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DECLARATION

I hereby declare that this thesis is an original work with references made as appropriate and stated accordingly, and that it has not previously been submitted for any degree in any higher learning institution nor has it been published in any publication.

.................................................. Rozainun Aziz-Khairulfazi
ABSTRACT

Since way back in the 1970's, academic research has attempted to improve forecasting practice. Unfortunately, this process is still incomplete and ongoing. There has been little research in the forecasting area in incorporating forecasting techniques, systems and administration (Mentzer and Kahn, 1997). Several other problems have been identified upon reviewing the literature, such as the limited use of modern forecasting practices (Flores and Duran, 1998). In particular, quantitative methods were slow to gain acceptance in practice, whilst forecasting techniques are little known and little used.

The purpose of our investigation is to find out if the findings from various related studies persist or have changed over time and whether there are any other factors involved in forecasting that should be highlighted in the current practice. The motivation for this research is to bridge the gap between theory and practice in order to improve forecasting practices and enhance the quality of forecasts.

We carry out four types of study, namely pilot study, postal survey, case study and follow-up survey, and we base our work on several related publications (Wheelwright and Clarke, 1976; Sparkes and McHugh, 1984; Dalrymple, 1987; Winklhofer et al., 1996; Mahmoud et al., 1992). We explain our findings using statistical analysis and we offer different ways of explaining the behaviour patterns of the factors involved in forecasting. We demonstrate links between particular variables by offering basic mathematical functions to describe the effects of changes and by presenting an application of methods for improving point predictions and cost functions (Goodwin, 1996 and Percy, 1993).

This research contributes to the present literature on forecasting in which behavioural issues have not been as thoroughly explored as have quantitative methods. It is intended that our findings will strengthen principles and enhance strategies within organisations towards achieving the ultimate goal of accurate forecasting.

Keywords: profit forecasting, behavioural factors, decision analysis.
CHAPTER OUTLINE

This thesis consists of nine chapters. The first chapter introduces the general idea behind the study and presents information about the importance of forecasting in an organisation and in industry as a whole. It also lists the objectives of the study, with glossaries and summarises the main focus of the study.

The second chapter reviews the previous literature and published materials relating to past studies that form the basis of our investigation and support our approach of carrying out such investigations. Many areas are related to forecasting, such as management, planning and budgeting, in general. This chapter provides related coverage on previous related studies relating to forecasting practice.

The third chapter describes the methodology adopted for our study, based on different alternative methodologies in the literature. In our investigation, there are basically four types of studies, namely pilot study, postal survey, case study and follow-up survey. This chapter also presents the rationale of conducting these studies and how they relate to one another.

Chapters four, five and six present details of the data collection and exploratory data analysis for the first three types of study respectively, one for each chapter. Chapter seven describes modelling certain aspects of profit forecasting, with a focus on the outcome of the forecasting function and changes in behaviour patterns of chosen variables.

Chapter eight provides information on the fourth type of study, a follow-up survey, to support our propositions from investigations we have carried out via the postal survey and the case study.

The last chapter, chapter nine, presents conclusions and recommends further work for future research. Appendices as indicated show the questionnaires and interview questions as well as details of our results. Lists of tables and figures are also included after the table of contents.
CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In the business world today, with the advent of the vast and rapid transmission of information and the emergence of the k-economy and globalisation, corporate businesses must aim to achieve higher profits more effectively. In this situation, planning and forecasting are of the utmost importance to ensure that the inputs of resources and the outcomes to be expected are well planned, in order that key activities can be pursued, monitored and expanded accordingly.

Planning concerns the activities to take place in the future and forecasting has the role of steering businesses towards a choice of actions addressing the uncertainties associated with those future activities. Due to the uncertainty of the external environment, many forecasts will prove to be mistaken. Yet this does not invalidate the case for basing decisions upon forecasts, which is often far better than using no forecasts at all.

Whilst every effort is taken to make sure that plans are carried out, uncertainties can influence the meeting of targets. Needless to say, no matter how much effort and resources are expended on planning, there is still the problem of forecasting accurately (Shim, 2000, p.12). Inevitably, uncertainties and risks are always present, of which some are uncontrollable and unexpected, even though much thought has gone into assessing them.

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A business is formed to fulfil certain objectives and has a responsibility to satisfy different groups of individuals. Though the list of business objectives can be enormous and conflicting, the possible objectives of a business include maximising shareholders’ wealth, satisfying customer demands and obtaining high profits.

The list of interested parties is as follows (The Corporate Report, 1975):

a. shareholders
b. society
c. customers
d. creditors
e. employees
f. managers
g. government

Our interest lies mainly in one of the aims of a business, which is to maximise its performance, and we believe that in order to achieve this, various management functions are required. One of the tasks involved is to forecast the business’s future results, as these have an impact on its decisions in the field of sales, product pricing and cost fluctuations, as well as the field of business needs such as financing and budgeting. The performance results may be expressed in many forms such as sales achieved, profits, productivity, efficiency, resource utilisation and so on. These measures are commonly used for many purposes, such as indicating progress, strength, stability and the future prospects for the business. These are useful for sustaining current investments and attracting further investors. This thesis concentrates on the most important of these performance measures, such as profits.

These days, forecasting has grown to be one of the most important tasks in projecting attainable performance so as to attract investments. Therefore,

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formulating objectives by using forecasts, though not easy, is quite crucial. Nevertheless, there must be ways and means that companies should seriously consider to minimise, if not eliminate, errors and disturbances in forecasts. It is hoped that, within the planning stage, forecasts can be presented effectively to support and secure the fulfilment of an organisation’s objectives.

In recognising the importance of forecasts, management plays the role of efficiently utilising information, via its management cycle, to achieve all the company's objectives (Wheelwright and Makridakis, 1980, p. 2; Drury, 2001, pp. 4-5; Ryan et al., 2002, pp. 69-70). This means that processes and conducts into which businesses are directed might not materialise without the help of other factors, such as the extent of use of forecasting methods, the size of the firm, nature of its business, and also the capabilities of the people involved in the forecasting.

In business, as most of the activities and transactions are measured in terms of monetary values, financial planning plays a strategically imperative role. It is then the task of a person or persons to ensure effective management, for example, in the case of a financial planner, to secure it in terms of managing money, arranging for loans, raising capital, and arranging credit terms and other funding facilities.

Since financial planning and forecasting are so important, the people in charge of these functions must be capable of these functions. They must have the qualifications and experience, even the tactics, to handle situations and foresee conditions. Indeed, before anyone decides to embark on an activity, careful planning is needed and, in doing so, a prediction or a forecast is useful to give an idea of the result.

Managers are normally required to evaluate business performance by way of profits; the results are then compared with plans and targets in order to check progress. Should there be any material discrepancies, comparisons are made, the results

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analysed and remedial actions are taken thereafter. In most cases, further adjustments are then made to future plans in the budget to improve performance further.

For budgets to simulate the future realistically, managers may estimate expected outcomes against their budgets. This is done by basically allocating the percentage of likelihood of an occurrence in relation to the expected costs and profits presented in a budget. This is also known as forecasting and is regarded as a vital contribution to decision-making (Wilson and Keating, 1994).

In integrating forecasting with management and accounting, particularly planning, emphasis is now placed on factors which influence the practice of forecasting and on discovering how this can support the process of preparing forecasts.

1.2 TAXONOMY OF FORECASTS AND OF ORGANISATIONS AND COMPANIES

The objectives of this study require a taxonomy of forecasts and of the organisations and companies to be established. This facilitates the whole idea of forecasts and forecasting, as well as increasing the familiarity with the terms used in these contexts.

Forecasts are quantitative presentations of predictions for plans and budgets which are likely to exist in some future period (Wheelwright and Makridakis, 1980, pp.2-3).

Forecasting is the process or act of preparing forecasts for an intended purpose. It describes what will happen in the future and gives a clear picture as to what to
Chapter 1 – Introduction

expect in the future relating to a particular activity (Wheelwright and Makridakis, 1980, pp.4, 11).

Forecasting is typically used in such functional areas of an organisation as:

i. Marketing
ii. Production
iii. Finance and accounting and
iv. Personnel

Forecasts may be short-, medium- or long-term in nature, subject to the time period for which the forecasts are prepared (Granger, 1989, pp.6-7). If a forecast is prepared for the near future, some time between one year and three years, it is known as a short-term forecast. If it is prepared for an intermediate period, say three to five years, it is called a medium-term forecast. If the time period in question is for more than five years, then it is a long-term forecast.

The typical types of forecast which can be prepared by a business organisation are as follows (Wilson and Keating, 1994, p.2):

i. *Sales forecasts*: projections of the sales amount which can be achieved in a future period, prepared by the marketing managers.
ii. *Human resource requirement forecasts*: projections of the employees required by departments for certain periods in the future, prepared by the personnel officers.
iii. *Profit forecasts*: projections of the profits expected from business activities for a future period, prepared by the accountants.
iv. *Forecast of interest rates*: forecasts prepared by financial advisers or experts, to allow for the management of cash flows over a period of time.

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v. *Forecasts for production resources:* forecasts prepared by production managers, to determine the raw material requirements and the expected level of stock of finished goods.

The above list is not exhaustive, because forecasts for any intended purpose or activity can be prepared as required by the organisation.

In a forecasting exercise, there are basically three elements to consider, namely (Wheelwright and Makridakis, 1980, p.33):

i. The time factors in the future

ii. Any uncertainty that is present

iii. Reliance on information contained in historical data.

Various methods of forecasting can be applied, depending on the purpose of forecasting. These methods can be formal or informal. Informal forecasting relates to making predictions on an ad-hoc basis and judging situations on the basis of intuition. Formal forecasting takes the form of qualitative and quantitative methods, which can be further classified as follows (Wheelwright and Makridakis, 1980, p.34; Mentzer and Kahn, 1995):

I. Qualitative methods

i. Technological assessment

a. *Normative forecasting* determines future objectives and works backwards to find out what inputs are required.

b. *Exploration* uses current information to estimate future conditions.
ii. **Subjective assessment**

a. *Decision trees* assign probabilities subjectively to projected events using Bayesian statistical methods.

b. *Sales force estimates* involve collecting forecasts by salesmen and making judgements on a collective and total basis.

c. *Juries of executive opinion* involve seeking the opinions of representatives from various parts of the organisation to prepare forecasts jointly. According to Wheelwright and Clarke (1976), the opinions of top executives from such areas as sales, finance, production, purchasing and human resources are required to gain the widest possible understanding.

d. *Anticipatory surveys and market research* study the market situation and the desires and wants of prospective clients.

e. *Customer expectations* involve combining managerial judgements in ascertaining the needs and wants of customers for the services and products of the business. This information is gathered through surveys or through salesmen collating information from chosen customers (Wheelwright and Clarke, 1976).

II. **Quantitative methods**

i. **Time series.**

a. *Naive forecasting* applies the basic rules, for example, equating a forecast to last year's value plus ten per cent.

b. *Trend extrapolation* makes linear, s-curve or similar projections.

c. *Smoothing*, typically, calculates the average of actual figures in a linear or exponential way.

d. *Decomposition* rests on a time series drawn into trends of seasonal, cyclical and random fluctuations.

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e. Filters make use of parameters to model changes in a linear pattern.

f. Autoregressive moving average (ARMA) (Box Jenkins methodology) bases forecasts on linear functions of past values and extrapolates these functions into the future, using statistics to ascertain the accuracy expected in a given scenario.

g. The state space model is a mathematical function to describe a set of all the possible states of each distinct situation in the world with a view to feasible planning.

ii. Causal or explanatory

a. Single and multiple regression forecasting establish a relationship between dependent and independent variables in the form of equations.

b. Econometric methods are simultaneous functions of multiple regression.

III. Other formal forecasting methods

i. Combinations of qualitative and qualitative methods

a. Expert systems adopts a knowledge of forecasting expertise.

b. Neural networks present trends of past sales and factors to deduce relationships for preparing forecasts.

c. Life cycle analysis looks at the 5 stages of the product cycle in terms of its introduction, growth, maturity, or decline periods.

d. Simulation formulates actual scenario forces via computer packages in the form of models.

The common methods of forecasting, for example Box-Jenkins, require time series data, usually a large set. The present study focuses on another area, looking at cross-...
sectional data which most methods do not address. Time series methods take account of historical data which may not be relevant in the period concerned. Hence, a more recent set of data is likely to be more useful. For example, the tax rate might change or an economic crisis might occur and this might not be reflected in time series data.

On the other hand, another consideration that supports the use of the forecasting methods above is behavioural factors. These are important in forecasting for management, because it mediates between the systems and techniques used in forecasting, in order to assist planning and decision-making.

A crucial point worth making is that the people involved in the forecasting process must also be considered. They are called forecast preparers and forecast users, who may or may not be the same people (Wheelwright and Clarke, 1976). Forecast preparers typically comprise chief executive officers, financial controllers, accountants, heads of department and even external experts in forecasting. These are the people involved in using forecasting methods to prepare forecasts according to the requirements of the organisation as a whole. Forecast users are the people in the organisation who make use of the forecasts in their daily activities. These are the chief executive officers, financial controllers, accountants, heads of department, managers and supervisors. It should be noted that the people involved become a crucial factor in forecasting since they are the ones who consider and decide on the forecasting methods to be used to achieve the most accurate result they can.

