In recent years the scope of forecasting has expanded well beyond technical aspects.

Forecasting: The Key to Managerial Decision Making

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Introduction

The context in which management is now carried out is changing rapidly; a number of American management thinkers have talked about companies living in "a turbulent environment"[1] and the phrase is being used more and more by Australian companies. What it means is that the economic and market conditions which companies face seem to be changing in a swift and often unpredictable manner.

Hence, every day, managers make decisions without knowing what will happen in the future. Inventory is ordered without certainty as to what sales will be; new equipment is purchased despite uncertainty about demand for products, and investments are made without knowing what profits will be. Managers are always trying to make estimates of what will happen in the future in the face of uncertainty.

But good forecasts are an essential part of efficient and effective management; they are a crucial modelling tool both in strategic and tactical decision making. So commitment to forecasting in organizations of all types has grown steadily. There are several factors which have stimulated interest in forecasting:

- Because organizations and their environment are becoming more and more complex, decision makers find it more difficult to weight all the factors in a given situation without some explicit, systematic aids.
- As organizations have grown larger, the magnitude and importance of individual decisions have grown. Many decisions warrant special forecasting studies and more thorough analysis.
- The circumstances of most organizations have been changing at an accelerating rate. With key relationships no longer stable, forecasting has proved to be one of the best tools for quickly identifying and understanding new relationships.
- Many organizations have moved towards more systematic decision making, requiring explicit justification of individual actions. Formal forecasting methods are one way to support and evaluate such actions.
- And perhaps most important, forecasting methods (and cumulative experience concerning their application) have been developed which can be applied directly by practitioners rather than by technical experts only[2].

Clearly, the availability of mainframe, mini-, and micro-(personal) computers has broadened this widespread access and applicability.

Forecasting as Distinct from Planning

The notion that planning and forecasting are different functions deserves special mention. Forecasting is generally used to predict or describe what will happen (for example, to sales demand, cash flow, or employment levels) given a set of circumstances or assumptions[3]. Planning, on the other hand, involves the use of forecasts to help in making good decisions about the most attractive alternatives for the organization. Thus a forecast seeks to describe what will happen, whereas a plan is based on the notion that, by taking certain action now, the decision maker can affect subsequent events in a given situation, and thus influence the final results in the decision desired. For example, if a forecast shows that demand will fall in the next year, management may want to prepare a plan of action which will compensate for or reverse the predicted drop in demand. Generally speaking, forecasting and forecasts are inputs to the planning process.

An important point for managers to remember as they make decisions is the effect of those decisions on the forecast. That is, when action is taken, the forecast may need to be adjusted to reflect the impact of that action. If the forecast is not adjusted, it may become misleading if it is used as a basis for making other decisions.

We wish to acknowledge the assistance of Mr Ian Ahon, manufacturing manager at Kenbrock Timber Finishes Pty Ltd and V. Thieu and K. The – past students at Monash University (Caulfield Campus).

Additionally, it will no longer be possible to evaluate the accuracy of that forecast after the fact because it no longer reflects the circumstance or assumptions which existed when the forecast was prepared.

Principles of Forecasting

In its simplest expression business forecasting is the projection of current experience forward in time. For example, if sales have increased by 10 per cent each year for the past four years, our forecast of the expected sales increase next year is 10 per cent or more.

However, this may be too simple a view, and may lead to error. Past experience may be related to various factors which have influence on the result. These factors may change in different proportions and the forecast then becomes a matter of relating factors to results, estimation of the changes and determination of a compound forecast from these individual trends.

At a further level of abstraction, these factors may themselves be influenced by external factors, such as the state of the economy, political climate, etc. and so forecasting becomes initially a problem of analysis – the analysis of first, second and third-level relationships with various transaction data of the economy.

Forecasting is an integral part of company planning – the systematic examination of the company's resources in order to utilize them to the best overall advantage. At each stage the company plan must examine current uses against the criteria of alternative possibilities and allocate resources accordingly.

Developing a Forecast

The task of forecasting is a matter of the use of objective techniques to analyse basic factors which may influence the result, the application of appropriate judgement, determining the values to be attached to the factors, and the results forecast. Once strategic data have been accumulated, they must be transformed into information which will enable strategists to determine objectives and formulate strategies and make appropriate choices. These decisions, while made in the present, relate to future events.

