Unit II

Introduction to Demand Forecasting Methods

❖ Demand Forecasting
❖ Factors Governing Demand Forecasting
❖ Methods of Demand Forecasting: Survey Methods
❖ Methods of Demand Forecasting: Statistical Methods

What is Forecasting?

Forecasting is the use of historic data to determine the direction of future trends. Forecasting is used by companies to determine how to allocate their budgets for an upcoming period of time. This is typically based on demand for the goods and services it offers, compared to the cost of producing them. Investors utilize forecasting to determine if events affecting a company, such as sales expectations, will increase or decrease the price of shares in that company. Forecasting also provides an important benchmark for firms which have a long-term perspective of operations.

Introduction

Demand forecasting refers to an estimate of future demand for the product. It is an objective assessment of the future course of demand, in recent times, forecasting plays an important role in business decision – making. The survival and prosperity of a business firm depend on its ability to meet the consumer's needs efficiently and adequately. Demand forecasting has an important influence on production planning. It is essential for a firm to produce the required quantities at the right time.

It is also essential to distinguish between forecasting of demand and forecast of sales, sales forecasts are important for estimating revenue, cash requirements and expenses whereas, demand forecasting relate to production, inventory control, timing, reliability of forecast etc. however, there is not much difference between these terms.

In simple Terms about Demand Forecasting:

Demand forecasting is predicting future demand for the product. In other words, it refers to the prediction of probable demand for a product or a service on the basis of the past events and prevailing trends in the present.

Factors governing Demand Forecasting

a) **Functional nature of demand** market demand for a particular product or service is not a single number but it is a function of a number of factors, for instance, higher volumes of sales can be realized with higher levels of advertising or promotion efforts.

b) **Types of forecasting** based on the period under forecast, the demand forecast can be of two types1) short – run forecasting and 2) long – run forecasting. Short run forecasts cover a period of one year whereas long- run forecasting any period ranging from one year to 20 years.

c) **Forecasting level** the forecasting may be at the firm level, industry level, national level or at the global level.

   1. **Firm level** firm level means estimating the demand for the products and services offered by a single firm

   2. **Industry level** the aggregate demand estimated for the good and service of all the firms constitutes the industry level forecast. The total estimate of different trade associations can also be view as industry level forecast.

   3. **National level** national level forecasting is for the whole economy, national level forecasts are worked out based on the levels of income, savings of the consumers.

   4. **Global level** globalization and de-regulation, the entrepreneurs have started exploring the foreign markets for which the global level forecasts are utilized.

d) **Degree of orientation** demand forecasts can be worked out based on total sales or product or service wise sales for a given time period. Forecasting in terms of total sales can be viewed as general forecast whereas product or service – wise or region or customer segment – wise forecast is referred is referred to as specific forecast.

e) **New product** it is relatively easy to forecast demand for established products or products which are currently in use. The new product in consideration can be analyzed as a substitute for some existing product. Assess the demand through a sampled or total survey of consumers' intentions over the new product features and price.

f) **Nature of good** The goods are classified into producer goods, consumer goods, consumer durables and services. The patterns of forecasting in each of these differ.

g) **Degree of competition** there may be a single trader or a few traders depending upon the nature of goods and services.

