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ENERGY DEMAND FORECASTING FOR SELECTED SECTORS IN SRI LANKA

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With the rapid growth of population demand for energy had been one of the most talked topics in the recent past. Among all the energy sources, electricity nowadays has become a vital need in human life. Electric power industry is one of the fastest growing industries in our country, so forecasting electricity demand for future would be of great importance to many sectors. The main objective of this study is to find the best method to forecast the monthly electricity demand for Colombo district, Sri Lanka and four different sectors, namely residential, commercial, industrial and public lighting, among the five methods classical, exponential smoothing, stochastic, ANN (Artificial Neural Network) and a relatively unexplored model, GMDH (Group Method of Data Handling) networks. For all three time series approaches models were developed and forecasts were obtained using MINITAB 14 software. In order to build artificial neural networks MATLAB (2013 edition) software was used. Monthly total electricity sales for Colombo district from 2001 January to 2013 December and for the above mentioned sectors data from 2004 January to 2013 December were used. Among the results obtained, for Colombo district classical decomposition method with a quadratic trend and for Sri Lanka both ANN and ARIMA(1,1,1)(1,1,3)12 model performed well. For sector wise data, for residential sector exponential smoothing model, commercial sector classical model, industrial sector exponential smoothing method and finally for public lighting classical method had the highest forecasting accuracy. To summarize results from all the methods for all the datasets time series methods had the highest forecasting accuracy compared to neural networking methods. For Sri Lanka ANN methods had better forecasting ability than GMDH methods, though most of the previously conducted studies for different countries indicated that GMDH method performs better than ANN and time series methods.

Keywords: Electricity, Forecasting, Neural network, Exponential Smoothing, Stochastic method