

Overview of Forecasting Techniques

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Abstract - Forecasting means estimation of quantity, type and quality of future work. Forecasting is the method of estimating the period of planning the activities of the process in advance. It mainly focuses on the activities that will be performed in the future based on the present status of the process i.e. the condition of the product, in flow of the product into the plant, its basic output requirements period. It consists of the procedures or techniques that can be best suited for the process. Accurate sales forecasting is required for a business firm to enable it to produce the required quantity of products at the desired time. It makes the arrangement in advance for raw material, equipment, labor, etc. some firm manufactures on the order basis, but some firms produce the material in advance to meet the future demands. It is committed on the part of sales department and future planning of the entire concern that depends on the forecast. It is looked upon as a projection based on past data. It is the inference based on large volume of data on past performance.

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.

Forecasting is the process of making predictions of the future based on the past and present data. A common example may be estimation of variable data at some specified future date. Forecasting refers to formal statistical methods employing time series, cross-sectional or longitudinal data, or alternatively too less formal judgemental methods. In some of the cases the term "forecast" and "forecasting" are sometimes reversed for some estimations of values at certain specific future times, while the term "prediction" is used for more general estimates, such as number of times the floods will occur, etc. Risks and uncertainty are central to forecasting and prediction. It is generally considered good practice to indicate the degree of uncertainty attached to forecasts. The data available must be up to date in order for the forecast to be as accurate as possible.

2. QUALITATIVE METHODS

Qualitative models of forecasting techniques are subjective, based on and judgment of the consumers or experts. These

models are appropriate when the past data is not available. They are usually applied to intermediate-or-long-range. The examples of qualitative forecasting methods are informed opinion and judgmental. Qualitative forecasting is used when little data is available as in case of new products and new technology. Different methods in qualitative forecasting are as follows

2.1 Delphi Method

It is structured communication technique, originally developed as a systematic interactive forecasting method which realise on a panel of experts. The expert answer the questionnaires in 2 or more rounds. After each round a facilitator provides anonymous summery of experts forecast from the previous round as well as the reasons they provided for their judgements thus experts are encouraged to revise their earlier answers in light of the replies of other members of their panel. It is believed that during this process the range of answer will decrease and the group will give correct answer. Finally, the process is stopped after a predefined state and the mean of the scores of the final rounds determine the result.

2.2 Consumer Market Survey

Consumer Market Survey is a well organized effort to collect information about markets or customers which are at target. However, expert practitioners may wish to draw distinction, in that, market research is concerned specifically about marketing processes. It is a key factor in maintaining competitiveness among the market. It provide important information to identify and analyse the market need, market size and competition. It include social and economic research .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 required future information as a function of previous information. They are appropriate to use when past numerical data is available and when it is reasonable to assume that some of the pattern in the data are expected to continue in the future. These method are usually applied to short or intermediate range decision.

3.1 Moving Average Method

Moving average is a series of arithmetic mean of data given. It is used when there is little or no trend and often used for smoothening. Moving average method is a simple technique of reducing the fluctuations and obtaining the trend values with comparatively a good degree of accuracy. This method consist of taking arithmetic mean of the values for the given time span and placing it at the centre of the time span taken foe calculations. the period for applying the method can be taken in terms of 3-yearly moving average, 5-yearly moving average, 7-yearly moving average, 4-yearly moving average, etc. the period of moving average can be decided based on the length of the series of data adopted.

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

3.2 Weighted Moving Average Method

Weighted Moving Average Method is used when trend is present and older data is less important. It is based on experience and intuitions. This method is used as an extension of moving average method when the value of the averages calculated in the 3-yearly moving average, 4-yearly moving average or 5-yearly moving average is calculated and it exceeds more than the stated value or the targets to be achieved by the organization. Small weights are attached to these averages that will substantially reduce for exceeded value for the company's profit. This will in turn reduce the overall extra burden on the inventory storage and give a smooth flow to the performance of the company. The weighted moving average is obtained by dividing the weighted moving totals by the sum of weights. A weighted moving average with appropriate weights is generally used when the moving averages are strongly affected by the extreme values.

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 sophisticated moving average forecasting techniques which weights the path data in an exponential manner so that the most recent data carries more weight in the moving average. This method assign increasing weightages to the past observations, obviously it is more reasonable since older the demand lesser relevance it holds for the future. It is superior to the moving average method. It can be extended to take into account seasonal changes and trends in sales that can take on such sophisticated process as a tracking signal and adaptive reasoning. The exponential smoothing makes no explicit adjustment for trend effects. With simple exponential smoothing, 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. For 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. It provides the convenient basis for obtaining the line of best fit in the series. The line of best fit is the line from which the sum of the deviation of various points on either sides is zero. Also the sum of squares of this deviations would be the least as compared to the sum of squares of the deviations obtained by using other lines. The sum of the deviations from the arithmetic mean line is zero, thus the sum of the deviations from the line of the best fit size is zero. For this reason, the sum of the squares of the deviations of various points from the line of the best fit 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. 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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