Methods of Demand Forecasting

The various methods of demand forecasting can be summarized in the form of a chart as shown in below figure. The methods were classified as Survey Methods, Statistical Methods, and other Methods. Refer below figure:
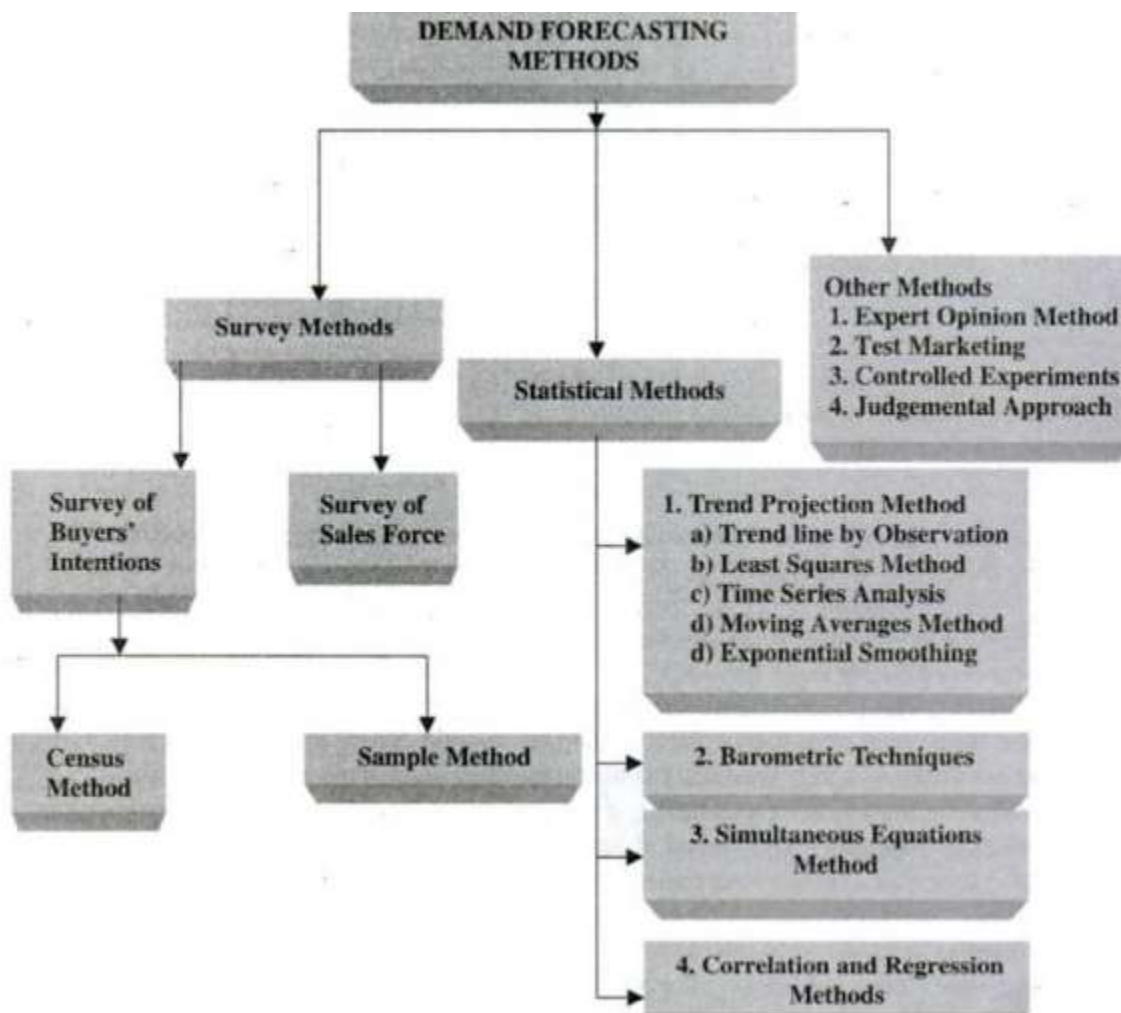
Survey Methods

Survey of Buyer's Intentions to anticipate what buyers are likely to do under a given set of circumstances, a most useful source of information would be the buyers themselves.

Simply put: In this method, after establishing direct contact with customers, they are being asked what they are planning to buy in the forthcoming time period usually a year. On the basis of advice and willingness of various customers, the future sale is estimated.

Situations in which this method is advantageous

➢ When you want to introduce new product for which no previous data exists
➢ When the buyers are few and accessible
➢ When the cost of reaching them is significant
➢ There should not be any change in the taste and preferences

Dis-advantages of this method

❖ Surveys may be expensive
❖ Sample size and timing of survey
❖ Methods of sampling
❖ Inconsistent buying behavior

Sales Force Opinions Method Another source of getting reliable information about the possible level of sales or demand for a given product or service is the group of people who sell them i.e. sales representatives

A **method** commonly used by companies for short-term forecasts is to take advantage of their field staff's intimate knowledge of customers' needs and market conditions by asking them to forecast the company's **sales** for their respective areas for the coming season or year.

