4th International Conference of Multidisciplinary Approaches (iCMA), 2017
Faculty of Graduate Studies,
University of Sri Jayewardenepura,
Sri Lanka
ISSN: 2386 – 1509



# FORECASTING MONTHLY AVERAGE PEPPER RETAIL PRICES USING A TRADITIONAL TIME SERIES MODEL AND AN ARTIFICIAL NEURAL NETWORK MODEL

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Sri Lanka produces the world's best pepper which is made from the ground dried berries of a tropical climbing plant. It is the second important commodity among spices in the country. Export price of this commodity is affected by its' retail price, as it affects the exporting companies of the country. Therefore it is very important for the country's economy to identify the behaviour of one of their main commodities' price in advance. Accurate forecasting of retail price of pepper will significantly reduce the risk of economic decision making and may result in increasing the pepper production where there is no evidence of such forecasting in the literature. The objective of this research is to forecast monthly pepper retail prices in Sri Lanka with higher accuracy. In the study 475 monthly average pepper retail prices (Rs/kg) from June 1976 to December 2015 were considered. The performance of two models: Auto Regressive Integrated Moving Average (ARIMA) as a traditional time series model and Feed-Froward Neural Network (FFNN) with Back-propagation algorithm as an Artificial Neural Network (ANN) model were compared and evaluated using two performance measures; Mean Absolute Percent Error (MAPE) and Directional Symmetry (DS). Selected ARIMA(3,2,3) model exhibits MAPE of 15.208% and DS of 52.174%. In FFNN model building seven potential inputs; lag 1 and moving averages from 3 to 8 were identified. Then the most suitable FFNN model was identified by changing model parameters. Final FFNN model consists of three hidden layers with 4, 3, 4 neurons and logsig, tansig, purelin transfer functions respectively in each layer. Learning parameters were minimum gradient of 0.05×10-6 and initial momentum of 0.61×10-3 which exhibits MAPE of 1.521% and DS of 90.91%. Therefore it can be concluded that the FFNN with above mentioned parameters is more suitable for forecasting monthly pepper retail prices in Sri Lanka compared to the fitted ARIMA(3,2,3) model.

**Keywords:** *Auto Regressive Integrated Moving Average model, Feed-forward Neural Network, Mean Absolute Percent Error, Directional Symmetry*