In the preceding chapter we discussed various concepts useful in demand analysis and indicated their key role in decision making. To use these concepts one must know the accurate estimates of demand relationships which are exceedingly difficult to obtain. Since short-run as well as long-run forecasts are sufficiently important and warrant devoting attention, an attempt in this chapter is made to estimate them and to consider procedures used in such estimation.

To fear the worst usually cures the worst. He that foretells his own calamity with reasonable accuracy and makes events before they come, doth twice endure the pains of evil destiny; and he who fails to foresee what is distant, often finds sorrow near at hand. Buxton has rightly remarked that in life, as in chess, fore-thought wins. Few things are brought to successful end by impetuous desire but most by calm and prudent fore-thought. To have too much fore-thought is the part
of a wretch and to have too little is the part of a fool. A managerial economist without forethought scarcely deserves the name of economist. Since he has to deal with forecasting of demand every now and then, it will be befitting if we discuss the same here so that he may prepare himself to submit on every occasion to the uncertainties of nature and obtain a greater distant good. This will give precision, tone and energy to his mind and help him in reaping victory from defeat and honour from repulse.

A forecast is a prediction about the future event which is most likely to happen under the given conditions. In a world where future outcomes are rarely assured, formation of some view, explicit or implicit about the future is inevitable. This view may be optimistic, pessimistic or based on hunches. Sometimes the specific view that is taken makes no significant difference because it is easily adjustable but many a times when costly resources have to be irrevocably committed on a once-and-for-all basis, it makes a great deal of difference to the fortunes of the concern. If the decisions go wrong, they cannot be modified or avoided without cost. There are thus good reasons for taking up an organised system of forecasting seriously rather than basing it on intuition or guesses.
Forecasting as a separate function of management in the off-shoot of the 1930's depression and the World War II. Before the great depression only a few of the more progressive organisations recognised business forecasting as an important tool of management. The financial losses incurred by various organisations due to the lack of preparedness compelled many organisations to abandon forecasting methods of the 1920's and instead discover new methods based on a more rational and dependable foundation. Besides this, the problems of post-war price hikes and the new conditions brought about by the World War II led many executives to organise forecasting research and practice on new and scientific lines. Most of the concerns started with sales forecasts since they were more tangible and directly usable. Sales forecast became the basis of the forecast of annual income as well as a function of accounting and treasury department. In the preparation of sales forecasts the help of the salesmen was taken but later on it was realised that they were hardly interested in management problems. Sales forecasts for periods beyond 6 months or so did not arise any enthusiasm in the minds of typical salesmen; consequently, management felt the necessity of specialised men and methods to improve the accuracy and dependability of the sales forecast based on the opinion of sales force.
Thus market research became a recognised function of field and sales staff. As time passed, even the best market-research job proved inadequate in the wake of unexpected changes in general business conditions. Many companies that relied purely on sales forecasts and ignored general business conditions suffered severely. They realized that market research alone was not sufficient. They finally employed professionally trained or practically oriented economists and statisticians to study and practice the art of forecasting general business conditions. Thus market research and the preparation of sales forecasts became separate from the forecast of general business conditions.

**FORECASTING AS AN AID TO MANAGEMENT**

Notwithstanding the unsatisfactory state of forecasting, it should be noted that forecasting by some technique or other is highly essential. No businessman can escape forecasting. The question that he faces is not whether he should forecast but rather, how should he forecast. He can forecast by hunch, intuition or by judgement or he can bring his methods within the more definite and tangible boundaries that govern business activity and can be stated in measurable terms. Unorganized forecasting is too often a guessing game. It is the product of personal judgement or of common sense.
or of mature experience, and is too frequently based
on a 'feel of the market' or on the 'sixth sense'. It
is more an art than science and like other arts it
needs no advocate and requires no justification. A
few forecasters of this kind may be quite successful
but this sub-conscious psychic type of forecasting
fails when we apply it to vast majority of business.
Although no forecasting system is infallible yet the
system that is brought within the tangible and definite
boundaries of an organised management function is better
than pure guess work. There are two main reasons why
forecasting should be taken seriously. In the first
place, it is a part of business management from which
there is no escape. Secondly, except for the rare fore-
casting genius any organised plan is certainly better
than no plan.

It is true that organised forecasting system is
not equally necessary for all types of business concerns
especially those that are too small or their operations
are so simple that they can be planned and controlled by
the foresight and ability of one chief executive. But
as the business grows in size, in complexity, in the
variety of products and in the extent of decentralisation,
it goes far beyond the physical and mental powers of one
man and organised forecasting becomes a separate management
function. There are various reasons why good forecasting should constitute the core of management. For every effective and intelligent planning of an enterprise a reasonably accurate forecast of the trend of general economy and of the sales income of the concern is a must. Management cannot act on the spur of the moment. It requires plan and must also forecast in order to plan to achieve the planned objectives. A well-conceived budgeting of costs and profits backed by a forecast of annual sales and prices is most vital for the control of business through a budgetary programme. It not only reduces the area of avoidable risks but also limits the area within which reason and judgment can be the only guide. Suitable forecasting is needed by management to stabilise production and employment over time. Ironing out of variations caused by seasonal and cyclical fluctuations is necessary to deal with many problems created by rigidities of labour. A dependable sales forecast for long term company growth is also necessary for future expansion and growth. It helps in planning of long term investment programme as well as in stabilisation of aggregate employment with a view to satisfy organised labour and to pacify public opinion. It is the key to sales budgeting which in turn determines the production and inventory plans, the
quantum of costs and the level of employment. Sales budgets are also used to compute standard costs and variances and to establish profit goals, capital budgets and future cash flows and sources of funds. The sales forecasts and sales budgets virtually regulate a factory's operations, improve the quality of business decisions and thus their importance can hardly be overemphasized.

Control of inventories based on past activities either results into loss of sales and competitive position in the wake of an increase in the market demand or into money loss when demand falls suddenly. Traditional system of inventory control generally leads to losses. A satisfactory method of inventory control of raw materials, semi-finished products, finished goods, spare parts and work-in-process should depend upon satisfactory forecasts of future sales of raw materials, parts requirements and their prices. The use of standard costing for purposes of setting prices and controlling costs and expenses depends on successful forecasting of production and sales. Normal volume of production should neither be set too high nor too low. If it is set too high, it results in unabsorbed expense, high variances, low standard costs and the danger of fixing prices below real cost of production. As against
this, a low normal volume of production leads to over-absorption of expenses, high standard costs and establishing prices that are unnecessarily higher.

Good forecasting needs team work among various departments such as general business research and market research, sales, production, planning, accounting and finance. Organised forecasting should lead to the forecast of general business conditions on which the company sales forecast may be erected. It is the sales forecast which really supports the complete superstructure of financial forecast and budgets and also production forecasts and schedules with their array of purchasing, employment and inventory plans.