Organisations can be profit-making or non-profit-making in type. Profit-making organisations aim to do business by selling products or providing services and this to maximise profits; for example, Tesco, B&Q, Debenhams and IKEA. Non-profit-making organisations aim to provide services for users; for example, Manchester City Council, universities and NHS hospitals.

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Organisations can be classified into various types of business such as:

1. Manufacturers
2. General retailers and sellers of consumer goods
3. Providers of services and utilities

There are cases where an organisation may combine two or more types of business; for example, Tesco is involved in operating supermarkets as well as in providing financial services in the form of loans and insurance.

Within each business, there is an organisation chart of functions and responsibilities. It has a definition of its own profits, income and expenses as well as a detailed breakdown of the composition for each item, which varies in content according to the type of business or activity. For example, a university will have income such as tuition fees, consultation fees and grants from national and local councils, whereas a manufacturing company will look at sales, commission and investment benefits in the composition of its income.

<table>
<thead>
<tr>
<th>No.</th>
<th>Keyword</th>
<th>Meaning in the context of the study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Financial planning</td>
<td>A management tool involving making investment and financial projections. This is to enable assessment for alternative outcomes of future plans (Atrill, 2000, p.2).</td>
</tr>
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<table>
<thead>
<tr>
<th>No.</th>
<th>Keyword</th>
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<tbody>
<tr>
<td>3</td>
<td>Budgeting</td>
<td>Setting up of future activities with transactions presented in an objective quantitative format (Drury, 2001, p.286).</td>
</tr>
<tr>
<td>4</td>
<td>Point forecast</td>
<td>Single estimated future result or single point prediction (Wheelwright and Makridakis, 1980, p.254).</td>
</tr>
<tr>
<td>5</td>
<td>Earnings or profits</td>
<td>The expected outcome and main aim of a business, which is usually turnover less costs (Lucey, 1996,p.421).</td>
</tr>
<tr>
<td>6</td>
<td>Forecasting</td>
<td>Estimating for future unknown situations (Wheelwright and Makridakis, 1980, pp.4, 11).</td>
</tr>
<tr>
<td>7</td>
<td>Forecast accuracy</td>
<td>The optimist’s term for forecast error (Wheelwright and Makridakis, 1980, p.9).</td>
</tr>
<tr>
<td>8</td>
<td>Forecast error</td>
<td>Difference between forecast earnings and actual earnings (Wheelwright and Makridakis, 1980, p. 13).</td>
</tr>
<tr>
<td>9</td>
<td>Uncertainty</td>
<td>Future events or factors which are unknown in the present situation. The lack of confidence associated with a forecast (Wheelwright and Makridakis, 1980, p.3).</td>
</tr>
<tr>
<td>10</td>
<td>Behavioural issues</td>
<td>Emphasis on human and organisational factors; observing the characteristics, actions and reactions of people, as well as organisational factors such as reward and recognition, policies and procedures (Drury, 2001, pp. 323-325, 331-333, 335-336).</td>
</tr>
<tr>
<td>11</td>
<td>Quantitative issues</td>
<td>Emphasis on figures, numbers and amounts as forms of measurement (Drury, 2001, pp. 82-83, 261).</td>
</tr>
<tr>
<td>12</td>
<td>Qualitative issues</td>
<td>Emphasis on opinions, behavioural and personal judgements to support figures and numbers presented as performance (Drury, 2001, p. 82-83, 261).</td>
</tr>
</tbody>
</table>
Table 1.1 above presents the related keywords and meanings which have been adopted in the present research, together with references to their sources.

The explanations which support the above taxonomies allow one to understand the meaning and orderliness of the idea of forecasting, which is necessary before one probes into this area of study.

1.3 OBJECTIVES

The general ideas for this study stem from planning and budgeting, particularly in relation to forecasting, focusing on the behavioural aspects.

- *The research problem* identified relates to forecast accuracy, in response to the problem of reducing forecast inaccuracy. As forecasting concerns predicting performance for the future, in the case of a business, which usually involves many uncertainties, forecasting accurately can be a quandary. We will address three types of problem related to forecasting in terms of the use of forecasting methods, management problems and disconnection and integration problems; these will be discussed in Chapter 2.

- *The problem statement* seeks to identify the gaps and weaknesses of the forecasting process in order to achieve the firm's objectives. This will examine the influential factors which to a certain extent contribute towards reducing forecast inaccuracy.

- *The research questions* are basic questions of 'what', 'why', 'when', 'who' and 'how' in relation to forecasting. In addition,
the study addresses the question of the practicality of the recommendations arising from the research.

The overall outline picture for our study is shown in Figure 1.1. The whole study examines the forecasting process deemed essential in an organization when it gives its attention to internal operations. These involve planning and budgeting, which require the aid of forecasting. Here two methods may be used, qualitative and quantitative, both of which involve behavioural elements, in this case, we examine factors influencing forecasting practice, as directed by our literature review.

Figure 1.1 – OVERALL OUTLINE OF STUDY

The tools involved in management accounting are planning, decision-making, implementation, coordination and control and feedback, which run in a cycle, as shown in Figure 1.2. These tools are also executed and measured in terms of numbers and monetary values. The focus of this study is on this part of the forecasting function, as shaded in the diagram, and the important role which it plays in planning and budgeting and, as indicated by Figure 1.2.

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Planning seems to be the backbone of operating a business, without which performance suffers; therefore forecasting becomes crucial in the significant assistance which it gives to planning by providing reliable future predictions. This is where problems are inevitable, for predictions are subjective. This study approaches the forecasting function from the angle of the forecasting management and the identification of the factors which influence the practice. These involve relationships, team work and group decision-making. Figure 1.3 presents more detailed information about the focus of the study and divides the forecasting process into three areas of investigation, as depicted.

The three areas of investigation can be summarised as follows:

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1. The first part of the study will look into why an organisation makes forecasts, what they are for, whom they are for, who prepares them, and how and when forecasts are made.

2. The second part will analyse the organisational aspects relating to forecasting. These concern observations from practices and perceptions by the people involved in the forecasting function.

3. The third part will recommend modelling and best practices in forecasting and will illustrate the forecasting scenario to improve the quality of forecasts and forecasting practice.

The specific objectives of this study are to achieve the following:

1. To find out the extent of written awareness about ideas in forecasting, in particular, the factors which influence forecasting practice.

2. To recommend to practitioners how they can forecast better by improving their forecasting management so as to support the use of forecasting techniques.

3. To highlight the importance of the success factors in forecasting practice, in an attempt to narrow the gap between the theory and practice of forecasting and to assist planning to achieve business objectives.

4. To suggest future research which could evaluate other factors influencing forecasting practice.
1.4 RATIONALE FOR THIS STUDY

Most studies in forecasting relate to forecast accuracy; in fact, this is one of the main issues raised in many published accounts. However, this study attempts to address forecasting in a different manner; it looks at the underlying issues responsible for forecast accuracy, in order to make the realizing of objectives not as difficult as it might be, but manageable and acceptable. This study does not look at time series or a set of longitudinal data; instead it addresses other important issues in forecasting, i.e. soft issues. It should be noted that this study attempts to address and focus on
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issues relating to forecast accuracy different from those which other studies in forecasting have explored.

Uncertainty about the future is a point often raised in articles about forecasting but this may not be the only factor affecting forecast accuracy. The process, input information and background and training of the people involved may also have some influence, which this study hopes to reveal. It also determines how they can be combined to work effectively towards achieving successful forecasting practice.

1.5 THEORETICAL JUSTIFICATION

Few empirical studies have investigated issues relating to forecasting management in organizations.

“While the importance of applying forecasting techniques in practice has long been recognized and researchers have been repeatedly urged to investigate such issues, there is little doubt that most empirical research on forecasting still deals with methodological issues (e.g. the development of more accurate forecasting methods)” (Winklhofer et al., 1996, p. 194).

Mentzer et al. (1999) note in their benchmark study of best practice in forecasting management that studies tend mostly to focus on the techniques being used rather than on issues such as systems and management. The literature on forecasting management is based on case studies, using normative models of administering systems and implementing forecasting systems in organizations (Mentzer and Schroeter, 1994; Fildes and Hastings 1994).
It would help the practitioners if they could understand better what factors might affect forecasting management. This may also lead to identifying what prospects there are of expanding forecasting management.

1.6 A SIMPLE APPROACH TO THIS STUDY

The approach to the study can be described as having three phases. The research looks at the mediator between the use of forecasting methods and their implementation before evaluating outcomes, as highlighted in the shaded box in Figure 1.4. The first phase acknowledges the fact that planning is crucial in driving the actual performance of the organisation. The second phase looks at what is involved in this drive, which involves forecasting and the use of methods, people and systems, implementation and evaluation. The third phase is the investigative part of this study; it checks what literature is available and what the gaps are, before addressing some of these gaps and making some suggestions for work to be done in the future.

1.7 ORIGINALITY OF THE RESEARCH

To the best knowledge of the researcher and through a thorough literature review, no research at all on this topic has been conducted in the UK. Most of the existing literature and theses on forecasting are quantitative and relate to population forecasting, marketing, modelling bootstrapping, revising forecasts and comparing methods of forecasting, to name a few areas.
Figure 1.4 – RESEARCH OVERVIEW: PROCESS OF FORECASTING AND IMPLEMENTATION OF FORECASTS

First phase

- Planning
- Actual performance

Second phase

- Forecasting and the use of quantitative and qualitative methods
- Forecast management – about the factors involved in realising objectives using forecasts
- Implementation
- Evaluation

Third phase

- In current literature, more coverage in this area than in forecasting management and process.
- Our research is concerned with this area
- We identify future work in this area

1.8 LIMITATIONS AND DELIMITATIONS

In carrying out this study, some of the following problems were encountered:

1. Time delays in distributing questionnaires and carrying out personal interviews at various levels of management. In addition, when questionnaires were distributed to respondents, there were time delays in retrieving responses. Where appropriate, the revisiting of interviewees was undertaken.

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2. There was a good chance that respondents would not disclose information deemed confidential; in fact most of the respondents thought that information relating to forecasting was confidential and therefore were not willing to participate. Some admitted that it is against their company’s policy to take part in any surveys.

3. Literature reviews of the latest publications and proceedings from conferences and workshops were not always readily accessible.

1.9 CONCLUSION

This research hopes to highlight the factors influencing forecasting management to enhance forecasting, a process which is necessary in order to achieve objectives. In most of the articles on this broad topic, this consideration is still on-going and incomplete, especially in the United Kingdom. This is where our research hopes to make a valuable contribution.

This research also attempts to offer a solution to some of the problems of forecast accuracy and to make forecasts more reliable or acceptable in the subjective ambience. If this can be done, investors will have confidence in members of management, who will have the right capabilities to foresee the future performance of their organisations and will therefore plan better. It is not easy to eradicate forecast errors but it is not impossible to achieve a ‘close enough’ forecast accuracy. Given a set of limitations and conditions, any theory and formulae derived from research could be acceptable and could be made to work, as long as the management of the organisation was aware of the factors influencing the practice.

In particular, it is hoped that the outcome of this study will help to provide better insight into forecasting practice in understanding what the factors are and how they
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influence actual practice. These factors may include the size of the company, costs, features of the management personnel, preparers and users of forecasts, the time expended and the method of forecasting adopted. The management’s perception, attitude towards the forecasts and forecasting practice should all be considered so as to achieve not just individual and departmental targets, but also the organisation’s overall objectives.

This chapter has sought to give an initial insight into the position from which the research starts. To this end, it includes glossaries, definitions and explanations for areas which will be dealt with in the rest of the thesis.

In the next chapter, we will provide reviews from various studies relating to forecasting practice in order to identify the specific problems to be looked at in our research. We will formulate questions in such a way the answers fill the gaps in this research area.
CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In the last chapter, we introduced forecasting in general, giving initial insights into the initial position taken by the research. In Chapter 1, forecasting techniques were listed; the emphasis in this study is on forecasting practice. The present chapter, a literature review, gathers information about previous studies relating to forecasting and identifies concerns which might be linked to this study. The whole idea of this review is to address problems in forecasting management, as opposed to the technical difficulties incurred by measurement models.

'Forecasting has been consistently recognized as an important capability for business planning and management' (Moon et al., 2003). Forecasting may be divided into three distinct parts, namely techniques, system and administration (Mentzer and Schroeter, 1994); the integration of these aspects will provide an effective forecasting process.

This chapter attempts to shed light on problems in the administration or the management aspect of forecasting. We present reviews from the forecasting literature with an emphasis on identifying unresolved issues in such management which could contribute towards accurate forecasting. These issues include: what are the problems with forecasting practice; what are the factors which influence forecasting practice; how do these factors contribute towards the success of...
forecasting practice and what are the perceptions of forecasting from the viewpoint of the people involved in it?