The role of forecasting in strategic management, therefore, is to reduce uncertainty and to aid in decision making. In strategic decision situations, uncertainty can never be eliminated altogether. Ultimately, decision makers attempt to quantify the uncertainty which remains. This process is usually referred to as risk analysis.

Compounding the problem of reducing uncertainty is the fact that the amount of uncertainty is increasing as the environment becomes more volatile. Changes have more pronounced effects because of the time horizons of most long-range strategies. One, two or more years frequently elapse between the conception of a new product and its actual making, or between the decision to acquire or sell a strategic business unit (SBU) and the actual event. During this time the assumptions (premisses) on which the strategy was based may change significantly. But rapid change is compressing these time horizons.

Much uncertainty can be reduced, however, and the strategic manager should become familiar with those uncertainty-reduction techniques at his or her disposal. Put simply, forecasting is vital. While it is assumed in most planning models, forecasting is not an easy task.

Techniques for Forecasting

Forecasting is anticipating, projecting, or estimating some future event, series of events, or condition which is outside the direct control of the organization. As previously mentioned, it is not planning, because planning involves actions, events, or conditions over which the organization has some control. Managers plan to take certain action because they have forecast that certain environmental events will occur. If the events fail to happen as anticipated, the plans must be altered.

Strategic managers use environmental information in two ways

A plan is only as good as the forecast on which it is based, and a forecast is meaningless without a plan. Strategy formulation consists of using forecasts of future environmental events to set a direction for the firm which will take advantage of those events. This strategy must be within the firm's capabilities.

Therefore it is necessary to interpret previously analysed environmental information which has been determined to be relevant for the firm, to project the future business conditions and set future directions for the organization. That is, strategic managers use environmental information in two ways: to forecast future events, and to formulate strategy to prepare the firm for those events.

Although a full treatment of forecasting techniques is considered to be outside the scope of this article, nevertheless it is an attempt to give an overview of the methods which are applicable to the external environment. It is perceived that there is a need to project

past trends into the future, despite the likelihood that the relative influence of future environmental variables will be different from that from historical influences.

Georgeoff and Murdick[4] have created an easy-to-use and readily available guide to choosing a forecasting model to reduce the complexity of the process. These techniques vary in their sophistication and the conditions under when they are most appropriate. The results of these forecasts establish the future environmental conditions for which the firm must plan.

Most forecasting required for decision making is handled judgementally in an intuitive fashion, often without explicitly separating the task of forecasting from that of decision making. This is true even within large organizations. Unaided, subjective judgments clearly are not as accurate and effective as more systematic, explicit approaches to forecasting. Techniques ranging from simple naive procedures to sophisticated quantitative methods and from simple judgemental methods to complex qualitative ones are available. Below we briefly describe the technique of forecasting.

Formal and Informal Methods for Forecasting

Informal methods are largely intuitive and depend on individual experience and abilities. Informal methods are used when there is insufficient time or data to use more formal means. *Formal* methods of forecasting are both qualitative and quantitative.

Qualitative methods rely on *managerial judgement and experience.* Different individuals can obtain different results from the same information. Qualitative methods are useful only when data are unreliable or in limited quantity or when time is limited.

Quantitative methods rely on *mathematical models* and assume that past data and other relevant factors can be combined into reliable predictions of the future. Two methods are in use; Auto projection (time series) or causal. Each method is suited to different circumstances.

Qualitative Methods

Delphi

Three to six rounds of answers to progressively refined questions are taken anonymously from an expert panel to eliminate bias from the most persuasive or authoritative person and from bandwagon effects.

Market Surveys

Statistically designed surveys of customers, potential customers or expert observers; test market of products to gather information on market conditions.

Life Cycle Analogy

Forecasts based on the position of the product in its life cycle. Each phase of product life from introduction through growth, maturation and decline has a different demand outlook and market and manufacturing characteristics.

Quantitative Methods

Auto Projection (Time Series)

Patterns of past demand are projected into the future. The pattern of past demand is broken into components of:

A – Average level T – Trend component

S – Seasonal cycle factor

Then forecast demand for period t is:

$$D = [A + T_t]f(S_t) + \text{error}$$

Moving Average

This is the simplest auto-projection method. Usually, trend, seasonal or cyclical patterns are not included in this method, although in more advanced versions they can be.