KINDS OF FORECASTS

Basically there are two types of forecasts: external and internal. External forecast deals with trends of general business or with the forecasting of aggregate sales of the whole industry, whereas the internal forecasts include all the forecasts that are related to the operations of a particular enterprise. The usual structure of these internal forecasts is as under:

1. Forecast of annual sales;
2. Forecasting of production group;
3. Forecast of product's standard costs and variances;
4. Forecast of operating profit or loss;
5. Forecast of taxable income;
6. Forecast of cash resources;
7. Forecast of cash requirements;
8. Forecast of new capital requirements;
9. Forecast of changes in assets and liabilities;
10. Forecast of number of employees and working hours;
11. Forecast of raw material prices, raw material requirements; and
12. Forecasting of overall inventory position.

External forecasts or national group of forecasts are usually prepared by company research staff or by outside consultants to guide management in determining policies and in preparing and approving company forecasts. It mainly deals with general business conditions or indices of production. Similarly, industry or market group forecasts are also prepared by the same staff as mentioned above to determine company forecasts of output as per cent of total output or total volume of trade or total market. It also deals with new orders as well as inventories.

As against this, internal or company group includes various forecasts such as sales group, production group and financial group. Sales group deals with dollar volume of new orders received, dollar volume of billings to customers as well as physical or dollar volume by
product groups, sales territories, manufacturing facilities, finished goods prices and inventories. These forecasts are prepared by market research department or district managers or sales staff or financial or planning organization. The basic purpose of such forecasts is to guide planning of company operations such as sales, production or finance or to determine production schedules, sales quotas and other expenses including advertising budgets or to control finished goods inventories. Production group mainly deals with production in physical units, machine or man-hours, workers cost, work-in-process inventories, raw material inventories or appropriation requests for new facilities. These forecasts are usually prepared by production or planning department or by budget department or by engineering department. The purpose behind such forecasts is to guide production and inventory planning, to determine production schedule, or equipment requirement or profit or loss budget or to coordinate production and financial policies with respect to capital expenditures. These forecasts also deal with the number of employees and working hours and prices and requirements of raw materials. Such forecasts help in formulating employment policies as well as in purchasing policies and planning. These forecasts are either
prepared by production department, planning department, industrial relations department or by statistical and economic division. Financial group deals with company profits and losses, division of operating profits, cash position, new capital requirements or with over-all inventory position of the concern. These forecasts are prepared either by the controller or treasurer to guide management to establish departmental expense budget or to establish operating unit's profit and loss budget or to guide management to determine the necessity for long-term and short-term capital requirements of the concern.

Before attempting the methods and techniques of forecasting, we should consider the relevance of time period because the accuracy of forecast depends largely on the forecasting horizon; shorter the length of period, better it is. How far ahead a forecast can go depends upon the nature of business. There is nothing sacred about time periods. Short-term forecasts cover any period up to one year since policy changes pertaining to taxation, sales promotion, etc., cannot be predicted for more than a year. But long-term forecasts cover a period up to 15 years or so due to their close link with capital expenditures and the long life of fixed assets.
Beyond fifteen years the future becomes so uncertain that the projection becomes dubious. Experienced and informed judgment is most essential for short-term forecasting since the forecaster mostly deals with production policy, cost reduction devices, inventory controls, price adjustments and setting of sales targets. For long-term forecasts reliance is generally placed on statistical devices to identify the variables that affect the socio-psychological aspects. The forecaster usually tackles problems concerning the long-term demand potential, competitive position, man-power planning and long-term financial requirements. Experience reveals that long-term forecasts generally concentrate on the establishment of trends, whereas short-term forecasts deal with the deviations from trends, hence short-term forecasts are likely to be more accurate than those for long periods.

Sales forecasting can be undertaken at macro level, industry level and firm level. Macro-economic forecasting deals with general economic conditions and is measured by an appropriate index of industrial production, national income, employment or expenditure. External influence concerning the general business conditions greatly influence the general level of demand for products such as consumer durables, construction and capital equipment. In addition, fluctuations in disposable income and in living standards can also
result in a sharp upward or downward trend in the demand for many products. In case of few products, the demand lags behind changes in the whole economy, hence if we have macro estimates we can predict the likely changes in the demand for the product whose demand is to be forecast.

While study of the broad national aggregates is not enough for specific prediction in many industries. Other information which has a specific relevance to a particular industry must also be taken into consideration. For example, the producers of automobile are particularly interested in changes in the age composition of the population and the extent of change in consumer instalment debt because these factors have a considerable effect on the sales of automobiles. Some other means of forecasting must also be discovered for products whose ordering depends upon the specific policy of a particular firm. Management is mostly interested to evaluate the impact of its own actions as well as the effects of outside forces on demand. It requires special techniques to meet the peculiarities of the situation so that the response of demand to changes in the manipulable variables may be determined. Suppose management desires to forecast the quantity of sales, with all controllable variables assumed to be constant.
It must determine, by whatever means are available, the impact of changes in income, tastes, technology and competitive strategies because these outside forces are most influential in affecting the sales of a concern.

Another factor which is equally important in the nature of forecast. Should the forecast be general or specific? General forecast gives the global picture, and understanding of the environment in which the business operates, an environment in which the aggregate activities such as industrial production, gross national product etc., play an important role. The firm may find such forecast useful since it provides the basis of forecasts and gives direction as well as the magnitude of change, but it is usually broken into commodity forecasts and forecasts by zones. Many firms adopt the mix of both because too much generalisation obscures the real picture and too little provides insufficient basis for planning and execution.

LIMITATIONS

It is sometimes stated that the forecasts should not be attempted since most of them are bound to be wrong. There may be some truth in the argument if the validity of forecast is thought to depend on its coinciding with actuality. It is a fact that all types of
outcomes cannot be forecast and those that are forecast seldom prove hundred percent correct. Firstly, because the underlying phenomena do not behave in a manner to warrant the use of information from the past and present to obtain reliable predictions for future. Secondly, the phenomena might behave according to some set pattern but economic science does not possess the necessary tools to discover the same. Lastly, there is a lack of factual data in a usable form which comes in the way of reliable prediction. In the natural sciences the future is mostly deducible. For example, we can say with certainty that after night there would be a day and that the velocity of light will remain the same even tomorrow. But economic relationships are not so easily deducible. They are approximations or mere generalisations; they have to be modified in the light of changing conditions. However, the view that economic events can be forecast depends upon the assumption that economic events have some continuity and that the past and present can tell something but not everything about future. If we do not assume this relationship between past and future there would be no basis for forecast and we shall have to leave the anticipations to the guess work.

In attempting forecasts, it is always useful to recognise their limitations since no forecast is wholly
correct except by chance. Actually the purpose of a forecast is not to achieve complete accuracy but to reduce the margin of uncertainty about future. The forecast should be undertaken to convey that all the materializing values would on an average lie nearer the truth or if it proves dead they would not be too remote from the forecast figures. The test of judging a forecast is whether it enables better decisions to be made whether it results in more profits being made than using techniques based on guess work. Following this reasoning it appears sensible to suggest that forecasting is worthwhile if its use improves the quality of decisions by increasing the accuracy of assumptions about future and only if the increase in the profit that results from improvement in foresight exceeds the cost of making the forecast. If the forecasts do not result in better profits, than would have been attained without them, there is no use in forecasting but if it increases profits it is useful to go on using it up to the point where its marginal cost is equal to its marginal revenue or in other words "the additional cost just offsets the increase in returns that result."