As with all other reviews of the treatment of a subject, one topic may inter-relate with many others. Our review lies within the boundaries around the subject of forecasting which this chapter proposes. Common issues dealt with in the literature are presented first, to identify some of the factors and show how forecasting can steer the outcomes of different types of business. Sales are often investigated in the literature, whilst profits are generally given a low profile, but in this study, we attempt to use profits instead as one of the measures of business performance. Moreover, profits of sales over relevant expenses are calculated net and therefore give a better picture as to the outcome of the business. Sales forecasting is, however, regarded as a significant part of planning (Sanders and Manrodt, 1994; Mentzer, Bienstock and Kahn, 1999). Nowadays, other areas of forecasting studies are beginning to appear, such as a survey of e-commerce forecasting by Golicic et al. (2001) and an evaluation of forecasting software (Sanders and Manrodt, 2003), which are the most up-to-date developments that tie in with present technology.

Armstrong (1986) reviews 25 years of research in forecasting and identifies three areas of concern, namely, preparing forecasts, assessing uncertainty and getting recognition for the forecasting exercise. The first two concerns relate to particular elements of developing and assessing methods of forecasting. The third concern, that of getting recognition, deals with behavioural and managerial considerations in applying forecasting models.

As noted in our previous chapter, forecasting practice involves ways of making forecasts in the real world. Besides acknowledging that forecasting can be done by using the tools or methods of forecasting, as listed in Chapter 1, we attempt to put forward other factors which might influence the practice. The focus of this literature review is directed towards identifying gaps in forecasting management which will
promote successful forecasting practice, as opposed to those which offer solutions to
the technical errors incurred by measurement techniques, including those described
by Bretschneider and Gorr (1989), Hogarth and Makridakis (1981) and Fildes and
Hastings (1994). Many aspects of forecasting in organisations go beyond developing
and testing techniques as the forecasting process ranges from causal to more
sophisticated techniques (Schultz, 1992).

In the next few sections, we offer reviews of the literature on the background of
forecasting, the justification of forecasting and of previous surveys of forecasting in
order to identify the problem areas for our research. We also provide justification for
modelling as we attempt to explain effects and associations between certain
variables.

Various methodologies of the studies carried out earlier are also given, along with a
discussion of their findings and a summary of their recommendations. At the end of
this chapter, gaps are identified in order to define the crucial questions for the
present study.

2.2 BACKGROUND OF FORECASTING

Going back in time, the actual boom of forecasting methods started at the beginning
of the 1960s, according to Pecar (1994, p.5). It started with the maintenance of army
inventories which were later discovered to be applicable to industry. Soon
afterwards, there was an surge of econometric methods, due to the emergence of
computers coupled with advanced statistics which had been built up for forecasting
purposes. In the 1970s, mathematical models surfaced along with forecasting
methods. Since then, notably in the 1980s, many models and tests were formulated
to strengthen and improve forecasts. The 1990s presented more sophisticated and
complex methods with the advanced technologies in computerisation and office
systems, enabling the prompt integration of input changes into the models used. For the 21st century, forecasts are increasingly being re-engineered to meet current demands (Edwards and Aziz, 2000), along with new developments, such as considering virtual organisations.

The poor state of forecasting, in terms of ignoring related the influential issues beyond models and methods, has long been articulated in the literature. Unfortunately, studies relating to these issues remain under-explored (Mahmoud et al., 1992; Mentzer and Schroeter, 1994; Moon et al., 2003). Such studies engage in examining the factors involved in managing and organizing forecasting procedures. The emergence of this type of study started some time ago in the 1970s, when Wheelwright and Clarke (1976) carried out a study of forecasting management in companies. In their recommendations they call for future related work to look into these areas which would support managing forecasting methods.

Moon et al. (2003) argue that the few studies which have offered useful information about forecasting management have failed to deliver a general framework which might be used to improve forecasting management. Hence, it is interesting to find out what literature has so far been published in response to the call for more papers of this nature. It is on this basis that we generate the research questions for our study, which will be listed later.

‘The role of forecasting in the business is to direct attention towards alternative courses of action and to bring out the degree of certainty or uncertainty attached to the various alternatives. It is the object of forecasting to minimise uncertainty and to identify and evaluate risk; a budget is not feasible without forecasts’ (Morell, 1972, pp.18-19). Therefore, it is imperative for forecasts to be as accurate as they can in depicting the future, so that budgets and other planning activities can be carried out as well as possible.

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Forecasting is by no means a guarantee of success, which may provoke the question ‘Then why do it?’ But an approximate value is better than none at all, to ensure that activities are steered by some guidelines (Lucey, 1996). Forecasting, however, should not be regarded merely as a matter of statistics (Pecar, 1994); statistics are just a tool to support and make forecasting an objective process. It is not the ‘answer’ or the ‘decision’ but should be regarded as an extra input for decision-making purposes (Mohn, 1994, pp.4-10). Hence, forecasting is a very useful, indeed crucial, device for management, for without it other related business activities might be disrupted, leading to under-performance.

The Accountants International Society (1974) in ‘Published Profit Forecasts’ suggest that the difficulty of making a forecast lies in the assumptions made and depends on the following factors:

- length of time to be covered by the forecast;
- reliability of the accounting records;
- quality of the personnel;
- industry in which the forecasting companies operate;
- knowledge which the company has of the products and markets involved.

It is more difficult to prepare reliable profit forecasts in times of economic instability and uncertainty. However, these difficulties are not such as to invalidate the preparation of forecasts which might still be required by shareholders, investors and other interested parties.

The following sections aim to provide a clear explanation and rationale for identifying the main problems associated with the way in which forecasts are produced in companies. They attempt to identify influential factors such as preparing

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forecasts, using forecasts, background and experience of people involved in forecasting, and the status of forecasting within the organization.

2.3 JUSTIFICATION FOR FORECASTING

Organizations are bound to make some inaccurate forecasts, no matter how much effort is put into preparing reliable ones. This problem is due to many factors, such as uncertainty, unsophisticated methods and untrained forecasters (Makridakis et al., 1998, pp.562-566). Dominant among these are behavioural issues in forecasting.

"All decision-making and policy making in organisations involve forecasting" (Schultz, 1992). There are three reasons why companies try to forecast (Mohn, 1994). Firstly, as the business operates in an environment which is influenced by economic conditions, rivalry and market place and social obligations. These factors must be considered in planning and therefore need forecasting. Secondly, forecast evaluation is a main contribution to the strategic planning of decision-making activities. As such, checking in terms of auditing the forecasting procedures is deemed a useful and effective measure to ensure efficiency and productivity (Armstrong, 1987; Moon et al., 2003). Thirdly, if forecasting is not done, it might mean that in the future, major alterations would need to be made or there might not be time to take action after an unexpected event.

Another rationale for forecasting is that the future ultimately becomes the past and we learn over time and through experience from the past (Mohn, 1994). On the basis of this process, considering also demands, funds and prospects, that forecasting can be put into use to produce better forecasts. This will then produce benefits after appreciating the significance of forecasting as a management function, as can be seen in the case of sales forecasting described by Moon et al. (1998).
Moon *et al.* (1998) also indicate that forecasting is required in order to have a ‘clear picture’ of what to expect in the future, in terms of performance based on available resources. This means that a forecasting function is a necessity in any organization if objectives are to be achieved. In their article, they provide insights into measures to encourage ‘excellence in sales forecasting’ in order to ‘boost a firm’s financial health and gratify customers and employees’. The lessons which they gained by learning about sales forecasting from working with several companies are summarised in seven measures, as given below:

i. Understand what forecasting is and is not;
ii. Forecast demand and plan supply;
iii. Communicate, cooperate and collaborate;
iv. Eliminate islands of analysis;
v. Use tools widely;
vi. Make it important;
vii. Measure, measure, measure.

Winklhofer *et al.* (1996) point out that according to Drury (1990), the popularity of making the finance function responsible for forecast preparation reflects the need to link forecasts with plans and especially budgets. The finance personnel are more familiar with quantitative techniques and with management information and therefore their office become an ideal place to set up a forecasting function (Reilly, 1981).

Profits considered in this study are ‘...business profits... a leading indicator for future demand...’ (Morrell, 1972, p.25). They are usually the main aim of operating a business. In their study, Mentzer *et al.* (1999) also emphasise the need to link corporate profitability with other areas such as sales management forecasting, so as to evaluate accuracy and profitability.

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Chapter 2 – Literature review

As we will use profits in part of our study, we now offer some definitions, which may be relevant. Basically, profits are the net figure of sales or revenues or turnover after deducting expenses or costs (Mason, 1972, p.205). This figure may be read off from a set of published accounts, usually the Profit and Loss Statements prepared by the company’s accountants, which are a requirement under the UK Accounting Law (Pricewaterhouse Coopers, 1999).

It is crucial that organizations forecast as accurately as possible because forecast errors may cause some adverse financial effects (Kahn, 2003). By under-estimating forecasts, the business might miss the market and lose customers or have dissatisfied customers. Over-estimating forecasts could result in having too much stock which will become obsolete, wasted expenditure or spending too early and hence a lower profit margin.

Kahn (2003) points out that ‘... cutting down the forecast error by a few percentage points may mean millions of dollars in savings a year...the senior management will be much more supportive to the forecasting function if it understands how much forecasting error is costing the company.’

2.4 PREVIOUS SURVEYS IN FORECASTING

As our study involves postal surveys in collecting data, we now provide a summary of related surveys which we can use. Surveys often cited in the literature are those by Wheelwright and Clarke (1976), Dalrymple (1975, 1987), Watson (1996), Hughes (2001) and Sparkes and McHugh (1984) and more recent ones by Sanders and Manrodt (1994, 2003), Kahn and Mentzer (1994), Mentzer and Kahn (1995), Fildes and Hastings (1994) and Moon et al. (2003).
This section will present a brief write-up of each of these, including in chronological order of the issues which they have dealt with, the problems they have identified and what they found, followed by criticisms and a description of their limitations. We will then indicate how our survey will differ from the surveys reviewed. We will next provide discussion, debate and the points of conflict and observe what the literature says about how to improve forecasting. This way will direct us specifically to similar questions to look at in our collection of data.

The emphasis in summarising the surveys is on the 'mechanics of forecasting', a term proposed by Watson (1996), which concerns forecasting management. This involves the factors influencing forecasting practice, as investigated in earlier questionnaire-based surveys of companies. Though several studies have been carried out, studies into these areas are seen to be under-explored, especially in the current period.

Several surveys in forecasting relate to sales (Mentzer and Cox, 1984; Mentzer and Kahn, 1995), as this is usually the basis and the start of a forecasting process in a business, i.e. to look first at what the forecast demand or forecast of sales is, before investigating further into budgeting and planning for production. Some other bases may be used in different industries, for example, profits, number of students (in the case of universities), number of patients (in the case of hospitals) and number of dwellings (for a public authority service). Even though Schultz (1992) encouraged studies in other types of industries such as those mentioned above, since his time no related articles have been published in many journals to date.

It is Wheelwright and Clark (1976) whose study is referred to by many other surveys to date; it assessed the forecasting status in 127 major U.S. companies. A major factor influencing the centralised or decentralised function of forecasting, they said, is the company's size; forecasting is centralised in 70.5% of the sample whose sales do not exceed $20 million and this percentage reduces to about 50% when the sales
They raised the issue of corporate and management interest in forecasting which has increased over the past decade. They discovered several other issues, for example, communication problems between forecast preparers and users as well as lack of knowledge on the part of the users. Forecast users and forecast preparers must be partners in the forecasting process (Mahmoud et al., 1992 and Lawrence, 1983). Hence, communication and co-ordination are important means in ensuring that such partnership will work in understanding the needs of both parties.

The sample chosen by Wheelwright and Clark (1976) is based on their knowledge of the companies' involvement with forecasting. As disclosing information may be confidential for some respondents, this might discourage them from participating in surveys. Galbraith and Merrill (1996) indicate from their survey that the management actions which they examined were directed towards realising forecasts at a desirable level rather than for the purpose of accuracy.

In order to improve forecasting, Wheelwright and Clark (1976) pointed out barriers to successful implementation of forecasting, such as communication, skills, a good user-preparer relationship and the company’s commitment to forecasting. There have been concerns over the understanding of effective communication, responsibilities and skills between the preparers and users. The users do not seem to understand forecasting techniques as the preparers do. At the same time, the preparers doubt the capacity of the users to apply their skills and assess forecasts precisely. Several of the sample companies which invest in forecasting do not have a useful programme to implement forecasting but the companies which do have one seemed to be successful in forecasting, because they manage their programmes effectively.

Sparkes and McHugh (1984) conducted a postal survey of British manufacturing industry relating to the use of formal forecasting techniques in an attempt to address the problem of providing forecast adequate for planning purposes. The study...
examines the extent of awareness and of using forecasting techniques in ‘various functional applications’ and the effects of the resulting forecasts on the companies’ activities. In addition they deduce the rationale provided by the companies as to why certain techniques are not used in practice. The sample of the survey represents major industries classified by SIC (Standard Industrial Classification), with a bias towards larger enterprises. The survey collected 76 usable responses out of 300 members who held a prominent designation in the industry, chosen from the ICMA (Institute of Chartered Management Accountants), United Kingdom.

