

Overview of Forecasting Techniques

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Abstract - Forecasting means estimation of quantity, type and quality of future work. It also means to plan and act in that way to for process in advance. Forecasting includes quality of product, quantity of production, recruitment of material, Human Resource planning etc. It involves various methods from which we can get to forecasting result like Delphi, Market Search, Consumer Market Survey, Least Square and many more. This are used for forecasting some are dependent on past data and some not. For different field different methods are used like production, sales, market business etc. Forecasting is necessary part of any system so that future requirements or sales can be meet. Forecasting is not an ideal concept but can be used in any organization to meet future requirements. Mostly is done based on past data and accurate when large past data available on past performance. Forecasting means nothing but focusing on planning for future based on the data available from past results.

Key Words: Forecasting, Quantitative, Qualitative, Delphi, Exponential smoothing, Least square

1. INTRODUCTION

Forecasting is essential for planning, scheduling and controlling the system to facilitate effective and efficient output of goods and services.

It is nothing but to predict on past and future data to get future predictions. Various methods are available depending on past data to get prediction for future. It is specification of data based on the result available from past and to get variable data on at given time. As all things has opposite side forecasting also has uncertainty. All forecasting can never be perfect and correct all time. Along with predication of future there are always uncertainties associated with it. Most of the methods give correct data only if any one reason can affect the forecasting so not necessary it will come true all time. Data available in the past the way it is collected and stores affects the accuracy of the forecasting

2. Qualitative Methods

Qualitative methods of forecasting are subjective and based on opinion of experts. This methods are use when data is not available or little data available in case of new products. The example of qualitative methods are informed

opinion and judgmental. Different methods of qualitative forecasting are as follows.

2.1 Delphi Method

It is communication and proper interaction methods among the experts. In Delphi methods panels of experts give their opinions. Two or more rounds of questionnaires are taken and experts answers the questions. After each round facilitator give brief summary of expert forecast from last round and reason provided for judgment. During this process number of questions decreases and group give correct answer. Finally, process is stop at certain specific round and scores of final round determine the results.

2.2 Consumer Market Survey

In Consumer market survey the information about how customer's feels, thinks and their imagination about product is collected. It is important to maintain competition among the markets. Which include information of market and customers which are at target. Market research concern especially about marketing process. From above information market need and trends are find out. It is systematic gathering and interpretation of information about individuals and organizations using statistical and analytical method and techniques of applied science to gain insight or support decision making.

2.3 Jury of Executive Opinion

In this method composite forecast is prepared by number of individual experts. The experts give their initial opinion based on given data and revise their opinion according to other jury member's opinions. It is a way to forecast future trends in which one experts gathers the opinions of numbers of other known experts. The jury perform their assessment initially on their own then revise each other's work and finalizing the estimate. The jury of executive opinion is very useful because it provide a sort of error analysis in a non-adversarial way.

3. Quantitative Methods

Quantitative forecasting methods are used to forecast future data with help of past data. This methods are convenient to use when past data is available in numerical form and when it can be assumed that the pattern in the

data will continue in the future. These method are generally applied to short or intermediate range decision.

3.1 Moving Average Method

Moving average is a series of arithmetic mean of data given. This method is a simple phenomenon of reducing the variations and obtaining the trend values with reasonably good degree of accuracy. Moving average method includes taking arithmetic mean of the values for the given time period and then placing it in the centre of time period considered for calculating moving average. The Time span for this forecasting method can be taken in terms of years. The span of time period considered for moving average can be selected based on the length of the series of data adopted. Moving average method is usually used for smoothening. It is used when there is very small amount of or negligible trend.

$$\text{Moving Average} = \frac{\sum \text{Demand in } n \text{ period}}{n}$$

3.2 Weighted Moving Average Method

Weighted Moving Average Method is used when there is trend appearing in data and older data is having less importance. Weighted Moving Average Method is used as a next version of moving average method when the value of the averages calculated in the 3-years, 4-years or 5-years is calculated and it outruns more than the required assumed value or the targets to be achieved by the Company. Small amount of weights are attached to the averages that will substantially minimize for greater amount of value for the company's profit. Doing so, this method will reduce extra load on the inventory storage and helps in smoothening the performance flow of the company. A weighted moving average with suitable weights is usually used when the moving averages are getting strongly affected by the extreme values. The weighted moving average is obtained by dividing the sum of weighted moving by the sum of weights.

Let $x_1, x_2, x_3 \dots x_n$ occur with the weights $w_1, w_2, w_3, \dots, w_n$ then

$$\text{Weighted Moving Average} = \frac{\sum w_i x_i}{\sum w_i}$$

In a simple moving average process, equal weightage is given to the 1st month, 2nd month and 3rd month in a three month moving average, but an organization might want to attach more weightage to the third month and least to the first month.

3.3 Exponential Smoothing

Exponential smoothing is a type of more convenient moving average forecasting method. In this method the path data is weighted in an exponential manner so that the recent data will be carrying more weight in the moving average. It is obvious that it will be more reasonable since older the data is, less will be its importance for the future.

This method is more advantageous than the moving average method. This method can be extended to take reasonable changes into account and the trends in sale of company that can take on such stogy process as a tracking signal and adaptive reasoning. Exponential smoothing method gives increasing weightages to the past data or observations. With the help of simple exponential smoothing method, the forecast is made up of the last period forecast plus the portion of the difference between the last period actual demand and the last period forecast. This method does not explicit the adjustments for trend effects. By exponential smoothing analysis the forecast is given by

$$S_t = S_{t-1} + \alpha (X_t - S_{t-1}) \\ = \alpha X_t + (1-\alpha) S_{t-1}$$

Where

α =smoothing coefficient lying between 0and1

X_t =observations at the t period of time

S_t =forecasting for the current time period t

S_{t-1} =forecasting for the preceding time period

3.4 Least Square

This is the method required for obtaining the values for a particular method or process. This method gives the efficient way of obtaining the line of best fit in the series. Line from which the sum of the deviation of various points on either sides is zero is known as the line of best fit. As compared to the sum of squares of the deviations obtained by using other lines the sum of squares of this deviations would be the least. From the arithmetic mean line the sum of the deviations is zero which also results in the sum of the deviations from the line of the best fit size is zero. Because of this reason, from the line of the best fit, the sum of the squares of the deviations of various points is the least. Hence, this method is known as the method of least square.

The straight line equation becomes $Y = a + bX$, where Y represents the estimated value of the equation and X represents the deviation in the time period "a" & "b" are constants The values of two constants a and b are estimated by solving the equation

$$\sum Y = N a + b \sum X$$

$$\sum XY = a \sum X + b \sum X^2$$

4. CONCLUSION

Forecasting will never be ideal, perfect and sometimes not even very good. From above discussion qualitative methods are not dependent on past data and qualitative methods are available on past data. From qualitative method we cannot say which it the perfect one but in quantitative we can say least square method gives best result from all available data. Forecasting involves analysis of past and present events to draw predictions for the future events. And to get idea about probable events in the future. No forecasting technique is appropriate for all

situations. Choosing a technique depends on the amount of money to carry forecast, time period, the complexity of situation, accuracy required. Forecast is generated through interaction of number of factors. All forecast contains some errors. Selecting an appropriate forecasting technique is important to get accurate results.

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