Forecasts go wrong due to fundamental reasons inherent in the use of the techniques of forecasting.
For example, many forecasters presume a definite relationship between certain variables such as sales and income, sales and advertisement which is only a rough approximation to the true relationship that exists. In the first instance, such relationships are established from past data which are subject to errors. Secondly, even if it is not inexact in some respects, it does not follow that it will remain the same in future at much the same level as it has remained in the past. Thirdly, some variables that are exogenous lie outside the system of prediction and hence they are unpredictable.

Another type of error is commonly known as economic error which arises out of the formulation of inappropriate relationship between variables. For example, if we base our forecast only on Jevon's sun spot theory, which hardly shows any specific correlation between sun's spots and growth and decay in business, it is most likely doomed to failure. Another class of such errors refers to the measurability of the phenomenon. There are so many variables which affect forecast such as fashion, attitudes and intentions of buyers, all of which are relevant but they are impossible to compile. Statistical errors also affect the accuracy of forecasts.
because many statistical techniques are based on the assumption that the observed values of variables are independent and hence the errors in variables too are independent of the values that the variables assume; if this does not prove correct, serious complications may result. Many statistical errors are caused by clerical mistake or by the negligence of those that are deputed for compiling the data. Very often the data is compiled by sampling procedures, which introduces its own quantum of errors. The sample may be either poorly drawn or may be unrepresentative in the sense that its characteristics may not be the same as that of population from which it is drawn. Although the accuracy of the sample can be increased by increasing the size of the sample but at the same time larger samples need more cost and more care. Thus in the wake of limited resources and time it may not pay to spread the span of inquiries too widely.

Forecasts pertaining to capital goods are likely to be in error for many capital goods not only take more time to produce but are also extremely durable. Durability of these goods results in little replacement demand which further complicates the forecasting problem because the root of these difficulties is that the longer the period the uncertain is the prediction.
Very frequently we observe a subjective element in forecasting. For example, forecasters mostly picture the future as being related to the immediate present or to a sequence of years. In business, however, it is not safe to rely too much on the continuity of history. But the other danger is that we may adopt the opposite extreme and regard the forecast as the product of the expert judgement. The role of judgement in forecasting is vital; the other two being information and analysis. What is required is 'some common sense mean between pure guessing and too much mathematics.'

There are always a considerable variation in the accuracy of forecasts. Nevertheless, such forecasts are invariably better than the pure guess work. The uncertainties that remain do not support the case for the abandonment of scientific and organised forecasting but are reasons for attempting to improve it further so that it may give better results.

**CRITERIA FOR A GOOD FORECASTING PROCEDURE**

There are various ways to make a guess about the future. How to pick up the best criterion for testing the usefulness of the forecasting procedure depends upon cost, appropriateness, efficiency, skill and sophistication. In the following section, we are
discussing certain technical and economic criteria for selecting the most desirable procedure for a particular demand situation.

1. **PLAUSIBILITY**

The method must be such that the executives who use it must be able to understand it and must be willing to have confidence in the techniques used. Experienced executives usually have a "market feel" but they cannot interpret it scientifically so as to bring it within the purview of matrix algebra, differential equation and other forms of higher mathematics. Plausibility requirements can improve the chances of accuracy if the experienced executives understand and accept what their specialists do to estimate the demand.

2. **SIMPLICITY AND EASE IN COMPREHENSION**

Mathematical and econometric models are certainly useful but they are intolerably complex. To those executives who have a pathological fear of mathematics, these methods would appear Latin and Greek. The procedure should, therefore, be simple and easy so that the management may appreciate and understand the procedure adopted by the forecaster.
3. ECONOMY

Forecasting techniques involve costs; some techniques are relatively costless and some are costliest. Thus, there is always the question of how much money and efforts should be employed to obtain the desired results. Costs must always be weighed against the returns from the forecasts. The ideal system is that which yields returns over costs. There is no gain in pursuing a procedure which provides very high level of accuracy at the expense of great cost if the forecast is insignificant because these superior methods of forecasting would cost more than they are worth. But if the accuracy of forecast is bound to make a sizeable contribution to profits by improving the quality of decisions, the forecaster would be justified to select the sophisticated methods involving great cost.

4. ACCURACY

The problem of accuracy can only be answered in terms of cost because there is always a cost for precision. The decision concerning the precise measure of accuracy must, therefore, be judged by the relevant rules of economy. By accuracy here we mean the comparison of the model with reality.
of accuracy of past performance against the present happening and of present forecast against the future predictions is most desirable. After every forecast deviations should be studied and its predictive accuracy must be improved in the light of the size of the coefficients of inequality and average deviation of prediction from actual values etc.

5. **AVAILABILITY**

The quest for relevant data exerts a constant strain on the mind of the forecaster. He always tries to collect the up-to-date information but mostly his forecast is based on the immediate availability of data. The techniques adopted by the forecaster must be such that they may yield meaningful results quickly. Those methods which are time consuming produce useful information too late; by the time such information reaches the hands of forecaster it becomes meaningless for purposes of decision making.

6. **DURABILITY**

The durability of forecast is quite important for it determines the allowable cost of the forecast. Complicated relationship between a large number of factors might hold better chances of success but there are reasons to believe that forecasts would be more
durable if they are reasonably simple and are based on the stability of the underlying variables measured in the past. The more variables are used the easier do they become subject to unavoidable and indeterminate errors.

7. FLEXIBILITY

Flexibility is the off-shoot or durability of in other words it is an alternative to generality. Business plans must take into consideration the element of uncertainty that is attached to the future and provide for a degree of flexibility in operation. It may be cheaper to provide a margin for this flexibility by taking into account a range of outcome than to improve the accuracy. If a long lasting function based on natural forces and human psychology is set up, it would be fundamental in nature yet it would be hard to measure and thus not very helpful. "A set of variables whose coefficients could be adjusted from time to time to meet changing conditions is a more practical way to maintain intact the routine procedure of forecasting."

8. CONSISTENCY

The forecaster has to deal with various components which are interdependent. If he does not make adjustment

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1. Dean, Jools op.cit., p. 176.
in one component to bring it in line with a forecast of another and go on making succeeding adjustments of this nature, he would achieve a whole which would appear inconsistent. For example, the forecast level of government expenditure must be consistent with the total forecast. If the overall forecast exhibits unemployment, a reduction in taxes or increase in government spending on public works might be imminent. Similarly, if it shows inflationary pressure, enhancement of taxes and reduction in spending might be in prospect.