This survey used three levels of response in order to ascertain the extent of awareness, namely practical working knowledge, awareness without practical experience and no knowledge. The companies seemed to lack awareness of time series analysis (Box-Jenkins), the Delphi method and cross-impact analysis. The companies were more familiar with and, in fact, used moving averages, executive assessments, surveys and trend analysis. The results also showed that companies prefer subjective techniques, similar to findings by Wheelwright and Clark (1976).

In contrast, in their mail survey of US forecasting managers, Mentzer and Cox (1984) find that most of the respondents were familiar with all techniques, except for Box-Jenkins, life-cycle analysis and classical decomposition. The techniques which they learned came mainly from conferences, textbooks and trade journals. Most of the respondents were satisfied with regression, exponential smoothing, moving average, trend line analysis, classical decomposition, simulation and juries of executive opinion; and most were not satisfied with the Box-Jenkins time series. Majority of the respondents use subjective techniques for short-run forecasts. Juries of executive opinion were a popular method at corporate levels of management and at different time horizons. Ease of use was the top criterion in choosing a method and there was some use of computer modelling among the respondents.
Dalrymple (1987) from his mail survey in the United States discovered the way in which sales forecasts are prepared by business firms, the choice of methods used and the precision of their forecasts. The population used in his study consisted of marketing and forecasting managers. The result showed that naïve techniques dominated the use of extrapolation forecasting techniques and the most popular forecasting techniques were sales force composite and a jury of executive opinion. The companies were not satisfied with the level of accuracy of the forecasts produced by other techniques used. Only a few companies took the initiative to improve accuracy by using alternative techniques, but the rest of the companies were not willing to learn and use techniques which can be facilitated by technology, such as computers.

The questions asked in his survey are about

1. forecast preparation
2. methods used
3. effects of forecast horizons
4. market and size effects
5. forecast accuracy

Dalrymple (1987) found that subjective forecasting techniques continue to be a common method used among the respondents in spite of the increased accessibility of computers. Yet a naïve model was used by the majority of firms for both short-term and medium-term forecasts. Respondents used various other sales forecasting techniques. However, these differ in the length of forecast period, the firm size and the product type. The next common extrapolation technique mentioned in the survey was the moving average.

Dalrymple (1987) suggests that the respondents may increase accuracy in forecasting by more use of computers which can incorporate statistical forecasting.
techniques. Using *seasonal adjustments* seems to be the simplest way to enhance accuracy in sales forecasting, and this is also cost-efficient. The study also indicated that *simple exponential smoothing* can reduce errors compared with the moving average methods favoured by many respondents in this study. It also picked up the fact that firms which modify sales forecasts over succeeding *time intervals* reduced errors substantially. The use of computers also led to a reduction in forecast errors. The *bigger* the size of the firm, the *smaller* is the forecasting *error* as larger firms tend to operate in a more established market compared to smaller firms, which tend to operate in unstable and new markets. The study also showed that *combining two or more methods* of forecasting can reduce forecasting errors. All these reductions of error will then lead to better forecasting practices.

Drury (1990) examined forecasting management in areas such as the choice made by management among the various techniques available, the implementation of such a choice and learning any improvement in forecasting practice. Drury (1990) also recognizes that forecasting is "*necessary to management*" and therefore needs to be organized or else it may hinder progress, as a whole. A total of six surveys were compared from Canada, the United Kingdom and America; two surveys from each country.

The issues which Drury (1990) deals with are as follows:

1. forecast techniques: the extent to which subjective and objective techniques were used;
2. forecast reaction: the degree at which the management compares its forecasts with actual data and the extent to which they find explanations for all significant differences;
3. forecast revisions: forecasts are revised regularly and often supported by forecasts prepared for particular events;

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4. forecast improvement: areas which needed improvements were, firstly, systems to analyse forecast errors, secondly, systems to revise forecasts, and, thirdly, sophistication of forecast techniques; and

5. forecast responsibility.

Drury (1990) concludes that "as firms become more formal in their forecast management, the gap between current technical knowledge and its implementation is reduced. As forecasting increases in sophistication, the gap between forecasting expertise and general management's knowledge of forecasting tends to become apparent".

The study compares the use of subjective and objective techniques. Management judgment is used by far the most frequently, with a high percentage of 76% in the U.K. and 85% in Canada. Firms in the U.K. tend to use more forecasting techniques than in Canada and America. In addition, there has been an increase in the use of forecasting techniques in each country. Combined forecasts have a tendency to give more accurate results as they consider more information than using a single forecast (Makridakis and Winkler, 1983; Lawrence et al., 1986).

The survey method used by Drury (1990) is a mail questionnaire seeking details about the formalisation of the companies' forecast systems and management practices. The respondents were officers of Canadian companies and 234 (23.4%) responses were received. The sample distribution by industry ranges widely from financial, utilities, chemicals, mines, wholesale, electrical, oil and manufacturing, the latter being the largest in sample size. The size of the firms ranged from small (less than $10 million) to large companies (more than $100 million). Drury (1990) indicates that, as forecasting becomes more sophisticated over time, there is a gap between 'forecasting expertise' and 'general management's knowledge of forecasting'. Therefore, 'forecast management' must address this gap in order to improve the related practice.
Schultz (1992) points out that, in order to find out whether an organisation is better or worse off upon implementing a new forecasting method, “we must go beyond measures of accuracy and look to objective performance measures such as sales, costs and profits” (p.409).

Fildes and Hastings (1994) approach the issue of the ‘mechanics of forecasting’ (Watson, 1996), through the organisation and improvement of market forecasting, in terms of promoting sales. They say that qualitative forecasting is not used much and organisations rely on the judgment of managers working close to the product market. They examined organisational issues affecting the implementation and improvement of formal forecasting procedures.

Fildes and Hastings (1994) highlight the fact that in market forecasting practice, the preferences of subjective forecasting techniques and the opinions of experts are prevailing over quantitative ones. As managers’ judgments are used, the paper discusses three distinct areas in their study, namely, the relationship between forecaster and decision-maker, information flows and the technical characteristics of forecasts, in an attempt to bring marketing and operations together to achieve accurate forecasting. In their case study of a company having ten different units, Fildes and Hastings (1994) recommend that forecasting methods and systems must fulfill the requirements of the forecasting manager. The related technical skills and expertise should blend in with the organisation’s structure and database system, supported by enough time and resources to improve forecasting. Hence, the personal characteristics of the forecaster and decision-maker and their motivation, together with the links between forecasters and users, must be ascertained. The study also indicates the overall importance of uncertainty in the planning process.

Mentzer and Schroeter (1994) recommend the use of the Multiple Forecasting System (MFS), to integrate the systems and administration of forecasting with
forecasting techniques in order to develop an effective forecasting process. Their study involves observing inventory control in Brake Parks Inc., a basic manufacturing company producing replacement parts for domestic and import automotive and light truck braking systems. MFS, together with MIS (management information systems) and the systems of DRP (distribution requirements planning), is intended to aid decisions involving forecast preparation by enhancing managers' experience in stock accounts and the data base.

Kahn and Mentzer (1994) raise the issue of the impact of team-based forecasting, where group-work promotes information exchange. A survey was carried out on executives involved in forecasting which examined the method of forecasting employed, the satisfaction with their approach to develop forecasts and forecast accuracy. Managers seem to favour team-based forecasting as a result of inter-functional efforts and this goes more to the heart of the forecasting process. Their results provided on-going support for team-based forecasting.

Sanders and Manrodt (1994) survey forecasting practices at 500 US corporations to study the status of forecasting at the time. Several issues are addressed in this study, including familiarity with forecasting methods, the forecasting techniques used, satisfaction with the methods used, the effects of firm size and type of firm, findings on the use of judgemental methods and forecasting the problems and needs of practitioners.

With regards to familiarity with techniques, the study finds that judgemental forecasting techniques are the main ones used and are depended upon by the managers. This survey also made an effort to find the mis-match between managers' needs and existing procedures. Unfortunately the use of quantitative forecasting methods has not increased, even though managers show more familiarity with quantitative forecasting methods than in the past. The reason for using such methods is familiarity, which suggests that if managers are not familiar with a method they

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will tend not to use it. There are, however, key barriers in using formal forecasting methods such as 'lack of relevant data and low organisational support'. The study recommended improving the way in which data are collected so as to enhance the use of quantitative methods and increase accuracy as a whole.

On the issue of forecasting the problems and needs of practitioners, Sanders and Manrodt (1994) raise the issue of the approachability and simplicity of use of the forecasting techniques. This is also linked to findings on the use of judgemental methods. The respondents indicate a desire for better management support and better training. They also point out that the 'changing business environment' makes forecasting most difficult. For this reason, judgments are used to modify quantitative methods in an attempt to forecast accurately. This is in line with work done by Goodwin (2002), who advocates the integration of statistical methods with management judgement to improve short-term forecasts. Most respondents tend to under-forecast so that they are not penalised if they do not perform; though a few respondents preferred to over-forecast so that, in order to support more sales, they are given more help in terms of staff. Therefore, forecasting techniques should incorporate judgments and quantitative methods to make their application more practical (Goodwin, 2002).

In terms of firm size, more use of almost all quantitative methods is seen in companies with higher sales, except for naïve models. Conversely, companies with lower sales made more use of the moving average, succeeded by regression analysis and naïve models. With respect to type of firm, two categories were used and manufacturing firms showed higher familiarity with quantitative techniques than did service firms, which used the naïve method more. The moving average, however, is a popular method for both categories.

In contrast, in studying familiarity, satisfaction and the use and application of forecasting technique in sales, Mentzer and Khan (1995) investigate whether there

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were any changes or similarities in these areas over a ten-year period. Their findings uncover some changes since the study carried out by Mentzer and Cox (1984). *Familiarity and satisfaction* did not suggest a positive relationship; the study found that firms depended more on *quantitative forecasting techniques* than they had ten years before, when they depended more on subjective methods. For example, a jury of executive opinion was deemed less successful. *Moving averages* were recognised but the firms were *not satisfied* with this method. Practitioners were less familiar with the qualitative technique than they were ten years before. In terms of *using* forecasting methods, the time horizon emphasised ranges from a three-month to two-year period. The study also found that *accuracy*, which featured as a priority in examining effectiveness in sales forecasting, did *not increase* although the *use and knowledge* of several methods to forecast sales were on the *rise*. Several characteristics were examined in order to assess such effectiveness; these are accuracy, credibility, customer service performance, ease of use, inventory turns, amount of data required, cost and return on investment.

Mentzer and Khan (1995) have also reviewed studies about sales forecasting practices since 1984 (Mentzer and Cox, 1984; Fildes and Lusk, 1984; Sparkes and McHugh, 1984; Wilson and Daubeck, 1989; Drury, 1990). In their mail survey of 207 forecasting executives, Mentzer and Kahn (1995) found that there is greater reliance on quantitative methods than ten years ago. There was also an indication that forecasting accuracy has not improved since ten years ago, although accuracy is still the priority in measuring forecasting effectiveness. Nevertheless, the practice showed that there was an increase in the familiarity and use of related methods. It was recommended that managers must account for other issues relating to forecasting, such as administrative matters, which is what our study aims to deal with.

Kahn and Mentzer (1995) survey forecasting in the consumer and industrial markets. They found that consumer markets prefer regression, straight-line projections and
juries of executive opinion more than industrial markets do. The latter prefer sales force composite techniques, the use of information technologies in the forecasting process and related information about their consumers in preparing forecasts.

Watson (1996) presents results from a questionnaire-based survey of sales forecasting in the Scottish electronics industry. The interesting issues raised were the lack of understanding in this industry for the need and the practice of forecasting and the minor use of quantitative forecasting techniques. Watson's survey investigates issues such as familiarity, satisfaction with and use (or non-use) of forecasting techniques and environment, including training level, data availability and computer availability. She also highlights that several earlier surveys fail to address the reasons for choosing particular methods of forecasting and whether the firms understand the needs of forecasting in a particular environment (Wheelwright and Clarke, 1976; Rothe, 1978; Drury, 1990, Sparkes and McHugh, 1984; Mentzer and Cox, 1984; Dalrymple, 1987). She claims that Fildes and Hastings (1994) address such issues in their survey in 1988.

Watson (1996) appraises familiarity in three areas, namely, qualitative techniques, simple quantitative techniques and sophisticated quantitative techniques. The more training the forecasters receive, the more knowledge they have about sophisticated techniques; however, they were more familiar with judgmental techniques compared to easy quantitative techniques. In this account, the more sophisticated sales force composites and Delphi/expert opinions were preferred over trend growth rates and moving averages, in contrast with the survey of Sparkes and McHugh (1984). Perhaps this could be due to the size of the firms where a majority consist of small organisations.

