Time Series

A time series is defined as collected data, observed or recorded at more or less regular intervals of time each hour, day, week, month, year etc. It is a collection of observations made sequentially through time.

Examples are, hourly temperature recorded, daily no. of cars passing through a bridge, weekly checks transactions and monthly electricity consumption of a certain town.

This observation Y1, Y2,..., Yt are taken as they are associated with equal time (t) intervals. Where time is taken as the independent variable along the x-axis and Y-axis variable dependent with values. Time series analysis of meaningful data and other data on methods for analyzing time series data for the extraction.

2.2) Time Series Types:

2.2.1) Economic and financial time series:

The economic and financial time series are routinely recorded for example monthly profits, stock prices on daily base, import and export yearly etc.

2.2.2) Physical time series:

Many types of time series occur in physical science especially in the Meteorology, Marine Sciences and Geophysics. For example, consecutive days of rain and air temperature are measured in hours, days or months.

2.2.3) Marketing Time Series:

Marketing analysis of time series is a major problem in Commerce. In observed variables that sales is include and figures for weeks or months, monetary receipts, advertising costs and so on. Often it is important to forecast the future sales so as to plan production.

2.2.4) Demographic time series:

Different time series occur in the study of population change. Examples are measured annually and monthly birth total population in Canada and England.

Components of Time Series

A time series consists of the following four kinds of moments.

- Secular trend
- Seasonal variations
- Cyclical variations
- Irregularities

2.4.1) Secular trend:

It is defined as 'the long-term change in mean level'. This data refers to a smooth, broad movement of a series in the same direction, showing the increase or fall within.

2.4.2) Seasonal variations:

Seasonal variation is short-term movements occurring in a periodic manner. These variations are repeated with the same intensity, more or less within a period of one year or less. This is due to the weather conditions, the crop season, summer or winter seasons in the sale of various beverages.

2.4.3) cyclical variations:

There are long term trend about long oscillations, they are in a more or less regular pattern in a specific period of years. The peak to peak period or trough to trough known as duration of cycle. Peak value which is higher than its two neighboring values and trough value that is smaller than its two neighboring values. A cyclic variation contain the duration of Recession, Dump, Recovery and Boom.

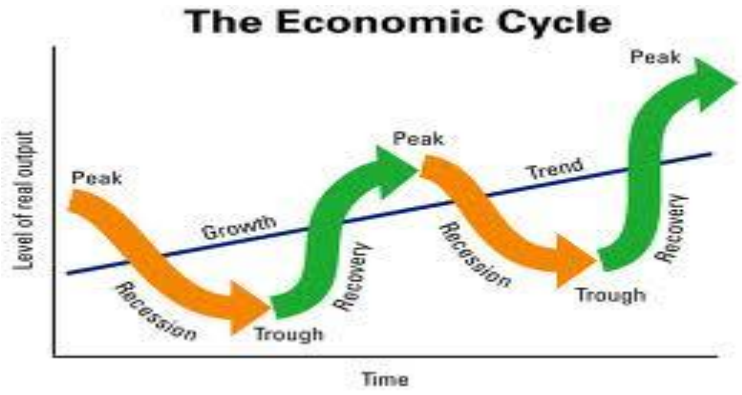

Fig. 5. A Business cycle

2.4.4) Irregularities:

The irregular component of a time series, the series of rest time after the trend-cycle and seasonal components (including calendar effects) have been removed. It corresponds to high frequency variations in the series. Erratic, nonsystematic, random fluctuation or accident occur.

2.5) Time series decomposition:

"Decomposition of observed component in the data series so as to estimate their separate effects is called the decomposition." It’s assume the model is additive or multiplicative.

The multiplicative model, we assume that each component dependent and observed value of Yt by four components T, C, S, I.

$$\mathbf{Yt = T \times C \times S \times I}$$

The additive model, we assume that each components are independent and each observed value of Yt by sum of four components T, C, S, I.

$$\mathbf{Yt = T + C + S + I}$$