Average demand is the arithmetic average of demand from a number (N) of past periods.

$$A_t = [D_1 + D_2 + \ldots + D_{t-N+1}]/N.$$

The forecast demand F for period $t + 1$ is a projection of the past average demand. The number of periods included in the average can be increased for more importance on past demand (damping). To fine tune sensitivity of the moving average to certain periods, a weighting factor W_t can be applied to those periods:

$$F_{t+1} = A_t = W_1D_1 + W_2D_2 + \ldots + W_ND_{t-N+1}$$

where $W_1 + W_2 + \ldots + W_N = 1$.

Exponential Smoothing

This method is a special form of the weighted average and focuses on the most recent period in a weighted combination with the average from immediately preceding periods.

$$A_t = WD_t + (1 - W)A_{t-1}.$$

Weighting fact W, is $0 < W < 1$; usually, $0.1 < W < 0.3$ for stability.

Larger values of W increase the sensitivity of the forecast to recent demand.

Causal

So called because they develop *cause and effect* relationships between demand and other variables. Causal methods help in predicting turning points in time series data and therefore are most useful in medium-to-long-range forecasts.

Regression

Best-known causal methods in which the main variable is tested mathematically for correlation with other variables whose patterns are known. Linear or multiple regression can be used; that is, testing correlation with a single variable or two or more variables simultaneously. Regression analysis produces a line which best represents the past data. This line can be projected to describe future demand.

Regression equations:

linear regression: $y_x = a + bx$

multiple: $y_{x_1 x_2 \ldots x_n} = a + b_1 x_1 + b_2 x_2 + \ldots + b_n x_n$

where y_x is the dependent variable, estimated demand;

x_n is the independent variable hypothesized to cause y;

a is the initial value of y_x, i.e. when x_n is zero;

b_n are the rates of change in y_n with respect to x_n (slope).

Regression analysis finds the line of best fit to past data by finding the points with minimum overall error compared with the actual. This line is projected into the future to obtain a forecast.

Box Jenkins

Box and Jenkins developed an iterative method which identifies the forecast model to be used, estimates the parameters, performs a diagnostic check, then uses the model to develop a forecast. This system uses autocorrelation (whereas others ignore it) to improve accuracy.

Econometric

Econometric methods are an extension of regression analysis. Regression assumes that the variables being examined are independent. However, for variables which depend on each other, the relationships between the variables must be expressed in separate equations and analysed for regression simultaneously.

These methods are not common in companies. They are mostly used as predictors of the macroeconomic climate and can be purchased from a bureau when required.

Input-output

Input-output models are a type of econometric model based on the relationship between outputs and inputs of various industries. For example, the number of motor vehicle sales could be used as an input to predict sales demand for motor car tyres. This method was developed in the 1930s and is still used in economic planning throughout the world.

Projections of output are often made for industry groups, e.g. food industry sales. These projections can be used to forecast micro demand when it is related to the output of the particular industry group, e.g. demand for metal cans for packaging the food. This method is mainly used for long-range, high-level forecasting.

Forecasting Errors

Errors between past and actual forecasts are calculated and used to evaluate the reasonableness or confidence of the new forecast. Estimates of error, typically *bias* and *deviation*, are used for:

- setting safety stocks or excess capacity to protect against the downside error in the forecast;
- highlighting unusual forecasts to enable a check on validity;
- checking the tracking ability of the forecast.

The Uniqueness of Situations

Forecasting is indispensable for any form of planning or decision making – no single forecasting method or even narrow set of methods can meet the needs of all decision-making situations.

The manager must be aware of values and costs □

Any manager concerned with the application of forecasting in his or her decision making knows the importance of selecting the appropriate forecasting technique for the specific situation. Although each situation is different, as mentioned earlier, each technique has somewhat different strengths and weakness, it is extremely helpful to identify the general characteristics of forecasting situations and to contrast those with the general characteristics of available forecasting methods. These two sets of characteristics or criteria can be used as a basic framework for matching specific needs with specific approaches.