In her survey, Watson (1996) indicates that firm size and the use of methods were thought to be highly correlated because small firms prefer qualitative and simple quantitative techniques to sophisticated quantitative techniques. Another correlation

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is that the use of judgmental techniques grows with the experience of respondents. It will be the nature of this evaluation of relationships that our study hopes to present later in the thesis, but with different variables.

Watson (1996) also carries out case studies to get a more in-depth understanding of the current function of forecasting in the electronics industry, in terms of problems faced, methods used and the success of forecasting, the last being the emphasis of our research question. The case study samples use simple statistical techniques and simple spreadsheet computer packages for forecasting. Their problems remain as “lack of knowledge, expertise and confidence in forecasting” though they make an attempt to better their forecasting accuracy by considering new methods and software for forecasting.

Watson (1996) also indicates that there is a problem with communication and information flow in the industry and suggests that improvement in these might come about by virtually centralising forecasting to the firm. In line with Sparkes and McHugh (1984), Watson (1996) also found that more companies do recognise the significance of forecasting, though most use a naïve model, but several companies are not so serious about adopting computerised techniques as an alternative. Moreover, in terms of use, there is a significant gap between judgmental techniques and statistical techniques. The use of trend growth rates and moving averages is most favoured (by 35% of the respondents) as opposed to the use of exponential smoothing, even though research shows the latter method produces more accurate forecasts than the former.

Kahn (1998) provides an overview of how forecasting is done, either by top-down or bottom-up forecasting approaches, in sales and new product forecasting scenarios. He wants more work to be done in a search for ‘the best intelligence management infrastructure and process for forecasting’.

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Chapter 2 – Literature review

Mentzer (1999) examines the impact of forecasting on the shareholder's return. He claims that “no company was ever successful simply from more accurate demand forecasting. Unless these more accurate forecasts can be translated into higher levels of customer service and lower supply chain costs, the impact of improved forecasting accuracy is lost on corporate profitability” (p.8). In other words, top management is not (and should not be) attracted to spending money for accurate forecasts if it does not produce greater amount of profits to the stakeholders. Our postal survey takes into account profit forecasting.

Mentzer et al. (1999) refer to two surveys in their article on sales forecasting management. These surveys are Mentzer and Kahn (1997) and Moon et al. (1998). The framework provided looks into four different areas, namely, functional integration, approach, systems and performance measurement. Functional integration considers the extent of communication and overall features of forecasting, such as its functions with other departments, the need of forecasting in other aspects of the business and returns for the preparers. Approach in forecasting involves integrating forecasts with plans, whether it is a top-down approach or vice-versa, what methods are being used and whether the people involved are trained. Systems concerns establishing electronic links between the intra-company and the supply chain, data base and the extent of knowledge of the systems within the business. Performance measurement evaluates accuracy, the effect of influencing factors on accuracy and the use of other performance devices.

Sanders and Manrodt (2003) evaluated forecasting software in terms of their use, satisfaction and performance. Their data was based on a survey of 240 US companies and they reported 10.8% used forecasting packages. The survey reported dissatisfaction with the packages used and the qualities considered in choosing a particular software is ‘ease of use’ and ‘easily understandable results’. The survey showed that practitioners still use simple spreadsheets instead of sophisticated ones and the output produced by the software is unreliable, as managers alter the

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forecasts. This shows that managers are not satisfied with the packages. However, the practitioners who use business software tend to be satisfied with the forecast prepared.

As an inspiration to enhance surveys, our study will also take into account the recommendations made by Moon et al. (2003). They provide a description of a methodology to perform audit in sales forecasting in order to recognize and improve the related processes. They use three distinct phases, namely ‘as-is’, ‘should-be’ and the ‘way-forward’ as directions to change towards achieving ‘world-class levels of forecasting processes’.

The surveys reviewed above were mainly done in the United States of America but scarcely ever in the U.K., which becomes the general research site of this study. The general focus is typically on preparation, involving the choice of methods, relationship between familiarity and satisfaction in using those methods, performance of methods, who the people involved are, looking at their backgrounds and other organisational issues. No other relationships between factors or identifying of key variables are considered in these surveys; hence, our study attempts to highlight these other factors. Most of the surveys used sales as a rule; other measures or functions include marketing and budgeting. Profits are scarcely ever used in surveys. No measure nor any forecasting studies in the public service sector, such as universities and hospitals, has been found; and forecasting reviews from 1996 to date are not found either. Reports by most of the earlier surveys relating to forecasting management are based on frequency responses, though few study associations between factors. More factors might be worth cross-casting in order to study their relationships for a better perspective, as we attempt to do in our study (for further details, please see Chapters 5 and 6).

It can be seen, then, that there has been a change recently in terms of approaching forecasting. The trend is towards studying and applying both forecasting methods
and forecasting management, though there are indications that more emphasis will
be placed on the latter in future. Related computer skills, knowledge and the people
involved in forecasting should be fused together to promote better features in
forecasting.

We now investigate whether industries today have changed, ten years later, in their
perceptions and practices of forecasting in relation to the above studies, especially

Winklhofer et al. (1996) offer a synopsis of empirical studies on forecasting practice
with a summarised description of the methodologies used, as shown in Table 2.1. It
can be seen that there were 35 surveys and 6 case studies conducted between 1973
and 1994. 64% of the investigations were carried out in the United States of
America, 15% in the United Kingdom and 11% in Canada, while the remaining 10% were in other countries, such as Brazil and Australia, or used cross-national samples (e.g. USA and Canada).

According to Winklhofer et al. (1996), half of the studies were on sales forecasting,
in which a majority observed sales forecasting with regard to particular settings, for
example, time factors, levels of forecasting and the practices of sales forecasting
(Dalrymple, 1975, 1987; Mentzer and Cox, 1984a,b; Cerullo and Avila, 1975;
Rothe, 1978). Percentages of coverage were not presented for types of industry
because the companies studied were involved in more than one type of business.
Similarly, as regards the area of forecasting investigated, the vast majority of
companies were concerned with sales while a minority were concerned with other
areas. Again, due to overlap, the descriptions 'many', 'some' and 'a few' were used
to represent the coverage.
Table 2.1 - SUMMARY OF EMPIRICAL STUDIES IN FORECASTING (1973-1994)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Results reported</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of studies (41)</td>
<td>35 Surveys</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>6 Case studies</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td>Investigation by countries</td>
<td>United States of America</td>
<td>64%</td>
</tr>
<tr>
<td></td>
<td>United Kingdom</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>Canada</td>
<td>11%</td>
</tr>
<tr>
<td></td>
<td>Brazil, Australia and cross-national samples of USA and Canada</td>
<td>10%</td>
</tr>
<tr>
<td>Type of industries</td>
<td>Manufacturers of industrial products</td>
<td>Many</td>
</tr>
<tr>
<td></td>
<td>Consumer goods</td>
<td>Some</td>
</tr>
<tr>
<td></td>
<td>Services and utilities</td>
<td>A few</td>
</tr>
<tr>
<td>Area of forecasting study</td>
<td>Sales</td>
<td>Many</td>
</tr>
<tr>
<td></td>
<td>Sales with specific variables</td>
<td>Many</td>
</tr>
<tr>
<td></td>
<td>Market potential assessment</td>
<td>A few</td>
</tr>
<tr>
<td></td>
<td>Price forecasting</td>
<td>A few</td>
</tr>
<tr>
<td></td>
<td>Competitive response forecasting</td>
<td>A few</td>
</tr>
<tr>
<td>Methodology</td>
<td>Mail questionnaire</td>
<td>61%</td>
</tr>
<tr>
<td></td>
<td>Personal interviews</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>In-depth investigations</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Combination of the above including telephone discussions</td>
<td>14%</td>
</tr>
</tbody>
</table>

The data collection for these studies was done via mail questionnaires (61%), personal interviews (15%), in-depth investigations (10%) and a combination of

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methods (personal interviews, mail questionnaires and follow-up telephone discussions, 14%).

Winklhofer et al. (1996) note that, despite several literature reviews of forecasting practices published (by such writers as Turner, 1974; Rao and Cox, 1978; Makridakis et al., 1983; Wheelwright and Makridakis, 1985; Makridakis and Wheelwright, 1989), another review was needed as the coverage of previous reviews was limited to only six empirical studies. In addition, there have been many more investigations, which include case studies detailing corporate forecasting processes and providing additional aspects to survey investigations such as applying judgemental methods.

Winklhofer et al. (1996) also indicated that the reviews by Turner (1974) cover much earlier studies and this raises the question of their suitability and relevance in current circumstances. Previous reviews fail to suggest future research outlines to examine forecasting practices; in reality, only Rao and Cox (1978) recommend learning 'more about the ways in which new techniques and new applications of sales forecasting are diffused among the firms in industry.'

It was found that, as opposed to the vast number of empirical studies on forecast preparers, there was very little coverage of forecast users (Winklhofer et al., 1996). In their case study, Fildes and Hastings (1994) suggested that forecast preparers may also be the prime forecast users.

As reported by Peterson (1993), major forecast users were top management, marketing, finance and accounting officers. Rothe (1978) suggests five key user groups, namely production planning and operations management, sales and marketing management, finance and accounting, top corporate management and personnel.
Galbraith and Merrill (1996) indicate from their survey that management actions were directed towards realising forecasts at a desirable level rather than for in the pursuit of accuracy. This supports our case study, in that we do not ask our respondents about forecast accuracy.

Sparkes and McHugh (1984) found, through their survey, that despite the awareness of useful forecasting techniques, the respondents, who held leading positions in British manufacturing industry, were reluctant to learn and use those techniques that would benefit them by computerisation. In our study, we also asked personnel in leading positions about this issue.

Duran and Flores (1998) carried out a survey on forecasting practices in Mexican companies, which also shows that these companies use mainly judgmental methods. This finding is similar to that of Watson (1996), who learned that managers were more familiar with these methods even though they have some knowledge of more sophisticated ones. She also finds that judgmental techniques grow with the experience of respondents. In Duran and Flores (1998), despite forecasting being taught in colleges and universities in Mexico, local companies hardly used and knew very little about forecasting methods. Among the issues addressed were the extent to which forecasting techniques are known and used in Mexico and what main problems and challenges were faced by Mexican firms face in using forecasts.

The survey was directed to top-level executives in marketing or sales and the response was a low 5.4% of the 1000 mail questionnaire distributed by the leading journal, *Expansion*. This was because their managers were not used to responding to questionnaires. Moreover, the economic instability of the country was a priority concern which may have discouraged academic interests. The companies were distributed in various places in Mexico, apart from the south; most of them were large firms (measured by the number of employees). The officers who responded were mainly from sales (35%), marketing (22%) and the rest came from other
functional areas. 52% of the firms are in manufacturing and the others were in commerce, finance and construction. The average annual sales were over US$100 million and the average number of employees was about 920.

The issues addressed in this study are familiarity with forecasting techniques, frequency of use, satisfaction with methods used, forecasting problems and forecast improvement, time horizon and the frequency of forecast preparation, and evaluation issues.

The survey demonstrates that many firms use only a limited range of forecasting techniques, even though personnel are familiar with them from college. The growing uncertainty factor which emerged due to the economic crisis made even the formal forecasting techniques unreliable. Consequently they turned instead to judgmental ones. However the more sophisticated methods were hardly known. The problem faced by the firms when using forecasts is accuracy, like that faced by the US firms and also the changing business environment, due to the economic situation at the time. The respondents claimed that there was support available in the market and if there was a need to resort to forecasting techniques, the positive perception among businesses of forecasting must be encouraged. Businesses should also be selective in using commercial software as some packages may not be appropriate for the country’s economic condition.

Duran and Flores (1998) suggest that improving the forecasting practices in Mexico is important to Mexican businesses and that the economic situation at the time must not be used to discourage planning and decision making functions for better operations.

Mentzer and Kahn (1994) also find that judgments are used to modify quantitative methods in order to forecast accurately. Dalrymple (1987) discovered that
companies use subjective forecasting methods even when computers are accessible. Hence, judgmental techniques are favoured by the practice to a certain extent.

As for organisational factors, Stewart (2001) uncovers motivation consequences which contribute to realising forecasts, including rewards, recognition and opportunities such as special training programmes. All of these factors were gathered from groups and companies; however, none were found in universities. No surveys in forecasting have been done for public services, in particular, universities.

Moon et al. (2003) also suggest that the practice relies on computers and information systems in order to improve forecasting. Moon et al. (2003) summarise frameworks from three studies by Armstrong (1987), Fildes and Hastings (1994) and Mentzer et al. (1999). It can be seen that each study approaches forecasting management in a different way, but they all address somewhat similar issues. Armstrong looks at forecasting methods in terms of use, cost and procedures. He also observes uncertainty and cost and the benefits of forecasting. Fildes and Hastings (1994) focus on the forecaster and decision-maker, information systems and communication, as well as the technical characteristics of the forecast, such as accuracy, bias and uncertainty. Mentzer et al. (1999) concentrate on four areas which deal mainly with communication and the collaboration of other functional areas, use and training, systems and the evaluation of performance measures relating to forecast accuracy. Moon et al. (2003) describe a methodology to conduct a sales forecasting audit as a continuous improvement in sales forecasting. This methodology identifies three phases, namely ‘as-is’, ‘should-be’ and ‘way-forward’. To date, 16 organisations have implemented this audit process and they have responded positively.