**METHODS OF FORECASTING DEMAND**

'Despite the difficulties involved, partly inherent, partly in the availability of data, and partly in the theory' various techniques to estimate demand with respect to either the economy as a whole, an industry, or the individual firm have been developed which are certainly superior to sheer guesses. Although these techniques differ widely yet they cannot be regarded as mutually exclusive. In many organisations most of them or even all of them may be employed with varying degrees of sophistication. Fundamentally there are two approaches to the forecasting of demand. One is to obtain information directly, without particular reference to the various forces which go to determine
the demand. The other is to estimate the effects on
the curve of changes in the various determining forces,
taken singly or in combination. In the first class
of methods, there are two main subdivisions. The first
sub-division includes market research, surveys, economic
intelligence, etc., while the second subdivision uses
the historical data concerning notions of buyers to
suggest the level of future demand. The first method
tends to be suitable for short-term, whereas the second
method tends to be used for long-term forecasting. In
the second class of methods much depends on the classifi-
cation of forces determining consumer demand. If the
classification of forces include income or price, they
can be treated quantitatively, but if they include
taste patterns it is less apparent how they can be
expressed quantitatively. Pragmatic analysis reveals
that theoretical demand function is usually comprehen-
sive since it includes all the forces that may influence
the sales but it is abstract. For practical purposes
we should select only those demand determinants that
are "variable, important, measurable, independent and
controllable by management." Besides this, we should
"concentrate more on nonconditional forecasting involv-
ing the estimation of the changes in the independent
variables themselves" rather than the conditional one.
which involves less uncertainty and estimates the impact of certain "known or assumed changes in the independent variables on the dependent variables."

Much economic forecasting is concerned with estimating changes in general business situations because forecasts of general business conditions are quite helpful in preparing the forecasts of the sales of particular industries or firms. As regards commodity forecasts, most sales forecasting is confined either to the short run projections for established products or with long range predictions for new products. The first part of this section deals with techniques for forecasting of general business conditions and the second part deals with forecasting of established as well as new products. In forecasting overall conditions we mostly rely on: (1) gross national product models; (2) barometric techniques; (3) mechanical extrapolations; (4) econometric model building, and (5) survey techniques.

1. **Gross National Product Model**

The national product account for the economy as a whole is a combination of the consolidated current income and product accounts for the various sectors of the economy. The gross national product total is a measure of the flow of final goods and services resulting
from current production during a specific period normally a year. From the viewpoint of forecasting, it may be considered a measure of aggregate demand. The basic assumption behind the GNP model is that "demand governs business activity; if the total spending increases, business activity increases." Thus, if we can forecast the components of aggregate demand, we can also forecast the estimated changes in general business conditions. Normally we break the GNP into various sectors such as the business sector, personal sector, government sector and the rest-of-the-world sector, each of which represents an important segment of total expenditure.

Long term predictions of the firms concerning plant expansion plans and equipment replacement policies relate to projected developments in the economy as a whole. The forecaster must study the probable progress of national income, its principal elements and the related aspects since all of them have a direct bearing on the future growth and development of the firm. Attempts should be made to obtain an estimate of the magnitudes of the major components of national income in terms of expenditures: consumption, government investments and expenditures; in terms of incomes: salaries, rent, interest, taxes, profits; in terms of production:
value added from various sectors including industry, agriculture, transportation and services. The first step to forecast the rate of growth of the economy is to understand the various inter-relationships between major sectors of the economy. Usually, model builders assume that wage-earners and entrepreneurial families spend different proportions of their income remaining after taxation. They also assume that the prices depend on wage rates, the cost of raw material, prices of imported goods and tax rates. On the basis of similar relationships they build a working model of the economy. Prediction proceeds by feeding into this system a number of plausible guesses. It is then possible to tell from the model what would happen, if, for example, wage rates increase, the level of production goes up or a number of such changes take place simultaneously. If the overall forecast indicates heavy unemployment, a reduction in taxes or an increase in government spending might be expected. Similarly, if the general forecast for the economy reveals inflationary pressure, an increase in taxes or decrease in spending might be in prospect. Besides this, heavy unemployment has a tendency to ease money situation with its possible repercussions on residential construction and a strong inflationary pressure might mean
that there is a pressure on capacity and some investment or consumption plans have not been materialised.

It is obvious that all business concerns are affected by the growth of output in the economy; but few business houses can afford to devote their resources to calculations of this type. Normally they rely on the forecasts made by bodies specialising in this field. What is needed is the understanding of the published forecasts by the decision maker. It is the conviction of the author that in the hands of an able managerial economist this type of forecast can do a lot in indicating to business what scope there is for expansion.

2. BAROMETRIC TECHNIQUES

Barometric technique or the lead-lag approach is based on the notion that 'the future can be predicted from certain happenings in the present.' This approach 'has a less clear relation to theory'. It is based on the observation that certain statistical indicators when used in conjunction with one another serve as barometers of economic change. They provide an indication of the direction in which the economy is expected to move. Forecasters generally correlate the company's sales with leading, coincident or lagging series and
utilise lead-lag technique to forecast their sales. No method has acquired so prominence in matters of forecasting as the leading indicator approach. Forecasters have often sought leading indicators that could quite consistently precede the upturns and downturns of business and thereby predict the future course of business activity. Unfortunately, they have not succeeded so far. They have discovered certain indicators which turn up or down before general business turns or those that move approximately in phase with general business and those that follow or trail behind aggregate economy. If a single leading series could be discovered which could successfully indicate with substantial regularity the turns in economic activity, a large part of forecasting problem could be solved. None of the series so far discovered is perfectly consistent. For example, stock market prices which have been long utilised as indicators of business activity "have led 31 times, but have coincided sixteen times and even lagged 5 times." Forecasters, therefore, never concentrate on few series but instead concentrate on several dozen economic series that in their opinion quite consistently precede or succeed the upturns and downturns of business activity. They interpret the
movements of series against the background of the expansions or contractions of general business and detect the favourable or unfavourable trends in the light of these cyclical changes.

The knowledge that has accumulated concerning the timing sequence of economic processes reveals that the lead-lag approach is not as useful for the purposes of forecasting as might at first seem because it is not consistent in its behaviour to lead. Frequently, most of the series either fail to signal a true change or else signal too late. Besides this, it is not always possible to predict whether the series is showing an actual turning point or whether it tells merely a false start. For this, we have to wait, which destroys the very spirit of forecasting. Finally, it has been observed that the declines in the leading indicators have usually been followed by a decline in overall economic aggregates but there is no evidence to suggest whether the decline is signalling a lull, a minor setback, or a decline of sufficient magnitude. Thus, declines indicate only the direction of change and not the magnitude of change. They may at the most be interpreted as signalling a decline in economy of unknown amplitude and duration. Leading indicators, therefore, should not be utilised without caution.
They should at best be a supplement to other forecasting devices.