At least four key areas need to be considered by management as it assesses alternative forecasting methods for a specific situation. First is the item to be forecast. This requires a study of the characteristics of the situation, paying particular attention to whether one is trying to predict the continuance of a historical pattern, the continuance of a basic relationship, or a turning point.

Second is the interaction of the situation with the characteristics of available forecasting methods. Here the manager must be aware not only of values and costs but

also of relative changes in value and costs when the level of accuracy changes. If a manager can use a more straightforward and less expensive forecasting method and still achieve the required level of accuracy, he or she should generally do so.

A third consideration is the amount of historical data available. Since different methods (particularly quantitative methods) are based on historical information, the manager must consider the quantity of data at hand, the appropriateness of the data, and what it would cost to gather additional data. All decision-making situations requiring a forecast are reliant on accurate information contained in those historical data. The term data is generally used to refer to any set of numbers or facts which may be available. The amount of information contained in such data is a measure of how relevant those data are to decision making. Forecasts are based directly or indirectly on information which is obtained from such historical data.

Fourth, the manager must consider the time allowed for preparing the forecast. The urgency in many situations can influence the selection of method[5]. All such situations deal with the future and thus involve time directly. That is, a forecast must be made for some specific point in time, and changing that time horizon generally affects the forecast and its accuracy.

Finally when a selection decision as to the "best" forecasting method is unclear, it has been shown to be beneficial to hedge. This can be achieved by using more than one forecasting method or forecaster and then combining their predictions. This has proved to be an extremely effective way of increasing forecasting accuracy and decreasing the variance in errors. Thus, when in doubt, managers should combine multiple forecasts which come from a variety of independent sources. Forecasting is not a substitute for management judgement in decision making; it is simply an aid to that process.

The Limits of Predictability

Over the past few years, considerable criticism has been voiced with regard to the inability of forecasting to warn of forthcoming events and changes. Furthermore, forecast users often have been disappointed because of large forecasting errors which have caused planning and decision making to go awry. This is a misconception as forecasting, used correctly, gives a plus-or-minus error and ultimately is to be used as a guide for decision making. It is interesting to note, however, that as the criticisms about forecasting have increased, so have the number of requests for and interest in obtaining additional forecasts e.g. sales of computer software packages.

This is not surprising, because when there is little uncertainty in the environment and things turn out largely as expected, there is much less need for formal forecasts, whereas in a turbulent environment with high uncertainty, the need for such forecasts is great. It must also be accepted that the forecasting in such a chaotic environment is more difficult to implement, more sophisticated, and would result in accepting high error rates (multiple regression for instance).

No doubt many of the criticisms of forecasting have been well founded. Unexpected developments, predicted events which never materialize, large forecasting errors, and mistakes in the timing and intensity of predicted changes are just a few of the problems commonly cited. However, users of forecasting take the blame, because, like those seeking advice from fortune-tellers or astrologers, their expectations have been unrealistic, particularly with regard to error-free forecasts. Explicit systematic forecasting approaches can provide substantial benefits when properly used, but it is illusory to believe that omniscient powers are plumbed by such approaches.

To understand the advantages and limitations of forecasting it is most important to recognize that all types and forms of forecasting technique are extrapolating in nature. When historical quantitative data are available, the forecasting methods used are called quantitative. Otherwise they are generally referred to as qualitative/technological or judgemental/subjective methods. In practice the distinction may be blurred since all forecasts must add judgements to the answers. It is unfortunate but true that, for quantitative forecasting techniques, there are no simple, reliable ways of predicting what will happen when established patterns or relationships change. This is where forecasting moves into such methods as multivariant analysis and becomes modelling, which is most difficult but most useful. Furthermore, it is seldom possible to predict when such changes will occur. Because quantitative methods base their forecasts on extrapolations from past patterns and interrelationships, they work well only when the future is similar to the past or when changes (by chance) happen to cancel out.

When quantitative techniques do not work well, human judgement, with an appropriate degree of help and structure, is the only alternative for predicting the effect of the change and the subsequent pattern. However, since judgemental methods also base their forecasts on the observation of existing trends, changes in those trends, and the magnitude of future change, they too are subject to a number of shortcomings. The advantage, however, of human-based forecasting approaches is that they can identify systematic change more quickly and better interpret the effect of such change on the future. Weighted against this is the fact that, because we all have vested

interests which often override good (objective) judgement, our desire for a specific outcome or event becomes confused with what is a more likely outcome.