It is inevitable that there are many aspects of forecasting management to be studied and used to form a basis for a research framework. Our study attempts to add to and support the current related literature. To provide better understanding of those
various aspects, it will also be useful to gain some insights into the human factors in forecasting, as it is the people in the organisations who make the forecasts.

2.5 HUMAN FACTORS IN FORECASTING

In an organisation, one of the leading members of staff is a manager and, for him, the forecasting of profits is important (Mason, 1972, p.205). The forecasts which he makes may be subject to some inaccuracy but concentrating on the following can reduce this:

- Lucid comprehension of the information involved;
- Choice of a suitable forecasting method;
- Continuous assessment and immediate ability to modify relationships, considering the latest developments.

Therefore, managers should have the qualities to predict future cash flows and sustain liquidity (Bowerman and O'Connell, 1993). Extending into the core management of the business is the forecasting process, which is believed to support successful planning (Makridakis et al., 1998, p.2).

In budgeting, human factors must be considered in order to execute the budgets efficiently. Training, motivation, participation, negotiation and reward systems are all part and parcel of human resource management, which are essential in order to execute business activities effectively (Drury, 2001, pp.335-336; Lucey, 1996, pp.155-158).

It was suggested in Wheelwright and Makridakis (1980, pp.317, 329) that companies of medium to large size employ staff to assist specifically in the initial set-up and implementation of forecasting. These staff must be apt and competent, not only with
the methods and applications but they also need to understand management requirements and problems. Their training may be of a technical nature but they should be open and able to discuss practical issues with the managers concerned and should apply them to actual situations accordingly.

In the survey titled ‘Corporate Forecasting Report: Promise and Reality’ by Wheelwright and Clarke (1976), it is found that medium to large sized companies in America invest in sizeable numbers of staff to be responsible for their forecasting exercises. Most companies centralise their forecasting function at their head office, but the bigger companies which have some experience are inclined to have decentralised forecasting functions. The survey also highlights the distinction between the users and the preparers of forecasts, who have conflicts of interests, characterisation and opinions. These include technical abilities, understanding routine activities and management support.

2.6 BEHAVIOURAL ISSUES OF FORECASTING

Fildes and Hastings (1994) mentions issues related to the managers and humans involved but with little emphasis. Bewley (1997) attempts to bring together academic and practical quests in forecasting and reports that the disparity between them is worrying. Mahmoud et al. (1992) present interesting views on issues of implementation and communication in bridging the gap between the theory and practice of forecasting.

Mahmoud et al. (1992) recommend that academic research be carried out in order to examine and understand the sociological process of forecasting, not merely advances in forecasting methods. They also suggest that academics and practitioners would gain by moving away from the traditional forecasting modelling, towards learning to forecast from the environment itself.

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As forecasting is a human activity (Bretscheneider and Gorr, 1989), research should probe into the way in which an organisation’s environment, culture and process interrelate when developing a forecast. Jones et al. (1997) states that ‘more attention needs to be focused on how managerial, political and procedural factors influence the forecasting process in organisation’s implementation of forecasts, uses of forecasts and credibility of forecasts’. After reviewing various studies (Dawes et al., 1994; Fildes and Hastings, 1994; Galbraith and Merrill, 1996; and Winklhofer et al., 1996), Stewart (2001) points out that ‘research into organisational factors associated with forecasting would be valuable’. This indicates that there are complementary issues, besides forecasting methodology, which must be considered in order for successful forecasting to take effect.

Achievement in implementing formalised methods of forecasting depends on the manager’s qualities (Wheelwright and Makridakis, 1980). These include his understanding of the situation where the forecasting will operate, interest in real improvements in decision-making and his knowledge of the forecasting techniques. Mahmoud et al. (1992) also suggest that emphasis should be given to the process of forecasting and the way that it is carried out in companies.

Major behavioural issues must be considered in terms of the management’s capability to design and overcome problems of forecasting (Fildes, 2001). Training should be taken seriously so as to increase understanding of the forecasting methods. Expertise is also important. Hence, generating ideas to make practical forecasting more effective within a business must also be developed.

Goodwin (2002) highlights the fact that ‘all forecasts involve judgement’. This indicates that the element of behavioural issues comes in as a complementary strength no matter which statistical methods is used and is therefore crucial. This is associated with the ‘nature and attitude of personnel involved in producing and using

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the forecasts’ when deciding on ‘the choice of method, model form, predictor variables or data set’.

Goodwin (2002) also refers to work done by Asch (1965) and Janis and Mann (1979), who shows that an organizational system can be affected by group processes which set the system exposed to the possible mis-communication of opinions and information which will impede a successful outcome. The forecasting function is part of the organizational system, the focus of the present study, which it relates to group work.

In planning and supporting the forecasting process, four areas may be identified to eradicate problems with the staff members involved (Wheelwright and Makridakis, 1980, pp.323-326), namely:

- Who is responsible?
- Who makes decisions?
- Who pays for forecasting projects?
- Who does the work?

The motivation of an employee in her/his work relates to the quality expected to achieve a successful performance (Lawler and Suttle, 1973; Ferris, 1972; Mia, 1989).

Forecasting is said to be successful when forecasts are able to predict the actual performance within a period of time. However, forecasting fails when actual performance varies considerably from forecasts. Klein (1984) noted many successes and failures in formal forecasting exercises. From a review of successful forecasts, only about 20% of the forecasts examined could be classified as successes, in a growth market situation (Schnaars, 1989).
One of the failures in forecasting may be caused by relying on single point predictions. In forecasting extraordinary events, Stekler (2003) discusses the problems involved and classifies them into two categories, as follows:

1. ‘those that occur infrequently and are not generally predicted in advance and
2. those that are expected to occur but whose impact cannot be predicted by conventional methods.’

Stekler (2003) also suggested that, to overcome the first problem above, ‘more emphasis be placed on understanding the role that individuals play in the forecasting process.’

The latest technology and knowledge-based systems relating to financial events make it simpler for companies to predict the future (Lynch, 1994, p.209). There is also available highly developed computer software which can assist in forecasting and which can generate varying results for alternative inputs. With this technology, the personnel involved are forced to learn about not only the system but also the principles behind forecasting.

The qualitative or judgmental approach is practical in the preparation of short-term forecasts (Shim, 2000, pp.8-9). Two relevant forecasting methods, in this case, are executive opinions and the Delphi method. Executive opinions are biased projections by a group of executives in a business; these experts form and manipulate forecasts on the basis of their own outlook. The Delphi method addresses expectations for the future by probing the group of executives individually. Hence, the qualities of the personnel involved are in question.
2.7 OTHER BEHAVIOURAL STUDIES

A behavioural study in itself covers a very wide range of areas and is conducted in many disciplines, such as management, education, accounting, information technology and marketing, to name a few.

Studies in understanding the behavioural effects of budgetary control systems were done before prescribing theories for the subject area (Al-Sammarree, 1990). Basically, the studies covered areas such as motivation, control, people’s performance, leadership, participation, negotiation in budgeting, managers’ behaviours, job-related tensions and attitudes of employees and senior managers. According to Al-Sammarree (1990), these studies were conducted in the 1950s: Argyris (1952); and Simon (1954); the 1960s: Stedry (1960); Stedry and Kay (1964); Hofstede (1969); and the 1970s: Hopwood (1973); Bruns and Waterhouse (1975); Swieringa and Moncur (1975); and Otley (1976). Subsequently, Brownell (1982), Hirst (1983) and Brownell and Hirst (1986) carried out studies to integrate the results from the earlier studies by Hopwood and Otley. As these articles are reviewed by Al-Samarree (1990), their references are not reproduced in our bibliography. Related studies in the 1980’s reveal relationships between accounting, budgeting and control in an organisation (Flamholtz, 1983; Brownell, 1985). Mia (1989) found that participation did influence managerial performance and that motivation was dependent upon an objective agreed through consensus and participation by employees.

The methodologies used involved questionnaires, interviews, observations and fieldwork, together with supporting documents and organisational policies. Data collected were analysed using both qualitative analysis and statistical methods to identify relationships and confirm correlational structures. The former were described and presented in the form of tables and schemas.

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Miandehi (1997) studied the process of strategic decision-making at the University of Manchester. The methodology adopted is qualitative in nature and the data were collected via the triangulation method (interviews by tape recorder and observations when attending meetings, as well as documents). Data were analysed using generic methods. In this case, interviews were transcribed into a special format for use in ‘Ethnography’ software. Once the researchers familiarised themselves with the data, a thematic framework was identified where the categories of findings were named as collegiality, political models and consensus building. As for the ‘actors’ involved in decision-making, they were classified into students, faculty, deans, administrator and senate. Codes were then used to classify the data under various themes before analysing and interpreting them. Findings showed that collegiality is the main management model behind strategic decision-making at the university. Collegiality means ‘the broad participation of academic staff in the governance of the university’ (Miandehi, 1997). It is interesting to observe studies from other areas than these, as they are also related to forecasting and help to conceptualise this study as a whole.

More behavioural studies in areas such as budgeting and accounting are seen to be related to this study. These are summarised in Table 2.2. The list is given to indicate what proportion of behavioural studies have been done in budgeting and accounting and so to give an idea of the overall coverage in general; hence, in-depth reading on these references has not been undertaken.
### Table 2.2 - SUMMARY OF PREVIOUS STUDIES RELATING TO BEHAVIOURAL FACTORS IN BUDGETING AND ACCOUNTING (1991 - 2001)

Source: [www.theses.com](http://www.theses.com) and AIS Library Information Service (ISD E-resources)