Economists have developed various ratio and difference measures called pressure indexes as guides to forecasting. They are a variation on the lead-lag approach and are based on the idea that amplitude differences play a prominent role in the analysis of trade cycles. It has been observed that the production of durable goods fluctuates more widely than that of non-durables over the course of a business cycle; hence the ratio of durable to non-durable goods production is often used by the forecaster as an indicator of cyclical change. The difference between the rate of housing inventory growth and the rate of family formation has been often used as a pressure indicator of the long-term demand for new construction. The difference between the yields of common stock and corporate bonds has also been used as an indicator of stock prices. These ratio and difference measures as well as diffusion indexes seldom help in forecasting the magnitude of change. They do serve the purpose of providing signals as to the future course of change and, hence, they should be used in conjunction with other forecasting methods to accomplish better predictions.
3. MECHANICAL EXTRAPOLATION

Mechanical approach is one in which conclusions are drawn on the basis of past experience without examining the past and current causal forces. It includes recurrent cycles or lead series or critical levels and many others. In such situations past is mostly projected into the future without any explicit logical rationale. History and data are usually projected into the future without looking into the causes of past movements and relationships and without estimating the possibility of a continuation of such forces. These extrapolation techniques range from simple coin tossing to the trend projections, auto-correlations and other more complicated mathematical procedures. They are widely used by businessmen for forecasting demand partly because they are simple, convenient and inexpensive and partly because time series data exhibit a persistent growth trend. The basic assumption behind the method is that tomorrow would be just like today. This is true because where there is any continuity, today may well be the best predictor of tomorrow. Those who have observed many events or the same event over many days can predict that tomorrow will equal the mean. Extrapolation consists of observing the pattern of sales over some
past period and extending this trend into some future period. An industry or firm which has been in the picture for quite some time normally accumulates sufficient information on sales pertaining to different time periods. Such information when arranged chronologically yields the time series to which a trend line is normally fitted by means of statistical techniques. The trend line is finally extrapolated into the future and corrections are made for seasonal and stochastic variations. Projections based on time series are being increasingly used in making forecasts for relatively long periods. They are valid only if non-recurring distortions have been carefully removed from the sequence of values corresponding to particular periods and if the influence underlying the trend in the past shows a persistent tendency to move in the same direction.

Time series are subject to at least four sources of variations: trend, seasonal variation, cyclical variation, and irregular forces. Trend refers to the long-run growth or decline of series. Seasonal variations result due to weather and related factors and repeat themselves each year. Cyclical forces are related to boom and depressions and are the product of calamities, strikes, wars, etc., and occur in an erratic manner. ICI forecasters have developed a fairly
sophisticated technique for long-term forecasting based on moving average. There a persistent growth trend exists, 'a moving average is obtained by adding early demands for successive periods of a given number of years and dividing by number of years.'

An illustration of three-years, five-year and seven-year moving average is presented in the following Table-1:

**TABLE - 1**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>SALES</th>
<th>MOVING AVERAGES</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3-Year</td>
<td>5-Year</td>
<td>7-Year</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>36</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>64</td>
<td>60</td>
<td>..</td>
<td>..</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td>84</td>
<td>74</td>
<td>..</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>108</td>
<td>90</td>
<td>88.8</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>62</td>
<td>100</td>
<td>101.8</td>
<td>94.1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>110</td>
<td>107</td>
<td>103</td>
<td>104</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>129</td>
<td>78</td>
<td>108</td>
<td>..</td>
<td></td>
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<tr>
<td>8</td>
<td>86</td>
<td>116</td>
<td>..</td>
<td>..</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>133</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td></td>
</tr>
</tbody>
</table>

The above moving average has been constructed from a hypothetical sales data by "replacing each value in the series by the mean of that value and some of the values immediately preceding it and directly following it." Moving average is normally
constructed to smother out the fluctuations in the series, hence the length of the moving average should be equal to the average period from trough to trough or from peak to peak so that such a series may be produced which changes gradually. Having drawn a desired moving average, a line is fitted to the demand data which represents an average demand curve. The slope of the trend is then treated as criterion for selecting the desired trend curve which is then utilized as the basis of forecasting. For determining trend a moving average is quite simple and tends to represent a realistic picture of long-run movements but it misses many observations both at the beginning and at the end of the original series and, hence, moving averages are often used to study the deviations from the trend rather than the trend itself. Professor Holt of Carnegie Institute of Technology has developed a technique for short-term forecasting by extrapolation using exponentially weighted moving averages. He attaches a progressively greater importance to the most recent period and successively lesser degrees of importance to periods in the more distant past. However, the formula needs certain corrections so as to allow for changes in trend and for systematic seasonal variations.
Correlation and Regression Analysis

Correlation techniques are frequently adopted by the forecasters to use the available historical data for an estimate of the future. The technique measures the relation between two or more variables that exist either at the same date or previously and indicates the significance of this relationship. Analysis can be undertaken at various levels of sophistication. In simple correlation the function has only one independent variable whereas in the case of multiple correlation more than one independent variables are involved. To use this technique based on past relationship, we have to assume that the same forces will continue to operate in the future as operated in the past. However, an evidence of a high degree of correlation between two variables never implies causation. The fact that sales were high when advertisement expenditures were high or sales were high when disposable incomes and advertising expenditures were high, does not imply that high advertising expenditures or high incomes and high advertising expenditures caused the high sales. All that we can conclude is that the data are not inconsistent with such relationships. If the relationship found to prevail in the past does not
remain valid in the future, correlation analysis usually produces misleading results. More confidence can be placed only if a logical or causal basis for such relationships can be established or predictions based on correlation are confirmed by other techniques. Only qualified correlation techniques may be treated as one of the important tools of forecasting.

The statistical method known as regression analysis is most frequently used for the estimation of demand. A full description of this technique is beyond the scope of this project. We are only presenting the outlines of this method. The first step is to specify the variables that are likely to influence demand. The second step is to obtain accurate estimates of these variables and the next step is to specify the form of the equation. The most common form is a linear relationship such as the following:

\[ D = a + bp + cy + dA \]

where \( D \) represents quantity demanded, \( p \) is the price, \( y \) represents disposable income and \( A \) is advertising expenditure.

Linear demand function is very popular because many demand functions are approximately linear. It is also a convenient statistical technique. The method of least squares, can be used to estimate the parameters
a, b, c and d, the regression coefficients, for linear equations.

The second most commonly used demand relationship is the multiplicative form:

\[ D = a p^b A^c y^d \]

The above equation is the most logical form of the demand function. It assumes that the marginal effects of each independent variable are not constant but depend upon the value of the variable and on the value of all other variables. The multiplicative demand function can be transformed into a linear relationship using logarithms and then estimated by the least squares regression technique. The above equation is equivalent to:

\[ \log D = \log a + b \log p + c \log A + d \log y \]

Although the algebraic form of demand function—linear multiplicative or other form—should be selected to reflect the true relationship between variables, there is no a priori basis for the same. In such situations several forms may be tried and the one that suits the best may be selected.

