is the main research institute with a large data bank, were used as the main data source for the analysis.

Analytical procedure
Real Market Prices (RMP) were calculated for the generalization and to extract the absolute prices avoiding inflation by using Nominal Market Price (NMP). Colombo consumer price index, which uses 2006/2007 years as the base year (CCPI) (2006/2007 = 100) was considered. The CCPI gives the local government, businesses, citizens and idea about price changes in the Sri Lankan economy. Besides, the Colombo consumer price index is the widely used tool in adjusting for inflation and, by proxy, for the effectiveness of the Sri Lankan government’s economic policy (Alibuhtto and Peiris 2012; Sandika 2011). The calculation procedure of RMP is given in the following equation (i).

\[ RMP = \frac{NMP \times 100}{CCPI} \]  

(i)

Price is a value generated through the effect of four components namely trend, cyclical, seasonal, and random/irregular parts which are according to classical price multiplicative model as (Price = Trend x Cyclical x Seasonal x Random/Irregular components). In dried fish price variation and production, seasonality is one of the vital characteristics (Koralagama and Bandara 2018; Hirimutugoda et al. 2014). Therefore, the analysis focused on the seasonal components thereby removing other components (viz; trend, cyclical and random) from dried fish price series. This method is important as it enables to predict the future stock price movements based on recently available data.

Moreover, it is estimated the trend (T), cyclical (C), seasonal (S), and random (E), indices of the price series (Zhang 2013). See the below equation (ii)

\[ P = T \times C \times S \times E \]  

(ii)

Where; \( P \) = price, \( T \) = Trend component, \( C \) = Cyclical component, \( S \) = Seasonal component, \( E \) = Random component, \( T \) is expressed as a price per unit while \( C \), \( S \), and \( E \) are all indices, the linear trend is calculated as a simple linear regression of price against a time variable.

Trend regression was calculated as per the equation given below (iii). There, (a) constant and trend coefficient (b) were estimated to determine each trend

\[ T_i = a + bt_i \]  

(iii)

Where; \( T_i \) = trend value during the period I; \( a \) = the constant-coefficient as estimated by the regression analysis; \( b \) = the trend coefficient estimated by the regression; \( t_i \) = the value of the variable (dried fish price) during the period i.

Seasonal Index (SI) is the standard indicator of price comparison, which can be used to compare the movement of prices. It shows the average price variation of products SI states on percentage price increment or decrement of the commodity within the observed time period. It helps to forecast percentage changes of profit for traders during each month of the year. See equation (iv).

\[ SI = \left( \frac{P_i}{CMA_i} \right) \times 100 \]  

(iv)

Where: \( P_i \) = Price component; \( CMA \) = central moving average

Calculation of central moving average (CMA) is important to develop the seasonal price index. CMA is a simple, technical analytical tool. It is usually calculated to determine the trend direction of a product or to identify its support and resistance levels. CMA represents the trend and cyclical components of the
original series, and it removes seasonality and the random factor. The formula is given below (v).

\[ CMA_t = \sum_{i=t-6}^{t+5} \frac{P_i}{n} \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 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Prices of skipjack tuna and gold-striped sardinella reveal clear price increment in the month of July however the prices are gradually increasing from March to July and then decrease thereafter. In contrast, prices of double spotted queenfish show a clear increase of price in May where the prices are gradually increasing from January to May then slightly decrease till December. Peak prices are reported during south-west monsoon season from May to September period while the lower prices in north-east monsoon. Furthermore, gold stripped sardinella price indicate comparatively highest prices in January and February following the north-east monsoon. Price increment of gold-striped sardinella initiate with the beginning of the north-east monsoon. Large pelagic fish varieties that used for dried fish processing come largely from southern and western provinces whereas small pelagic varieties come from western and northern region of the country (Koralagama et al. 2021; Amarasinghe 2020; MFARD 2019). Therefore seasonal climate changes in each region causes to variation of dried fish production on variation of raw fish amount (Dayalatha 2020; Koralagama 2009; Murray and Little 2000). Following low dried fish production (Murray and Little 2000), dried fish prices have increased during south-west monsoon season for large pelagic varieties and in both monsoon season for small pelagic dried fish varieties due to the low fish production (Dayalatha 2020; Koralagama 2009; Murray and Little 2000: 30; FAO 1984: 40).