## This method is appropriate under following conditions

- Sales persons are likely to be the most knowledgeable sources of information
- The salesmen are cooperative
- Bias factor can be corrected by means of growth factor

Dis-advantage

➢ How far the data provided by sales representative are reliable
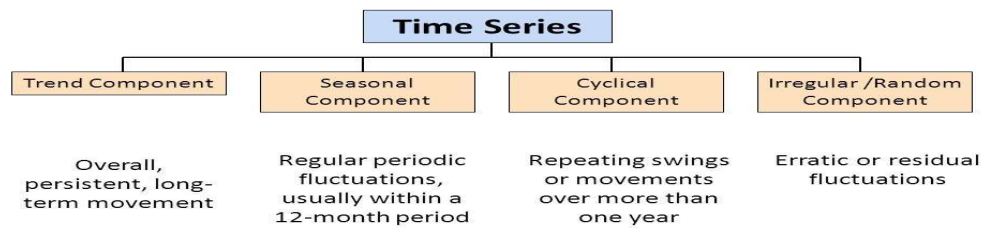
Statistical Methods

Statistical method is used for long run forecasting. In this method, statistical and mathematical techniques are used to forecast demand. This relies on past data. Refer below figure for example.
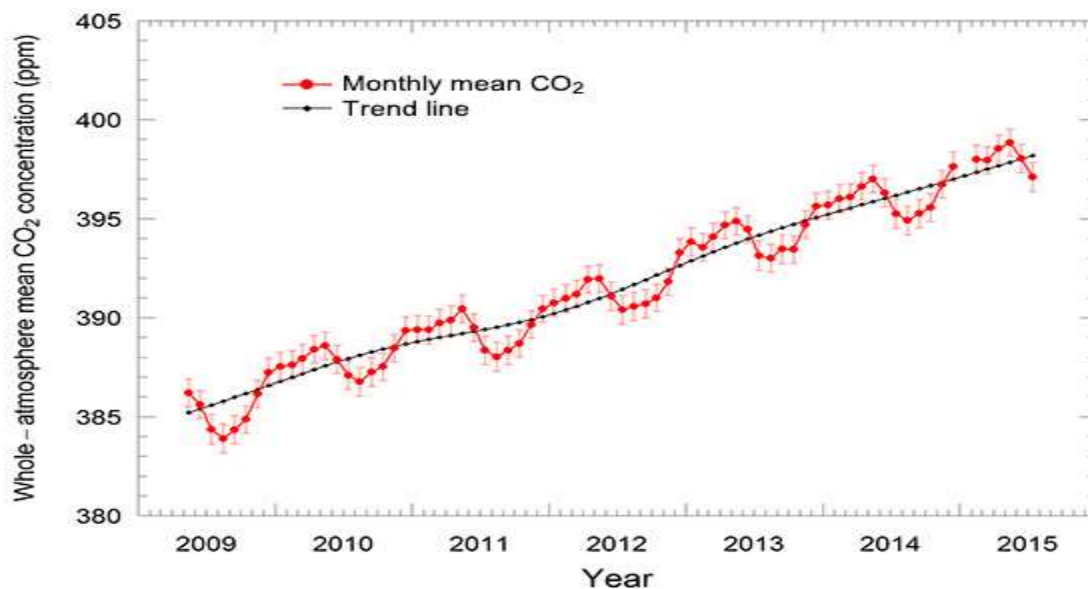
1. **Trend projection method** (refer above for a sample trend line) these are generally based on analysis of past sales patterns. These methods dispense with the need for costly market research because the necessary information is often already available in company files. This method is used in case the sales data of the firm under consideration relate to different time periods, i.e., it is a time – series data. There are five main techniques of mechanical extrapolation.

a. **Trend line by observation** this method of forecasting trend is elementary, easy and quick. It involves merely the plotting of actual sales data on a chart and them estimating just by observation where the trend line lies. The line can be extended towards a future period and corresponding sales forecast is read form the graph.

b. **Least squares methods** (also refer Problem done in class) this technique uses statistical formulae to find the trend line which best fits the available data. The trend line is the estimating equation, which can be used for forecasting demand by extrapolating the line for future and reading the corresponding values of sales on the graph.

c. **Time series analysis** where the surveys or market tests are costly and time – consuming, statistical and mathematical analysis of past sales data offers another methods to prepare

the forecasts, that is, time series analysis.