Achieving the Full Potential of Forecasting

The level of success in applying formalized forecasting methods is closely related to the skills and knowledge of the manager involved in the forecasting situation. Three things generally characterize a manager who successfully implements forecasting.

(1) He/she understands the situation for which the forecast is being prepared and knows what is required for successful decision making in that area.

(2) The manager must be interested in real improvements in decision making.

(3) The manager must understand the forecasting technique and its value or use a qualified consultant.

The second aspect of successful forecasting application is the circumstances within the company, e.g. preparing its managers on various forecasting techniques. Finally, the situation itself is important to ensure the success of forecasting. Situations must be chosen which are helpful to the manager, and in which the value of improvements in decision making is substantial[6].

The Accuracy of Forecasts

If the records of a variety of forecasters are examined it is clear that some are more successful (accurate) than others, at least for short periods of time. However, from a predictive point of view, the evidence is equally clear that there is no way of knowing *a priori* who or which method will be more accurate. The accuracy of forecasts does not correlate with the fame of the forecasters, their backgrounds, their experiences, or their past records.

There are some characteristics which can help in selecting the forecasters and forecasting methods which have the highest probability of providing the information desired in a given situation. Forecasters (and their methods) do not possess crystal balls. Understanding their limitations and setting realistic expectations on future performance are central on making effective use of forecasts in decision making.

The overriding aspect of the emerging trends is great uncertainty, coupled with the certainty that change will occur. For example Kenbrock Timber Finishes Pty Ltd, a Melbourne-based manufacturer of timber treatments, has found that strategy cannot be formulated without an explicit or implicit forecast of how the structure of the paint industry will evolve. Unfortunately, however, the number of variables which entered into such a forecast for this organization was staggering. As a result, an approach for reducing the complexity of the forecasting process was highly desirable and Kenbrock set about designing a model to suit its particular needs.

Case Study – Kenbrock Timber Finishes Pty Ltd (Cabot's)

Introduction

Kenbrock Timber Finishes Pty Ltd is a manufacturing company which produces a range of Cabot's timber treatments. Kenbrock considers itself to be one of the smaller "national" brands and accounts for 25 per cent of the total paint market in Australia. Since the company is involved in the wood finishing business, their market rivals are mainly from paint, wallpaper and other decorative products and the four major competitors in the market are Watty, Dulux, Bristol and Taubmans. However, Dulux and Bristol do sell Kenbrock's products in their own stores and both of them are important Kenbrock customers. Besides distributing nationally to all states, Kenbrock also receives export orders, mainly from Thailand; these exports account for roughly 3 to 4 per cent of its total sales volume. Kenbrock employs a total of 83 staff, 58 being at the head office in Victoria.

In order to penetrate the market fully, the company manufactures more than 250 individual products with different features, colours and sizes which provide the market with a comprehensive range for every possible application. The product range has expanded dramatically within the last five to eight years.

Background

Even though the company had such a large product range, which was also distributed throughout the nation, it continued to use simple (naive) 12-month moving average data on each product to forecast and schedule production requirements. However, from the analysis of the past sales data, a seasonal pattern corresponded closely to the weather conditions observed in each state. By using this simple moving average method, the company's forecasting system failed to incorporate the seasonal pattern into its forecasting process which produced misleading forecast results. It was taken for granted that the rolling average was valid but in the "real world" some product ranges varied between 25 and 30 per cent either side of the average with the seasonal variations. As the problem existed, it led to a combination of increased inventory cost (owing to a build-up of stock) and a failure to meet customer demand at peak times. Such a situation impeded the company's market competitiveness.

The identification of the seasonal factors was based on the intuition of the manufacturing manager. It was he who suggested that the process of seasonal factors and

moving averages should be incorporated into the production plan with the minimum of disruption. Previously he had a spreadsheet program, shuffled numbers and applied guesses; after identifying his misgivings he started with weighting factors but quickly realized that he needed a consistent formal system.