Some of the former research findings related to fish and dried fish are coincided with above findings. Price of fish varied highly during the
rainy season associated with short supply and increased demand (Pradhan et al. 2017). Furthermore, price is relatively low during the winter months on highest production following excess supply. Results of the Perera et al. (2016) revealed that the highest fish price during the middle months of the year in Sri Lanka. More fish are harvested during the winter season of Bangladesh and it causes to decline in the price of different fish varieties (Omar et al. 2014). Price of the fish is highest in the April to July month in Bangladesh due to the lowest production of fish and many religious festivals such as Ramadan and Eid-ul-Azha. Demand for fish is steadily increased during May to September month because of the low supply (Murray and Little 2000). Therefore, consumers’ demands toward dried fish are also increased during same time from May to September as the substitute product for fish. Accordingly price of fish as well as dried fish are increased during same period (Murray and Little 2000).

Figure 2 indicates that, seasonal price index value variation of observed dried fish varieties on monthly average RMP, during the 2007-2019 time periods.

According to figure 02, seasonal price index of skipjack tuna is indicated greater than 100 in June, July, August, September, October and December while November month is attained the lowest 98.2 seasonal price index. January, April, July, August and October month are identified as greater than 100 SI values obtaining month for gold-striped sardinella. January month (101.4) is the highest value obtaining month and December month (98.2) is the lowest value obtaining month. Double-spotted queenfish indicates greater than 100 SI values in May, Jun, September and October month while May month is identified as the highest SI value obtained month. Furthermore, June, July and September months are highest price increment months for skipjack tuna. Around 0.7% price increment can occur in these months for skipjack tuna. Gold stripped sardinella show 1.4% of price increment in January and double-spotted queen fish show 0.3% price increment in September month comparatively seasonal average. Skipjack tuna and gold-striped sardinella show a 1.8% price decrement in November and December month respectively. Double-spotted queen fish show 0.3% price decrement in February month comparatively seasonal average.

Highest seasonal price index variation is recorded for skipjack tuna and double spotted queenfish from June to October month. This is identical with the highest percentage of price increment of skipjack tuna and double spotted queenfish during the period (following the south-west monsoon season). The highest

Figure 2: Seasonal price index of each month on moving average of RMP
price variations of small pelagic-gold striped sardinella varieties are exhibited during June to August and December to February period following south-west monsoon (May-September) and north-east monsoon (December-February) respectively.

It has recorded that the fish production during the south-west monsoon (May-September) and north-east monsoon (December-February) comparatively lesser than other months of the year due to adverse weather condition and low community participation for fishing (Dayalatha 2020; Murray and Little 2000: 30; FAO 1984: 40). The small-pelagic fish that used to dry are mainly coming from west and north coast and large-pelagic from south and west coast in Sri Lanka (Koralagama et al. 2021; Amarasinghe 2020; MFARD 2019). Due to the lesser fish production during south-west and north-east monsoon in northern, eastern, western and southern coast (Murray and Little 2000: 30; FAO 1984: 40), it is perceived that the large pelagic raw fish production comparatively low during south-west monsoon while small pelagic comparatively low during the both monsoon season in Sri Lanka (Koralagama 2009) so as the dried fish. Therefore, production quantity of small pelagic dried fish is comparatively decreased in both monsoon periods and large pelagic in south-west monsoon (Murray and Little 2000). Low supply of dried fish varieties such during two monsoon periods causes to highest percentage of seasonal price increment for large pelagic in south-west and small pelagic in both monsoon periods (Murray and Little 2000; FAO 1984). Similar results have been obtained by a few researches conducted on Indian and Bangladesh fisheries (Vishwanatha et al. 2018; Omar et al. 2018), where has the same monsoon pattern as in Sri Lanka.