<table>
<thead>
<tr>
<th>Author</th>
<th>Area</th>
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<th>Methodology</th>
<th>Synopsis</th>
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<tbody>
<tr>
<td>Maclnnes (2001)</td>
<td>Accounting</td>
<td>Diversified companies in the U.S.A.</td>
<td>Survey questionnaire</td>
<td>Possibility of economic slowdown. When times are bad, accountant's role as trusted advisor is intensified. Advise clients to diversify.</td>
</tr>
<tr>
<td>Zimmermann <em>et al.</em> (2001)</td>
<td>Accounting</td>
<td>1,484 Non-national firms by voluntary and anonymous selection</td>
<td>Mail questionnaire</td>
<td>Examined firm size, sources of income, expenses, procedures and extent to which respondents address international issues for their clients.</td>
</tr>
<tr>
<td>Smith (1991)</td>
<td>Accounting</td>
<td>14 accounting firms (U.S.A.)</td>
<td>Survey questionnaire</td>
<td>Settling bankruptcy has turned into a paying proposition for debtors and creditors.</td>
</tr>
<tr>
<td>Abdul Rahman (1998)</td>
<td>Accounting</td>
<td>Islamic Organisations in Malaysia</td>
<td>Interpretive and ethnographic studies</td>
<td>Accounting and accountability practices were found to be lacking in esteem. Showed conflicting influence of Islamic religious values and power relationships.</td>
</tr>
<tr>
<td>Flaherty <em>et al.</em> (1997)</td>
<td>Accounting practices</td>
<td>Accounting firms in Arkansas</td>
<td>Mail questionnaire</td>
<td>Firms are performing well but individual firms must improve in client services and sources of fees.</td>
</tr>
<tr>
<td>Burns (1996)</td>
<td>Accounting</td>
<td>15 UK firms</td>
<td>3 longitudinal case studies and field survey interviews</td>
<td>Explored factors that may cause accounting routines to change.</td>
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<tbody>
<tr>
<td>Herman-son et al (1995)</td>
<td>Accounting</td>
<td>Audit staff and partners</td>
<td>Mail questionnaire</td>
<td>Staff retention rate (currently two years in service) to improve: better daily work environment, flexible hours, female staff arrangements and special treatment for alternative work arrangements.</td>
</tr>
<tr>
<td>Nisberg (1995)</td>
<td>Accounting</td>
<td>Business people, bankers and lawyers</td>
<td>Survey questionnaire</td>
<td>Found most clients satisfied with the service received from accounting firms. To expand services.</td>
</tr>
<tr>
<td>Mein (1995)</td>
<td>Accounting</td>
<td>Czech Republic</td>
<td>Qualitative (interviews), quantitative (questionnaire) &amp; case study</td>
<td>Cultural and environmental influences.</td>
</tr>
<tr>
<td>Lewis (1999)</td>
<td>Budgeting</td>
<td>Single institution and senior staff in Standing Conference of Principals (ScoP)</td>
<td>Exploratory questionnaire survey and case study</td>
<td>Attitudes towards financial performance at a budget centre. Attitudes were consistent, influenced by job or category or institutional size. These factors affect level of agreement and disagreement.</td>
</tr>
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<tbody>
<tr>
<td>Tsamenyi (1997)</td>
<td>Budgeting</td>
<td>Four different industries in Ghana</td>
<td>Gidden’s social theory (Gidden, 1997)</td>
<td>Examined the roles of budgets. Environment comprises many variables (linked with one another) and cannot be polarised with any fixed measurement.</td>
</tr>
<tr>
<td>Bujang (1996)</td>
<td>Budgeting</td>
<td>Malaysian Ministry of Health</td>
<td>Semi-structured interviews, documents, workshops, management meetings, non-participant observation</td>
<td>Modified Budgeting System – discovery and construction of MBS.</td>
</tr>
<tr>
<td>Poon (1996)</td>
<td>Budgeting</td>
<td>Large public utility in Hong Kong (64 managers)</td>
<td>Critical incident approach (qualitative and quantitative data)</td>
<td>Theory of goal interdependence in understanding relationship between budgetary participation and effectiveness.</td>
</tr>
<tr>
<td>Xavier (1996)</td>
<td>Budgeting</td>
<td>Observing budget reform in Malaysia and Australia</td>
<td>Explanatory inquiry based on three themes – political and administrative structures, change does not mean better performance, and change requires ‘engineered’ approach.</td>
<td>Inquiry into role-players in budgeting assessed progress of the reforms and identified influencing factors.</td>
</tr>
<tr>
<td>Pollanen (1996)</td>
<td>Budgeting</td>
<td>Ontario colleges and universities</td>
<td>Mail questionnaire based on previous studies (Brownell, 1982; Brownell and Hirst, 1986)</td>
<td>Understanding of organisational effectiveness through effective management control systems.</td>
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<th>Synopsis</th>
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<tbody>
<tr>
<td>Alebaishi</td>
<td>Management accounting (MA)</td>
<td>Manufacturing Companies in Saudi Arabia</td>
<td>Field study – interviews and questionnaires</td>
<td>Companies used traditional MA more than relatively new techniques. Used less than developed countries. Management with positive attitude used more of the techniques.</td>
</tr>
<tr>
<td>Namri</td>
<td>Management accounting (MA)</td>
<td>Saudi owned and joint venture (JV) companies located in Saudi Arabia</td>
<td>Descriptive and explanatory</td>
<td>Similarities and differences in MA practices between the two parties. Sophistication of system. JV managers rely more on accounting information for control and decision-making.</td>
</tr>
<tr>
<td>Russell</td>
<td>Management accounting</td>
<td>Managers (Canada)</td>
<td>Case study</td>
<td>Managers resolved dissatisfaction.</td>
</tr>
<tr>
<td>Pearson</td>
<td>Management accounting</td>
<td>Management accountant in pharmaceutical industry (Canada)</td>
<td>Pharmaceutical companies (by observation without any survey)</td>
<td>In restructuring to sell goods, the management accountant plays an integral strategic role – value added insights as strategic member of the management.</td>
</tr>
<tr>
<td>CIMA (UK)</td>
<td>Management accounting</td>
<td>Management accountants (UK)</td>
<td>Survey questionnaire</td>
<td>Strong desire to change roles of the management accountants, collective desire to use financial understanding to assist in the change process.</td>
</tr>
<tr>
<td>Al-Hazmi</td>
<td>Management accounting</td>
<td>UK manufacturing industry</td>
<td>Exploratory based on previous case studies and survey</td>
<td>Cost policies and cost practices.</td>
</tr>
<tr>
<td>Dargie</td>
<td>Behaviour of chief executives (CE’s)</td>
<td>Public sector organisations</td>
<td>Hypothesis testing using fieldwork research; comparing case studies of CE’s</td>
<td>Understanding the role of chief executives at work by observing their behaviour, post and behaviour vary.</td>
</tr>
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An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
### Chapter 2 – Literature review

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<th>Methodology</th>
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<tbody>
<tr>
<td>Cunliffe (1997)</td>
<td>Management and learning</td>
<td>Managers</td>
<td>Post-modern social constructionist way of thinking argued the need to develop 'practical theories'. Audio, videotaped conversations, observing how managers practise.</td>
<td>Establish new basis, different ways of thinking when in practice.</td>
</tr>
<tr>
<td>Gibson (1996)</td>
<td>Managers</td>
<td>Chinese financial controllers in Hong Kong hotels</td>
<td>Mintzberg's theory of managerial roles. Semi-structured interviews, transcribed into content analysis</td>
<td>Maintaining harmony by building good rapport among superiors and peers. Importance of culture's emerging naturally from the process.</td>
</tr>
<tr>
<td>Marston (1993)</td>
<td>Company communication</td>
<td>Analysts, fund managers – large UK quoted companies</td>
<td>Descriptive statistics and hypothesis testing</td>
<td>Chief executives and finance directors are involved in investor relation activities – meetings and telephone conversations; deemed valuable for communication. Cost, marketability and shareholding influence investor relationship.</td>
</tr>
<tr>
<td>Jones (2000)</td>
<td>Sales role responsibility</td>
<td>Sales staff, managers, directors and customers</td>
<td>Behavioural questionnaire, 2 pilot studies</td>
<td>Examines relationship between personality and work performance in sales roles. Instruments based on behaviour predict better than traditional measures of broader model of behaviour.</td>
</tr>
</tbody>
</table>

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
It can be seen from the summary table above that most of the previous studies were qualitative, conducted via questionnaires, interviews and case studies. These studies are either about organisational processes or the people involved, relating to budgeting, accounting and management accounting. These studies are picked from titles listed in two sources (http://www.theses.com/ and ISD E-resources). We refer to these studies in conducting our study to give us direction and idea as to their identification of research area and site, as well as methodology, in general. A synopsis of the titles is also given.

2.8 BRIEF INTRODUCTION ON MODELLING

Since this study also attempts to use mathematical models to describe the forecasting scenario and its findings, this section offers coverage of related published materials together with the rationale behind them.

'A mathematical model is a mathematical representation of the relationship between two or more variables relevant to a given situation or problem' (Berry and Houston, 1995, p.24). The following diagram, Figure 2.1, provides a simple view of mathematical modelling.

Figure 2.1 – A SIMPLE VIEW OF MATHEMATICAL MODELLING (TAKEN FROM BERRY AND HOUSTON, 1995)
From the above figure, it can be seen that mathematical modelling attempts to formulate models describing the real world. The models in turn are often fitted to sets of data and subsequently tested for goodness of fit. Figure 2.2 shows the steps involved in the modelling process.

Interpreting results and deriving findings are not sufficient to form generalisations unless they are described by models which can be applied to other similar situations. Mathematical modelling involves eight steps (Berry and Houston, 1995), as given in Figure 2.2.

As we attempt to explain issues relating to forecasting management, we will take up the recommendation for statistical correction on point forecasts given by Goodwin (1996) in order to contribute towards forecasting improvements. Deviating from forecasts may be costly to the organisation and therefore this loss needs to be accounted for. In our study, we will show an application of Goodwin's recommendation in Chapter 7.

2.9 PROBLEMS IDENTIFIED

Our main problem here is to address problems in forecasting practice. We will now re-classify the gaps given in the literature into problems by using the quantitative methods, management problems, disconnection and integration problems which have been forwarded from the previous literature.

2.9.1 Problems with using quantitative methods

This problem refers to the limited use of advanced forecasting methods. Forecasting techniques are little known and little used in practice (Duran and Flores, 1998; Mentzer and Kahn, 1994). The staff involved, in particular management, are not
very familiar with quantitative methods and these were slow in accepting such methods in practice (Duran and Flores, 1998; Drury, 1990). The most common methods used are those that were simple to use and understand, as Drury (1990) quotes from a study by Fildes (1990). Though much research has been done in

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improving advanced forecasting methods, sadly these have not been used extensively.

2.9.2 Management problems

The literature makes it clear and pointed out that there has been less attention given to systems and managerial approaches (Mentzer et al., 1999) than to methods of forecasting of the quantitative and sophisticated kind. Drury (1990) finds that several forecasting management practices do not support and are not able to use present 'advances in forecasting methodology'. Moreover, companies do not accept forecasting as part of the function of management. In addition, there is also a problem with technology and management process (Drury, 1990), which has also been pointed out by Wheelwright and Clark (1976).

2.9.3 Disconnection and integration problems

Thirdly, there are disconnection problems between the forecasting function, the information needed to produce accurate forecasts and the forecast users (Mentzer and Kahn, 1997). It should be noted that there is a need to integrate these three aspects, as we see from a study by Mentzer and Schroeter (1994) on an inventory control system for a U.S. company using multiple forecasting systems.

The problems indicate a lack of flexibility in terms of use, knowledge and the management of forecasting function, which must be addressed in order to realise the full potential of forecasting.
2.10 EFFECT OF PROBLEMS IN FORECASTING

The effect of the problems listed above is that the companies may not be able to obtain adequate forecasts for use in formulating plans for the future and this is a problem faced by the business executives in the study by Sparks and McHugh (1984). In addition, the forecasts may be inaccurate and might impact negatively on the practice.

The problems identified also encourage us to find the reasons for them and offer solutions, or at least to improve the situations concerned, which our study hopes to do.

2.11 PRELIMINARY RESEARCH QUESTIONS

In our study, we attempt to address and investigate in the following areas:

- forecast preparation – types of forecasts prepared and methods used
- forecast use – planning and budgeting
- awareness – whether preparers are aware of the forecasting methods available
- satisfaction – whether preparers and users are satisfied with the methods used

Our work will first pose a general outstanding question, namely, how do we improve forecasting management, an area which has continuously been seen as questionable in the literature and still is. Consequently, we now put forward the following sub-questions:
1) To what extent are forecasting techniques known and used in the United Kingdom? Why are there limited knowledge and limited use of forecasting techniques (Duran and Flores, 1998)?

2) To what extent are qualitative and quantitative forecasts used? Is there more use of qualitative methods than quantitative ones?

3) What are the main problems and challenges faced by firms in using forecasts?

4) Which aspect will contribute most to overall forecasting accuracy: advanced forecasting techniques, improved systems, or coordinated forecasting administration? (Mentzer and Schroeter, 1994)

5) Is there at present a problem of providing adequate forecasts?

6) What were the practices 10 years ago? What issues do the surveys raise and what findings have they offered? Are these results different from the current forecasting situation?

As we attempt to offer answers to the above questions, our research makes every effort to present why practices are as they are and thereafter to recommend what is good practice and how we can improve current practice. On the basis of the above, we will ask more questions about such practice to gather evidence in support of our propositions.

In order to help us provide answers to the above questions we identify some of the factors influencing forecasting practice, summarised from previous surveys and recommendations; these are shown in Table 2.3, below. We will then attempt to add certain other factors deemed essential as we discover them in our investigations later.
### Table 2.3 - FACTORS INFLUENCING FORECASTING PRACTICE

<table>
<thead>
<tr>
<th>No.</th>
<th>Factors</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Use, communication, skills, preparer-user relationship; problems with implementation.</td>
<td>Wheelwright and Clarke (1976)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US scenario</td>
</tr>
<tr>
<td>2.</td>
<td>Familiarity, satisfaction, use, time horizon, accuracy, credibility; ease of use; inventory turns, amount of data required; cost and return on investment.</td>
<td>Mentzer and Cox (1984)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US scenario</td>
</tr>
<tr>
<td>3.</td>
<td>Use, awareness; familiarity; effects of resulting forecasts on company’s activities.</td>
<td>Sparkes and McHugh (1984)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UK scenario</td>
</tr>
<tr>
<td>4.</td>
<td>Computers incorporate forecasting techniques; seasonal adjustments enhance accuracy in sales forecasting; time; combining 2 or more methods reduces forecasting errors; subjective forecasting techniques are common methods used even though the use of computers is rising; use of computers leads to reduction of errors. Firms which modify sales forecasts over succeeding time intervals reduce errors substantially. The bigger the size of the firm, the smaller the error. Subjective forecasting techniques continue to be a common method used among the respondents, in spite of the increased accessibility of computers. Even so, a naive model was used by the majority of firms for both short-term and medium-term forecasts. Respondents used various other sales forecasting techniques. However, these differ by the length of the forecast period, the firm size and the product type. The next common extrapolation technique mentioned in the survey was the moving average.</td>
<td>Dalrymple (1987)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US scenario</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US scenario</td>
</tr>
<tr>
<td>6.</td>
<td>Forecast techniques; forecast reaction; forecast revisions; forecast improvements; forecast responsibility.</td>
<td>Drury (1990)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UK scenario</td>
</tr>
<tr>
<td>7.</td>
<td>Approachability and simplicity of use of methods; the changing business environment makes forecasting difficult.</td>
<td>Sanders and Manrodt (1994)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Forecaster and decision-makers; information system and communication; accuracy, bias and uncertainty.</td>
<td>Fildes and Hastings (1994)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US scenario</td>
</tr>
</tbody>
</table>