As with most organizations an individual in such a position had little time to research 250 stock items over at least a three-year time span, as well as maintaining existing duties. It could have been accomplished but at the expense of something else. In collaboration with Monash University, a forecasting model was developed for Kenbrock's needs. Tacit approval was gained from the managing director of Kenbrock, who was very supportive of the professional development of his employees and industry liaison with educational institutions.

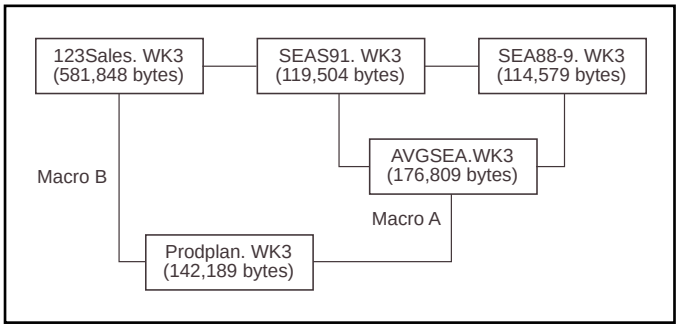
The manufacturing manager had little or no difficulty in initiating the change as it was accepted by all within the company that, ultimately, it was his responsibility.

Application of the New Method

The primary motive of this project was to develop a more appropriate forecasting method dealing with the seasonal pattern of the past sales data and integrate it into the production planning process. To develop a more sophisticated forecasting model, taking into account these seasonal factors, an advanced spreadsheet (Lotus 1-2-3 v3.1) was used for generating a revised production planning model. A supplementary manual was prepared to assist with its application. Also, recommendations were made, and supportive evidence given, that variance in demand from different states could be an item for inclusion with future development of the program.

Figure 1 represents the files and how they are linked. The 123Sales and SEAS91 files are linked since sales data are required to calculate the seasonal factors. The AVGSEA file contains the averages of the 1988-1989 seasonal factors, and the 1991 seasonal factors, the SEA88-9 and SEAS91 are both file linked to the AVGSEA, so that changes to either of these files will automatically affect the AVGSEA. The production plan is not linked to the AVGSEA or the 123Sales but instead, the Prodplan contains macros, which allow the user to extract data either from the 123Sales or AVGSEA.

Figure 1. *How the Files Are Linked within the Forecasting System*



The first macro (Macro A – refer to Figure 1) involved asking the user whether he or she would like to update the seasonal factors, and if yes, then which month. The second macro (Macro B) was also a language macro, and it involved extracting the rolling averages from the relevant worksheet. The macro, when run, would ask the user whether he/she wants to update the sales figures. Both the macros were created with the inexperienced and first-time user in mind. They were intended to be as user friendly as possible.

The presentation of the worksheet was also improved. This not only proved to be visually pleasing but also made the worksheet more user friendly.

Immediate Results

The project team were able to develop a recommendation regarding the suitability of the model created for 12 to 15 months advance forecasting, as required for the annual sales budget. The obvious advantage of the new forecasting system was a more accurate forecast leading to better planning which in turn led to increased production efficiency. Taking seasonal factors into account was especially important in the paint industry where seasons have a marked influence on the sale of paints and stains.

There were lower inventory, production and transport costs in the State of Victoria the savings of which could be extrapolated nationwide. Within four months of the programme being implemented, inventory levels had been trimmed; 50,000 litres ($20,000 in value) or 16 per cent had been reduced from inventory. Where there is reduction in such costs, it then results in better profits and a greater return on investment.

Also advantageous was that it was capable of updating to provide a more accurate forecast which could benefit the marketing department when looking at the best moment to launch a new product or promotion. The computer software was also very user friendly and there is minimal time required in training the user to operate the system.

The system cost next to nothing to develop, except for the time and effort of the project team. In addition, there appeared an increased level of motivation by participants within the company, as they became very keen to "keep tabs on the numbers".

Problems Still Existing

With any change in procedure, there is a resultant disruption in the normal functioning of the organization.

What was of immediate concern was the creation of "service level holes". For example, the orders department became "twitchy" when in the short term, they were without product units. What really occurred was that during August (1992), 44 stock items (out of 250) were out of stock but only 12-14 were unavailable for, at most, one day. What was needed was constant reassurance to the orders department that, in the long term, this "inconvenience" was of benefit to the customer as well as to the company.