The brief mention of correlation and regression analyses reveals that these techniques are not the substitute for sound judgement because not only the
variables affecting demand are many but they are themselves highly inter-related. They inter-act mutually and are determined simultaneously. In the present state of knowledge when the so-called structural relations are unknown, there will always remain doubt as to whether past regression relationship will be valid in the future too. It is a fact, however, that such techniques can greatly improve the reliability and accuracy of forecasts and minimise the role assigned to experience if they are handled by professional statisticians or econometricians.

4. ECONOMETRIC MODEL BUILDING

Econometrics deals with the science of economic measurement. It involves the use of economic theory, mathematics and statistics and is based on the assumption that changes in economic activity can be explained by a set of relationships between the critical economic variables. The econometric model used in forecasting takes the form of an equation or system of equations that seems best to express the most probable inter-relationship between a set of economic variables according to economic theory and statistical analysis. The model in essence is a simplified version of a real situation consisting of systems of simultaneous equations.
showing the pattern of interaction among the specified economic variables and employed as a predictions system that will yield numerical results. It is based on the idea that economic system is not static but it is subject to change and that change can be explained by a set of relationships between variables. It explains past activity by combining relevant variables covering past period of time into the best mathematical arrangement and predicts future activity or the future course of one or more of these variables, on the basis of established relationships or by deriving mathematical equations that will express most probable relationship between a set of relevant variables.

Econometric models are quantitatively and qualitatively formulated. They may be constructed for aggregative forecasting or for industry or company forecasting with a view to facilitate decision-making and planning by government, business executives, labour unions and similar organisations having a direct interest in economic and business conditions. These models include both exogenous and endogenous variables and are often dynamic in nature for they relate variables at one point of time to other variables at other point of time.

One of the first steps to construct an econometric
model is to determine all or most of the factors influencing the series to be forecast. Then the influence of these factors is reflected in a sort of equation. When assumptions are made regarding the independent variables, the resultant effect on the dependent variables is evident from the equation. Mostly the econometricians proceed to predict the future course of economic events by specifying the hypothesis which purport to explain the event under investigation. Then they translate the hypothesis into a multiple correlation formula or equation. The equations of the model are either identities—equations that are true by definition or behavioural statements—indicating how some variables react with reference to changes in other variables. A major objective of these models is to establish functional relationships between various variables and to measure them by some suitable techniques. A functional relationship is said to exist between two variables where a change in the value of one is associated with a change in the value of another. Consider, for example, a simple demand function in which it is assumed that the Sales (S) of a company during any given period of time (t) is a function of the number of consumers (C) during the period, price (P) of the commodity in the
period and their disposable personal income \( y \) during the previous period \((t-1)\). This model can be expressed by the following unspecified equation:

\[ St = f(Ct, Pt, Yt-1) \]

If it is assumed that the relationship existing among the variables is of linear type and that it is not exact, the model takes the form of specified equation:

\[ St = a + bCt + cPt + dYt-1 + Ut \]

where \( a, b, c, d \) are parameters to be estimated from the given data with the help of some technique and the variable \( U \) is a disturbance term. The term \( U \) represents factors other than number of consumers, price and disposable income, which are random in nature and in statistical sense they are normally distributed, hence \( U \) will average out to zero. Such equations are called predicting equations because once the parameters are estimates some test may be applied to evaluate the adequacy of the equation as a device to forecast the sales of the company. Single mathematical equation system can solve most of the uncomplicated problems of the industry but if the theoretical structure is complex and there are significant interrelations in the system we have to take the help of a simultaneous-equation model which undoubtedly needs a computer solution.
One advantage of this approach is that before an equation can be constructed, we have to isolate and analyse the factors which determine the series to be forecast qualitatively and quantitatively, and find out what forces cause the series to vary. Such investigation provides relatively more exact information about the series and the accuracy of the forecast. It should, however, be pointed out that the forecast of the dependent variables in this approach depends upon the forecast of the independent variables. Independent variables are mostly forecast by the use of lead series, trend projections, opinions and intentions surveys, etc. Such factors may or may not involve qualitative or casual analysis. Thus, it is merely a device for converting one forecast into another. One of the major limitations of the model approach is the implied assumption that the relationships established in the past will continue to prevail in the future. Besides this, it is not always possible to introduce various variables to reflect the real state of economy. It is, therefore, said that it is not a forecast, but a tool for appraising the effects of alternative policies.

Although econometric models have failed in many cases but this does not mean that we should abandon
them. Being analytical in nature and process oriented in approach, they throw more light on the problem of a theoretical and statistical nature provided the statistical data are good. The most important use of these models is that they provide a null hypothesis against which the more sophisticated forecasting methods can be compared. These methods rather than rivalling the other methods are perhaps the only methods which are logically suitable for incorporating the best features of all.

**Input–Output Analysis**

Another variant of econometric model building is input–output analysis. It provides a highly versatile forecasting method for examining the complex interrelationships within a system. It shows that industries in the economy are so linked that the output of one industry becomes the input for the other industry. The increase or decrease in the demand for one industry's output is bound to affect the demand for the output of other industries. For example, an increase in the demand for tractors will lead to an increase in the output of the automobile industry. The increase in automobile output will necessitate an increase in the production of steel, tyres, glass, plastics, coal and synthetic fibers. There will be further reactions; such
as, the increase in the demand for synthetic fibers and other chemicals will lead to an increase in the demand for electricity and transportation facilities. Input-output analysis thus traces intricate chain reaction through all these inter-industry relationships to provide information about the total impact on all sectors of the original increase in the demand.

Input-output forecasting is based on a set of tables that explain the inter-relationship between various components of the economy. These tables identify the activities that generate important demands and help in estimating related industry requirements. Many business executives have recognised the unique ability of this technique and have utilised it in decision making. The technique has been often utilised to discover new markets, to evaluate market prospects, to add new dimension to the introduction of new product and to find out the possibility of investment prospects in the economy. Government agencies have also made use of input-output tables for studying the implications of changes of GNP and the impact of fluctuations in GNP for manpower planning. It should be noted that the cost of setting up and maintaining these tables is enormous, consequently almost all the firms rely on the tables prepared by their national governments or research organisations.
The versatility and power of these tables depends upon the detail contained in the basic input-output matrix. If the matrix provides greater detail it leads to much greater use of the technique for forecasting as well as managerial decision making.

5. SURVEY TECHNIQUES

The problem of forecasting is sometimes tackled by the use of opinion polling or survey techniques to find out what people who are directly involved plan to do. Surveys usually involve use of interviews or mailed questionnaires asking individuals, business firms and government agencies about their future plans. Since most of these agencies plan and budget their expenditures well before the actual spending is done, their capital sales and operating budgets can provide much information that is useful for forecasting. Various kinds of surveys are employed both in economic and sales forecasting but the most prominent of these revolve round the plans for plant and equipment expenditures by business firms, surveys of businessmen's plans regarding inventory changes and the plans of individuals to buy important durable goods. The idea behind the technique is that most of such plans are made in advance. If such plans can be detected correctly, it is possible to
predict the future course of economic happenings precisely. Field surveys are mostly conducted by the corporation's field sales organisation, by its head-quarter's market-research staff or by the specialised market-research and opinion-research organisation. The usefulness of these surveys depend upon the wording of the questionnaires, the ability of those surveyed, on the representativeness of the sample and finally on the technique of analysis, testing reliability and conclusion. The approach followed will depend upon the sociological frame of reference, nature of the product and the characteristics of the market. However, the most direct approach to demanding men's behaviour, their intentions, their attitudes, their thought process and their motives constitute an indispensable preliminary for any enquiry.