Time-Series Components

Time Series

Trend Component	Seasonal Component	Cyclical Component	Irregular/Random Component
Overall, persistent, long-term movement	Regular periodic fluctuations, usually within a 12-month period	Repeating swings or movements over more than one year	Erratic or residual fluctuations

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d. **Moving average method** (also refer Problem done in class) this method considers that the average of past events determine the future events. In other words, this method provides consistent results when the past events are consistent and unaffected by wide changes.

e. **Exponential smoothing** (also refer Problem done in class) this is a more popular technique used for short run forecasts. This method is an improvement over moving averages method, unlike in moving averages method, all time periods here are given varying weight, that is , value of the given variable in the recent times are given higher weight and the values of the given variable in the distant past are given relatively lower weights for further processing.

2. **Barometric Technique** Simple trend projections are not capable of forecasting turning paints. Under Barometric method, present events are used to predict the directions of change in future. This is done with the help of economics and statistical indicators. Those are (1) Construction Contracts awarded for building materials (2) Personal income (3) Agricultural Income. (4) Employment (5) Gross national income (6) Industrial Production (7) Bank Deposits etc.

3. **Simultaneous equation method** (also refer Problem done in class) in this method, all variable are simultaneously considered, with the conviction that every variable influence the other variables in an economic environment. Hence, the set of equations equal the number of dependent variable which is

also called endogenous variables.

The equations to be solved simultaneously are:

$$\Sigma y_1 = n.a. + b\,\Sigma x_1 \quad\ldots\ldots(1)$$
$$\Sigma x_1 y_1 = a\,\Sigma x_1 + b\Sigma x_1{}^2 \ldots\ldots(2)$$

Substituting the various values, we get,

$73 = 5a + 70b$ (x14)...(3) $1063 = 70a + 1042b$ $1022 = 70a + 980b$ $62b = 41$ $b = 41/62 = 0.66$ Substituting the value of b in (3) $73 = 5a + 70\,(0.66) = 5a + 46.2$ $5a = 73 - 46.2 = 26.8$ $a = 26.8/5 = 5.36$ $a = 5.36$ $b = 0.66$	$y_1 = 5.36 + 0.66x_1$ $Y = 10(5.36) + 0.66(x/10)10$ $= 53.6 + 0.66x$ If the index of farm income becomes 210, sale of tractors will be $Y = 53.6 + 0.66(210)$ $= 53.6 + 138.6$ $= 192$ tractors.

4. **Correlation and regression methods** correlation and regression methods are statistical techniques. Correlation describes the degree of association between two variable such as sales and advertisement expenditure. When the two variable tend to change together, then they are said to be correlated.

Other Methods

Expert Opinion Method / Delphi Technique Well informed persons are called experts; experts constitute yet another source of information. These persons are generally the outside experts and they do not have any vested interest in the results of a particular survey. As expert is good at forecasting and analysis the future trend in a give product or service at a given level of technology. The service of an expert could be advantageously used when a firm uses general economic forecasting or special industry fore casting prepared outside the firm.

Test marketing It is likely that opinions given by buyers, salesman or other experts may be, at times, misleading. This is the reason why most of the manufactures favour to test their product or service in a limited market as test – run before they launch their product nationwide.

Controlled experiments Controlled experiment refer to such exercise where some of the major determinants of demand are manipulated to suit to the customers with different tastes and preferences, income groups, and such others, it is further assumed that all other factors remain the same.

Judgmental approach when none of the above methods are directly related to the given product or service, the management has no alternative other than using its own judgment. Even when the above methods are used, the forecasting process is supplemented with the factor of judgment for the following reasons

✓ Historical data for significantly long period is not available

✓ Turning point in terms of policies or procedures or causal factors cannot be precisely determined

✓ Sale fluctuations are wide and significant

✓ The sophisticated statistical techniques such as regression and so on, may not cover all the signing.