**Behavior of monthly RMP and different price components**

The behavior of monthly RMP variation of skipjack tuna, gold striped sardinella and double spotted queen fish are given in figure 03 during the 2007-2019 periods (see annex ii for NMP).

The monthly prices of all three dried fish varieties have increased continuously with fluctuating patterns during the period. Three time slots are visible namely, from January 2007 to January 2008, from January 2009 to January 2012 and from January 2015 to January 2018. Slight increases are noticeable during these time slots with a mild fluctuation. In contrast, higher price increases are reported from January 2008 to January 2009.
2009, January 2012 to December 2014 and January 2018 to December 2019 with higher fluctuation.

RMP variation is not well maintained during the observed period of different three varieties comparatively nominal market price variation (see annex ii). It can be identified; inflation is the main factor that affects the price increment of observed dried fish varieties. Therefore, processor income levels were not increased by a considerable amount comparatively market price increment of the three dried fish varieties.

Furthermore, the nominal fish prices have expanded over time, real price is consistent and occasional in Sri Lanka market (Perera et al. 2016). There is the fluctuating pattern in nominal fish price over the years but not in real price. Thusly, the evident expanding pattern in nominal fish prices might be represented generally by rising inflation in the country rather than by issues inherent to the fish industry (Perera et al. 2016).

The comparison of real market price variation, moving average price variation, seasonality impact removed price variation and seasonality around moving average price variation of different three dried fish varieties are shown in following figure 4.

Various fluctuating pattern of different price components of each analyzed three dried fish varieties are comparatively illustrated in above figure. Besides, each price components show the same fluctuating pattern within the same dried fish variety at most of the month. Inflation is the rate at which the estimation of a price is falling and consequently, the general level of price for goods and services is rising.

Figure 4: Different price component variation different dried fish varieties in 2007-2019
As inflation increments to the highest levels, price dissemination isn't even symmetric. At the point when the yearly inflation rate arrives at 130 percent, there is an equivalent chance of discovering real prices above or below the market average. Accordingly, inflation is the one of critical factor which affected to variation of each price components of analyzed varieties.

Relationships and forecasting models
In statistical analysis, a correlation matrix is used to determine the degree to which a pair of dependent and independent variables are linearly related each other. A strong positive correlation is noted (table 2) among all three varieties on the highest r-value (r~1) of each variety. Price of one variety has a direct impact on the prices of other varieties as well. Price increment of one variety would increase the other varieties and vice versa. Therefore, it demonstrates that most of the factors are the same which affect to increase the price of all three varieties.

The results of Perera et al. (2016) reveals that the wholesale price and retail price of fish in the Sri Lanka market moderately correlated. The highest correlation can be seen between Colombo and Kalutara retail market fish prices while the lowest correlation between Colombo and Kandy wholesale market fish prices.

Suitable price forecasting models (quadratic and cubic models) for each dried fish varieties are presented in the table 4 on the results of R2 value, depict in the table 3 (see annex iv for NMP). Accordingly three models are prominent based on the real market price forecasting for selected dried fish varieties. Price of gold-striped sardinella is escalating than other varieties. Skipjack tuna and double-
spotted queenfish are also being imported to Sri Lanka (MFARD 2019; HARTI 2014). The price of imported dried fish mainly affects price variation of local produce varieties (Ibid). Accordingly, timely importation quantity changes are not considerably affected to price variation of gold stripped sardinella in local market. Therefore, timely price increment of gold stripped sardinella is higher than other observed varieties due to the lower competition from imported varieties.

