Research Objective

The objective of this paper is to find a suitable model to forecast the usage of cellular and landline phones in Sri Lanka.

Methodology

The data needed for this study were collected from the Central Bank of Sri Lanka. The data set contains quarterly data from year 2000 quarter 1 to 2018 quarter 2. Kwiatkowski-Phillips-Schmidt-Shin (KPSS), Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests were used to check the stationary of the time series. In this study a univariate time series approach has been used in forecasting.

A Non-Seasonal ARIMA model can be obtained by combining the differencing with Autoregressive and a Moving Average model.

$$ARIMA(p, d, q) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(1)}$$

where, p: autoregression order

d: degree of differencing

q: moving average order

$$\hat{y}_t = c + \emptyset_1 \hat{y}_{t-1} + \emptyset_2 \hat{y}_{t-2} + \cdots + \emptyset_p \hat{y}_{t-p} + z_t + \theta_1 \hat{z}_{t-1} + \theta_2 \hat{z}_{t-2} + \cdots + \theta_q \quad \ldots\ldots\ldots \text{(2)}$$

where, $\hat{y}_t$ is the differed series.

The autoregressive order can be identified using PACF (Partial Autocorrelation Function) plot and the moving order can be identified using ACF (Autocorrelation Function) plot. ARIMA has four major steps as model building, identification, estimation, diagnostics and forecasting. In this study the Mean Absolute Percentage Error (MAPE) value has been used to assure the forecasting error.

Results and Discussion

Time Series Plots

Figure 2: Time Series plot of quarterly cellular phones usage

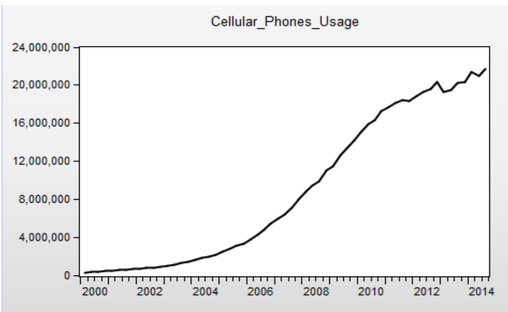

Figure 3: Time Series plot of quarterly fixed telephone lines usage