The most direct approach of all is to go out and ask the potential consumer-buyers to indicate their demand schedules for certain product according to their guesses or assumptions. Since it is manifestly impossible to ask all the customers, it becomes necessary to contact either by mail or by personal interviews a statistically satisfactory sample made up of the few that make up the bulk of the market. Mostly a panel of consumers is chosen and questioned about their
preferences in a concrete situation. Samples may be completely random or stratified; they must be as free of bias as possible. Bad samples make bad surveys. A good sample is generally obtained by spending a lot of money on learned and sophisticated professionals who are the incharge of such surveys. In a situation where corporate expertise is on the upgrade the commercial surveyors are in a state of decay.

The problem of surveying customers intentions in the farm and industrial markets is relatively simple because this method puts the forecasting burden on the customer and the problem of the seller is only to persuade the buyer to tell him his purchase plans. Besides this, the seller is in direct contact with his ultimate customers who being the purchasers of larger kinds of equipment are few in number and a small number of such large buyers usually determines the size of the total market. The accuracy of such surveys is greatest when officers interview officers but if it is left to subordinate staff whose usual contacts are with the personnel of purchase department, the accuracy turns out to be poor. In every case field surveys should be regularly checked and supervised. They should be strongly seasoned by head-quarters market research staff's own views. Without this the results
may be disappointing.

Market surveys of new or improved product generally require personal interviews to explain to the buyers the technical and cost advantages of the product. Experienced salesmen who have the necessary technical background and have had some personal training in conducting interviews can perform this job satisfactorily. There are, however, formidable barriers in understanding the buying intentions of the consumers. Not only do people lie for reasons of prestige, honour and reputation, experience has revealed that they are mostly inconsistent in their buying plans and fail to foresee what action they would adopt when faced with multiple alternatives. Besides the reluctance and dishonesty of the respondents, it is rather bad conception and poor execution that also make bad surveys.

The panel approach is the simplest way to know the behaviour of consumers because through this approach we regularly obtain market information from a select group of regular customers but the use of this approach is limited. Although a panel is relatively more economical than a questionnaire because it is continuing and a new sample is usually not taken every time a new product is tested. But frequent dropping out
usually occurs on account of death or unwillingness of the idle rich. Finally, the number of questions that can be asked are also limited and many a times it is never clear whether the buyer's plans are real or imaginary. Another variant of this approach is the selling of samples of the product to various groups of consumers to test hypothesis concerning demand. Few groups are selected for their approximate homogeneity with respect to income, taste patterns, etc. The commodity is then offered for sale at different prices to different groups. The results provide a demand curve which could be used in estimating the demand for larger population. The advantage of this technique over surveying intentions is that people are actually in buying situations. The disadvantage is that many commodities would not lend themselves to this approach and that there is likely to be little, "bandwagon effect," that is buying because others are buying." Direct inquiry of customers has thus several shortcomings in the sense that industrial customers' plans are sensitive to short-run economic fluctuations whereas customers' plans are fragile and capricious. Surveys for information regarding their buying intentions, to be worth anything, are costly.

An alternative method of obtaining information regarding the behaviour of the consumers is through
market experiments. One technique applies a controlled laboratory experiment in which consumers are given funds to buy goods from a specific shop. This consumer clinic has a number of drawbacks. Firstly, the consumer knows that he is the part of an experiment and this knowledge may distort his buying habit. Secondly the experiment is costly for it requires huge amount of money. Lastly, the high cost necessarily limits the size of the sample.

Another variant of this technique involves examining consumers behaviour in actual markets. For example, a firm wants to launch a new product but hesitates between two brand names. It selects two markets as close as possible and introduces the product in both markets. A study is, thereafter, made of consumers reactions and the differences are attributed to the differences in brand names.

This method differs from surveys because in this technique studies are made regarding consumers behaviour in situations wherein certain variations are controlled. A big advantage of such an experiment is that the consumer does not know that he is participating in an experiment. Therefore, we can believe that he will behave as he would, if the product were actually being marketed. Being expensive these experiments are undertaken on a small scale. They are seldom utilised for
long periods to indicate the long-run effects of price packaging and advertising strategies. Uncontrolled parts of the experiments such as strikes, natural calamities, changes in socio-economic conditions further reduce the value of such experiments. These experiments take for granted the possibility of locating two markets sufficiently identical but in actual practice where variables are so many this condition is difficult to achieve. There is another danger that customers once lost during the experiment as a result of manipulations might not be regained when the experiment is over.

Theoretically, consumer surveys provide excellent information on a number of topics relating to demand relationships but when it comes to practice this procedure does not work smoothly. Consumers usually do not provide adequate information to hypothetical questions, hence the information obtainable through this technique is limited. By this we should not mean that such surveys are useless in demand analysis. Where subjective information has to be obtained there is no substitute for the consumer surveys. Surveys are generally used to supplement rather than supplant quantitative analysis because surveys are well suited for a non-quantifiable psychological element which is
in almost all the economic events.

**FORECASTING THE DEMAND FOR NEW PRODUCTS**

So far we have discussed the problem of forecasting demand for products already established in the market. It should, however, be noted that the methods of forecasting demand for new products are in many ways different from those for established products. Since the product is new to the consumers, an intensive study of the product and its likely impact upon other products of the same group provides a key to the intelligent projection of demand. Joel Dean has classified a number of possible approaches as follows:

1. **Evolutionary approach**: It consists of projecting the demand for the new product as an outgrowth and evolution of an existing old product. This method is applicable only in those cases when the new product is so close to the established product that its demand can be assumed to be a more or less projection of the potential development of the existing product. This approach has obvious limitations since the basic problem is to estimate how the demand for the new product will differ from that of the old one.

2. **Substitute Approach**: According to this approach the new product is treated as substitute for the existing
product or service. This approach is quite useful if it is scientifically utilised. Since most of the new products are generally the substitute of the old products, they are in many ways an improvement over the existing one. Besides this, they usually have several uses. Consequently, each use possesses a separate substitutability problem, and substitution for the old product may account for only a part of the demand for the new product. Sometimes the old product sets the upper limit for the entry of the new product but it has been observed that it is not the upper limit of substitution but the rate of penetration and displacement and the disparities in the relative prices that are important.