Table 04: Price forecasting model of each dried fish varieties

| Dried fish type          | Price forecasting model for RMP |
|--------------------------|---------------------------------|
| Skipjack tuna            | $Y_t^{'} = 323.578 + 2.39 t -0.013 t^2$ |
| Gold-striped sardinella  | $Y_t^{'} = 260.867 -0.813 t + 0.02 t^2$ |
| Double-spotted queenfish | $Y_t^{'} = 485.874 + 2.391 t - 0.024 t^2$ |

Table 05: Best fit time Series models for the real price of different dried fish varieties

| Dried fish type             | Best fit model | Stationary R-squared | R-Squared | MAPE | MaxAPE |
|-----------------------------|----------------|----------------------|-----------|------|--------|
| Skipjack tuna               | ARIMA (2,1,12) | 0.130                | 0.84      | 2.785| 9.753  |
| Gold-striped sardinella     | ARIMA (0,1,0)  | 0.002                | 0.727     | 3.397| 14.153 |
| Double-spotted queenfish    | ARIMA (0,1,0)  | -0.003               | 0.873     | 1.679| 6.664  |

Confidence Interval= 0.05

Seasonal price index (SI) of skipjack tuna and double-spotted queenfish showed a high SI during the months of May-September whereas the SI is decreased from November to February. In contrast, gold stripped sardinella has higher SI in months of January and July while lowest in December. The indices models indicated satisfactory forecast value of prices lie close actual values to monitor the price behavior of fish and fish based products (Paul 2010).

CONCLUSION

This paper attempted to analyze the price behavior of three dried fish varieties, namely Katsuwonus pelamis (skipjack tuna), Scomberoides lysan (double-spotted queenfish) - large pelagic and Sardinella gibbosa (gold-striped sardinella) - small-pelagic, which are highly consumed by Sri Lankans. The price behavior was analyzed by developing the price indices. Large pelagic dried fish varieties showed relatively higher prices in the months of June and July months and lowest in November –February, which follows the fresh fish abundance during northeast monsoon season, hence lower fresh fish prices and vice versa. Small pelagic varieties-gold-striped sardinella reported highest price in May/June while lowest in November/December still following the monsoon impact on fresh fish availability and prices.

The resulted ARIMA model in this analysis with (0,1,0) is identical with the findings of Mustapa and collegues (2019), which was conducted for fresh fish and vegetables in Malaysia. Further, ARIMA model with (2,1,1) is identical to fish wholesale price analysis of India. Accordingly, ARIMA
follows the monsoon wind pattern, thereby the seasonality in fisheries.

Southwest monsoon (May-September) was identified as the highest percentage of price increase period for large pelagic group. Both north-east monsoon (December-February) and south-west monsoon season were identified as the highest percentage of price increase season for small pelagic varieties. In general, all three varieties showed higher prices during May-September (south-west monsoon). Impacts of imports of dried fish products to local price determination may not affect to considerably for gold stripped sardinella. Because of that reason price of gold stripped sardinella is highly increased with the time than other analyzed varieties. Coefficient of determination revealed that cubic price forecasting model was the best fit model of price forecasting for all the analyzed varieties. Besides, the Quadratic model can be used to predict the price of analyzed large pelagic varieties. The ARIMA analysis revealed that ARIMA (2,1,12) was the best fit model for price forecasting of skipjack tuna while ARIMA (0,1,0) for double spotted queen and gold stripped sardinella forecasting.

The study concludes that the seasonality of fresh fish is one of the important factors of variation of dried fish prices in Sri Lanka. Therefore, price stabilization policies need to be implemented during the south-west and north-east monsoon season particularly to expand storage facilities during the peak season and to ensure ceiling and floor prices, which would help to limit the speculative practices in the markets. Expansion and further development of price forecasting models can recommend for decision-making on future prices.

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Author Contribution
WPSSL, KDN and SAL conceptualized and designed the study. WPSSL and KDN performed the experiments. WPSSL, KDN and SAL analyzed and interpreted the data. WPSSL and KDN contributed in drafting the manuscript and WPSSL, KDN and SAL critically revised the manuscript.

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