Missing sales data for 1990 resulted in non-continuous periods from which seasonal factors were calculated which resulted in reliance on non-continuous data. This means that, in the short term, the seasonal factors are not as accurate as they will eventually be when more current sales data are used to update the forecasting system.

The sluggish hardware resulted in slow and frustrating operations

Also of immediate consequence was that the model could not anticipate any spontaneous promotion or unanticipated event, e.g. special deals for catalogues. The State sales analysis, to get a national view, was yet to be incorporated and resulted in guesswork still being applied.

The sluggish hardware resulted in slow and frustrating operations as the size of the worksheets and the more sophisticated model required upgraded software. It put considerable pressure on the existing mainframe systems.

Much of the work done by the project team was on existing information and stock lists. But within the next financial year there are going to be 56 new stock items added to the series. The difficulty will then be how to consider the "novelty factor" in sales of the new products and the attrition to the existing range in the short term.

Case Study Recommendations

With such a commitment to improved forecasting methods, it is crucial to receive management recognition and support. Whereas the responsibility has been that of the manufacturing manager, it would be more beneficial to have an overall commitment to the process by the organization as a whole. For instance, warehouse and purchasing are aware of the need to improve; meanwhile the orders department is experiencing the initial effects. Therefore consultation may be considered to be of more value if exercised prior to the implementation than subsequently. This could be addressed in the existing weekly management meetings. Success has been achieved, more is possible.

As Kenbrock is going to adopt this model of forecasting, it is important that the company should further refine the system to gain further credibility. It will require several years to smooth the seasonal and state influences adequately, after which it should be very reliable.

Computer upgrades would also be justified considering the savings resultant in the immediate implementation of the model. In fact a general review of computer technology throughout the organization would be a serious suggestion.

Links between industry and educational institutions have proven to be of mutual benefit. This interaction could continue at Kenbrock as the company progresses through to the next stage of the evolution.

It is imperative that companies like Kenbrock have effective approaches to forecasting and that forecasting should be an integral part of its business planning. When managers plan, they determine in the present what courses of action they will take in the future. The first step in planning is therefore forecasting, or estimating, the future for their products and services and the resources necessary to produce these outputs.

Conclusions

Previously forecasting was something which had traditionally been the preserve of mathematicians or consultants, but more and more senior managers are having to involve themselves in questions of long-term planning for their companies; there is neither the time nor the money to bring in consultants for every organizational shift. So executives are having to think through organizational issues for themselves, which may be no bad thing in itself but, as they know only too well, the risks of making the wrong analysis and implementing the wrong moves are high.

Prior to the changing nature/role of managing, decisions about particular problems could be taken in isolation. Marketing people could concentrate on the market, technocrats could concentrate on technological innovation and production people could concentrate on production. In future, a systemic view will be necessary in which people throughout the organization understand the relationship of the parts to the whole, and the role of the different parts in achieving the firm's overall goals. To bring about the more dynamic organization which is needed to cope with a future of rapid and complex change, managers will have to look anew at their businesses, the environment in which they operate, and the resources which they can muster to achieve their

purposes. But the choice of forecasting technique is a decision of great importance which, if made improperly, can make the company strategically short-sighted and result in a delayed reactive approach.

In practice, the choice of the techniques is frequently left to the staff member who has a little knowledge of the options available. On the one hand, this person may lack the breadth of perspective of the general manager and, on the other hand, his/her natural inclination is to use the technique in which he/she is trained. Thus the choice of the forecasting techniques is too important to be left to the forecasters. The choice must be made by the general manager who is responsible for the development of a strategic business plan.

In making the choice he/she need not, and cannot, become an expert in the details and processes of the respective techniques, but must learn enough about the techniques to understand the restrictions which the respective filters impose on the firm's image of the external reality.

No forecasting method is perfect under all conditions. And even when management has found a satisfactory approach, it must still monitor and control its forecasts to make sure that errors do not get out of hand. Forecasting can often be a very challenging, but rewarding, part of managing.

Not to forecast is inherently a forecast that the future will be precisely like the past – a forecast certain to be false[7].

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Application Questions

(1) Is a forecast meaningless without a plan? Why?

(2) The case study points to cost savings achieved through better inventory management. What savings could be made by more accurate forecasting in your organization?

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