(3) Growth Curve Approach: It estimates the rate of growth and potential demand for new product on the basis of some growth pattern of established product. This approach has narrow applicability because development of a law of growth for the new product on the basis of the actual rate of growth of the similar product is a tedious job. Even if any such law can be developed it is useful at the later stages of development. So far the investigations have not established any reliable pattern of growth for such products.
(4) Opinion-Polling Approach: Under this approach, demand is estimated by direct enquiries of the ultimate purchasers either by the use of the samples or by blowing up the sample to the full scale. This technique to survey the intentions of buyers as revealed by personal interviews has been successfully used by many concerns to explore the potential demand for the new product. For skilled industrial buyers, engineering drawing specifications and test results are utilized; and if it is a new chemical, description of known properties, composition and probable price are sent to a few prospective buyers. But if it is a big complex or drastic innovation, then a trier-man constitutes the part of the process of exploration of the demand.

(5) Sales-Experience Approach: The new product is offered for sale in a sample market and from this the total demand is estimated for all channels and a fully developed market. This experiment if properly controlled yields better results but allowance should be made for the immaturity of the sample market and its peculiar characteristics. An inadvertent experiment without any regard to the peculiarities of the market may result in a colossal loss.

(6) Vicarious Approach: It consists of surveying
consumers' reactions to a new product indirectly through the eyes of specialised dealers who are supposed to be informed about the needs of the consumers. This approach is quite easy but hard to quantify. Vicarious surveys are mostly used as a cheap horseback sally. Unless they are confined to the area of the dealers experience, they are worthless. Besides following the above approaches the firm should consider its potential market for the new product either through examination of existing data or by means of surveys analysing the number of current and potential competitors, the characteristics of their product, their productive capacities, their means of distribution, price structure and past developments and future trends. The firm should also acquire knowledge regarding the behaviour of the consumers, their intentions, their attitudes, their thought processes and their motives and their reasons for reactions. Although the problem of forecasting the demand for new product is in many ways quite distinct yet to some extent the methods described for forecasting of an established product can be equally applied or adopted with minor modifications for new product too.

In the end, we can therefore, conclude that for better forecasting a fuller understanding of the nature
of demand and its determinants is highly essential. A trained forecaster who understands the principles governing demand can make a more competent forecast than the naive amateur who indulges in pure guesswork.

In order to identify the determinants of demand, goods may be classified as those demanded by final consumers and those demanded by intermediate consumers. Goods demanded by the final consumers are either durables or non-durables whereas the goods demanded by intermediate consumers are either capital goods or raw materials. The major factors affecting the demand for these goods have already been discussed in the previous chapter, so in this chapter we will just touch them to provide a basis for their protection against oversight.

The influence of the sale price of the product and the sale price of substitute and complementary commodities on the volume of demand is most vital. It should not loose sight of the forecaster. Besides price variables, sales policy of the firm pertaining to advertising, sales methods, presentation of the product, discounts, rebates, etc., also affect the demand for the product. In order to understand the impact of the sales policy and its practice the forecaster must concentrate on the share of the market because sales
policies of firms mostly affect demand within industry group.

Income of the consumer especially disposable personal income affects both the level and pattern of demand. Since consumer behaviour is most responsive to real income, behaviour of income can be used as a means to forecast short run variations in the consumption pattern of the final consumer.

The analysis of those stochastic variables whose probability distributions can be studied in basis for the forecasting of demand. For example, the daily consumption of ice is closely related to daily temperatures. Since the probability distributions of daily temperature can be studied, they are stochastic variables. By foreseeing the rise and fall in the daily temperature, a forecaster can also foresee the demand for ice.

The demand for many products is determined by demographic factors such as the demand for shirts depends upon the number of men and the demand for petrol depends upon the number of cars, trucks and other vehicles in use. Time factor also plays a significant role in influencing demand. Changes in demand can be analysed in terms of long-term adjustments in consumption habits and short-term fluctuations in demand patterns.
The demand for consumer durables is influenced by time-use characteristics, use-facilities characteristics and demographic characteristics. Since consumer durables are not used at one point of time, the consumers can postpone their replacement. They are free to use by repairing them or to buy new ones. The purchases of these goods also depend upon special facilities provided for their use such as the use of car depends upon good roads and availability of petrol. Similarly, demographic factors such as the age distribution, size of the family etc., affect the demand for consumer durables like cars, radios, refrigerators.

The demand for intermediate consumption goods depend upon several factors. In this section we will discuss only those aspects which we have not discussed in the consumption market.

The intermediate consumption market is influenced by production processes of consumer industries. Short-run variations in demand mainly influence inventory levels and replenishment policies whereas long-run fluctuations result in adjustments in factors of production, cost structure, production techniques and profit ratios.

These goods are more sensitive to price changes and changes in the firm's policy than are consumer goods.
Substitution normally takes place whenever prices are abnormally high. The variety of goods, the promptness of the execution of orders, consistency in quality level and the facilities of payments affect the demand for intermediate goods both in the short and long run. Besides this, the demand for these goods largely depends upon the number of competitors and their relative share of the market. Since the number of consumers in the intermediate market is limited, it has an appreciable influence on the methods of marketing.

The demand for capital goods and the intermediate goods is a derived demand, for these goods are needed for the production of another goods. Their demand, therefore, depends upon the profitability of the firms using these goods, their relative prices and the ratio of production to capacity in the user industries. The forecaster of these goods should mainly concentrate on the growth prospects of the user industries, the norms of consumption of these goods per unit of installed capacity and their prices relative to other costs.

In forecasting the demand for a product, greater emphasis should be given to the analysis of economic structure which includes the influence of income and price, family budgets, dynamics of markets, potential markets for new products, firm's sales policy and
sociological and ecological conditions of demand.

So far we have studied forecasting of demand solely from the point of view of economic implications. We have neglected sociological and ecological aspects which can provide a correct rationale and lead to a more perspective analysis. In case of consumers durables and non-durables, the behaviour, intentions, attitudes, knowledge and motives of consumers play a significant role. We should have some idea how the consumers are stratified economically, socially, geographically and by age and sex; how they are attracted or impelled by the goodness or badness of the commodity. In case of intermediate and capital goods the number, size, geographical location and the goodwill of the sellers influence the sale significantly. Psychological motivation of industrialists, their personal attitudes with respect to product and production process and their sensitivity to business cycles can contribute more to managerial economics than the grid formalism of conventional theory.

In an 'onion-shaped' society, the demand is largely governed by inter-personal stimulation and socio-economic contact. 'One man's consumption becomes his neighbour's wish.' Consumers are normally interested in the maximisation of the rate of refinement of preferences rather than the achievement of a stable state. Socio-psycho-

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- (189) -

gical and sociological factors such as attitudes to leisure, significance of social status, quantum of education and emancipation of people play a prominent role in today's democratic society. A forecaster, therefore, should be cautious in employing highly formalised techniques of forecasting. We should give full and imaginative thought to the broad psychological and sociological influences in determining consumer behaviour. A neglect of psycho-socio-economic analysis of demand is bound to prove fatal to the forecasting of demand.