**An empirical and analytical study of forecasting practices and perceptions in the United Kingdom**
<table>
<thead>
<tr>
<th>No.</th>
<th>Factors</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Understanding the need and practice of forecasting; familiarity, satisfaction, use/non-use of forecasting techniques and environment; training level, data availability, problems faced, success of forecasting; problems with communication; use of naïve model; problem in practice – gap between judgmental and statistical techniques. Firm size and use of methods; current function of forecasting in the electronics industry, in terms of problems faced, methods used and success of forecasting, lack of knowledge, expertise and confidence in forecasting though they have made an attempt to better their forecasting accuracy by considering new methods and software for forecasting; problem with communication and information flow.</td>
<td>Watson (1996)</td>
</tr>
<tr>
<td>11.</td>
<td>Sales forecasting – time factor, levels of forecasting; practices of sales forecasting. Familiarity in three areas, namely, qualitative techniques, simple quantitative techniques and sophisticated quantitative techniques.</td>
<td>Winklhofer et al. (1996)</td>
</tr>
<tr>
<td>12.</td>
<td>Forecasting practice in Mexico improving the forecasting practices in Mexico is important to Mexican businesses so the economic situation at the time must not be seen as an impediment to planning and decision-making functions to secure better operations.</td>
<td>Duran and Flores (1998)</td>
</tr>
<tr>
<td>13.</td>
<td>The way forecasting is done: top-down vs. bottom-up (political judgment).</td>
<td>Kahn (1998)</td>
</tr>
<tr>
<td>14.</td>
<td>Impact of forecasting on profits; forecast improvement (more accurate) will lead to increased profits.</td>
<td>Mentzer (1999)</td>
</tr>
<tr>
<td>17.</td>
<td>Forecasting audit; checks and benchmarks against forecasting practice.</td>
<td>Moon et al. (2003)</td>
</tr>
</tbody>
</table>

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
2.12 CONCLUSION

The literature reviewed above attempts to pull together separate strands of research relevant to the explanation of the forecasting scenario under study. This also includes the element of cost associated with forecasting (Shim, 2000, p.8). In addition, the review aims to understand why there are gaps between theory and practice in organisations and in industry as a whole. We have seen in the past decade a massive contribution to the literature investigating forecasting methods. Our knowledge base is without doubt more progressive now than in the past but, needless to say, the issues in forecasting management remain relatively under-explored.

It can also be seen that majority of the references relating to forecasting management is from America, and a few from the United Kingdom. The list of previous studies presented above is comprehensive, though not exhaustive, and presents enough information to give an overall view of earlier studies relating to forecasting management issues.

After some quantitative work on forecast accuracy and on forecasting to minimise discrepancies between actual and forecast profits of UK public listed companies, as reported by Edwards and Aziz (2000), the direction of the research then moved to qualitative areas, leading to quantitative and qualitative analyses.

It is interesting to note that the vast literature discovered on forecasting focuses more on methods of forecasting, with little emphasis on its other aspects, such as the mechanics of forecasting and other non-technical areas. In recent scientific history, researchers seemed to have been more involved with the methods of forecasting rather than with looking at themselves as a crucial part of the forecasting function. Therefore, for a change, it seems to be worthwhile to probe into this latter kind of
study so as to fill in and amplify the area of ‘behavioural issues in forecasting’ in the current forecasting literature.

The next chapter will present the methodology adopted in this study. Methodologies from the studies given in this chapter are used to structure the investigation approach for this study. Among the issues raised in the next chapter are research design, ethical issues, and areas of investigation and data collection methods, supported by relevant literature, as appropriate.
CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION AND BASIS FOR METHODOLOGY

In the previous chapter, we presented information about what has so far been covered in the literature relating to forecasting, emphasizing the scarcity of studies in forecasting management. We also learnt that this gap has been studied mostly through the use of surveys, but also in interviews, which we will summarise later in this chapter when we sum up the state of the literature.

This chapter describes the research methodology which has been adopted for the present study and provides references to support this approach. We offer, in this chapter, a discussion of different methods of investigation, the strengths and weaknesses of these methods, an assessment of their usefulness and theoretical reasons for using such methods.

The research to be undertaken for assessing factors associated with forecasting practice could take various forms. The nature and purpose of the study influence the choice of the most suitable strategy and technique (Yin, 1994, p.1; Marshall and Rossman, 1995, p.42; Remenyi et al., 1998, p.66). The factors involved in choosing such methodology are as follows (Marshall and Rossman, 1995, p.42):

1. the investigation should provide suitable and sufficient information;
2. the study should minimise resources such as time, access and costs;
3. the research should take into account ethical factors.

Yin (1994, pp.4-8) also highlights that a particular strategy should not necessarily be chosen because it is the right method but in order to avoid discrepancies within the research needs. In this regard, it should also be noted that the selection of methodology for this study is 'a match between research and method rather than trying to demonstrate that the chosen method is the only correct method' (Stewart, 2001, p.62).

In designing our research methodology, we take account of the research objectives as set out in Chapter 1. This study will be one which is dominantly qualitative in nature, with some emphasis on quantitative issues, as we observe forecasting practice in order to study the behaviour patterns of the factors involved.

As shown by Preece (1994, p.187), the structure of research includes a justification of the research, its background and the design of the empirical work, as well as inferences which allow conclusions to be drawn from the evidence. Our discussion contains "speculation about relationships involving our topic of research" (Preece, 1994, p.187), and also makes some suggestions for future work.

Subsequent sections within the chapter present detailed descriptions of the methodology used for the research study. After reviewing related literature, the research issues are strengthened by a definite focus and this helps the build-up towards identifying the research process, as shown in Figure 3.1. This figure demonstrates the process of the overall methodology to fulfil the research needs and objectives. This then leads to determining the types of research to be undertaken, namely a pilot study, a postal survey, a case study and a follow-up survey. The methods of data collection and analysis are then established before interpreting the results and making recommendations. Further explanations are then given for each of the steps in Figure 3.1.

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
Chapter 3 – Research methodology

Figure 3.1 - RESEARCH METHODOLOGY

**Step 1**
Literature review of related previous surveys and publications

**Step 2**
Identifying the objectives and needs of the research

**Step 3**
Determining the methodology – dominantly qualitative with some quantitative input

**Step 4**
Developing types of investigation - pilot study, postal survey, case study and follow-up survey

**Step 5**
Developing methods of data collection
- Pilot study and postal survey – mail questionnaires
- Case study – questionnaires and interviews
- Follow-up survey – mail questionnaire

**Step 6**
Exploratory data analysis
- pilot study: frequency counts
- postal survey: logistic regression
- case study: Bayesian decision theory
- follow-up survey: frequency counts

**Step 7**
Interpretations, conclusions and future research

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
3.1.1 Types of investigation

In order to assist us in deciding which type of investigation to employ, we now present alternative types of investigation. Broadly, there are two methods of investigation, namely qualitative and quantitative methods. These classes can be further sub-divided into different types of study.

Van Maanen (1983) defines qualitative methods as 'an array of interpretive techniques which seek to describe, decode, translate and otherwise come to terms with the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world'. In-depth interviewing is fundamental in qualitative research, which is non-directive or open (Burgess, 1982, p.45). Qualitative investigation may include research reviews, meta-analysis and secondary analysis, population census studies and cross-national comparative studies (Hakim, 2000).

Bryman (2004, p.19-20) defines quantitative research as 'a research strategy that emphasizes quantification in the collection and analysis of data and that:

- entails a deductive approach to the relationship between theory and research, in which the accent is placed on the testing of theories;
- has incorporated the practices and norms of the natural scientific model and of positivism in particular; and
- embodies a view of social reality as an external, objective reality'.

3.1.2. Assessment of utility power

In terms of measuring the utility of an outcome from an observation or finding, we use statistical and mathematical models, as well as graphs, to show the relationship between variables. The statistical model used is logistic regression, which applies maximum likelihood estimation for the parameter of a binomial dependent variable.
It also estimates the probability of a certain event’s occurring and calculates the changes in the log odds of the dependent variable. The mathematical models which we use are, firstly, the application of probability distributions to point forecasts (Goodwin, 1996), then an application of Bayesian loss functions to measure under- and over-forecasting (Goodwin, 1996) and finally a simple calculus model to explain the effect of change against a response variable (Percy, 1993). All these will be explained in more detail in later chapters.

3.1.3 Theoretical reasons for the choice of methodology

It will be clear from the above that the surveys on forecasting practice are mostly conducted using questionnaires, but that some use interviews. As they observe and obtain responses to the current situation, we also use the method of postal questionnaires and interviews to obtain observations of forecasting practice.

Our choice of methodology is based on several issues raised in the relevant literature. Firstly, Kirk and Miller (1986, p.17) state that ‘Hypothesis testing is not the only research activity in any scientific discipline. Indeed the most dramatic discoveries necessarily come about some other way, because in order to test a hypothesis, the investigator must already know what it is he or she is going to discover’. Marshall (1990, p.43) indicates that the purpose of a qualitative study is to ‘discover important questions, processes, and relationships, not to test them’. Yin (1994, p.21) points out, however, that one may not need to have any propositions in one’s research.
3.2 ETHICAL CONSIDERATIONS

In considering ethical factors in choosing a methodology, we approach the subject through several issues raised by such authors as Bickman and Rog (1998), Miles and Huberman (1994), Easterby-Smith et al. (1991, p.65) and Churchill (1995).

The purpose of observing ethical standards in our study is to protect the welfare of the research participants by maintaining confidentiality and anonymity (Bickman and Rog, 1998, p.401-402; Churchill, 1995, p. 434). Miles and Huberman (1994) identify issues such as the worth of the work undertaken, limitations, informed consent, benefits, costs, any risks, honesty and trust, confidentiality and anonymity. Churchill (1995) takes into account ethical issues such as protecting the participants against disclosure of confidential details, mental pressure, biased questions, uninformed consent and the wider effect on society.

Bryman (2004, p.325) points out that in an interview, the interviewer should be 'sensitive to the ethical dimension of interviewing, ensuring the interviewee appreciates what the research is about, its purpose, and that his or her answers will be treated confidentially'. Dienar and Crandall (1978) raise several issues as to 'whether there is harm to participants, lack of informed consent, invasion of privacy and whether deception is involved'. These issues are vital to prevent the researcher from causing any stress or loss of self-esteem to the participant, still less physical harm. Also, the researcher must ensure that the participants in the research be informed of the research process and that confidentiality and anonymity are maintained. The researcher must be honest and also be cautious about not presenting to the participants a misleading account of the research.
3.3 RESEARCH DESIGN

As noted above, in exploring the data our investigation uses four types of enquiry, namely a pilot study, a postal survey, a case study and a follow-up study, as given in Figure 3.2; the results draw attention to the research questions. They also provide insights into issues which offer a better understanding and fuller explanation by applying a series of models. The researcher is also interested in delineating the important characteristics and qualities of factors which can be associated with forecasting.

The pilot study is necessary to check and test our questionnaire, whereas the postal survey aims to observe forecasting practice in the industry. The purpose of the case study is to observe forecasting practice more closely and to interview relevant people involved in forecasting about their practice. Once the results of these studies have been analysed, we then go on to try to validate our propositions by way of a follow-up survey.

As our investigation mainly involves observing practice, we consider several surveys reviewed in the last chapter which used postal questionnaires and interviews for their data collection (sc. Winklhofer, 1996; Fildes and Hastings, 1994; Duran and Flores, 1998; Watson, 1996; Mentzer and Khan, 1995; Sanders and Manrodt, 1994). Some use a combination of both (Drury, 1990; Sparkes and McHugh, 1984; Dalrymple, 1987). All these surveys have one main intention, to improve forecasting practice, which is also the aim of the present study, as the gaps identified by these surveys are still under-studied.

Generally, the purpose of this study is to explore the forecasting function in an organization, which includes the factors influencing forecasting practice and the qualities of the people involved. This means observing their qualifications, areas of
expertise, experiences and other related factors. In addition, this study looks at the way in which experts use their personal knowledge, opinions, judgements and

Figure 3.2 - FLOW OF INVESTIGATIONS BASED ON THE FOUR TYPES OF STUDY

1. PILOT STUDY
MALAYSIAN COMPANIES WITH U.K. SUBSIDIARIES

2. POSTAL SURVEY
U.K. COMPANIES OF VARIOUS TYPES OF BUSINESSES

3. CASE STUDY
A REPRESENTATIVE SERVICE ORGANISATION IN U.K. - Salford University

4. FOLLOW-UP SURVEY
THE SAME UNITS OF ANALYSIS AS ADOPTED FOR 2 AND 3.

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
intuitions to make predictions (Bowerman & O'Connell, 1993, p.8). This brings us the case study, which has not so far been described. An attempt is made to observe and interview the personnel of a selected organisation, in order to determine the personal opinions and responses connected with its forecasting functions. A study of the organisation's procedures and observation of its systems in relation to the forecasting exercise is also carried out.

3.4 LITERATURE ON USING SURVEY INSTRUMENT

As the main survey instrument used in our study is the postal survey, we now give a summary of previous studies which also use this instrument in their investigations. The aim of this section is to give an overview of the sample used, the response rate and the areas examined in each study, in order to help us in organising our research design.

Wheelwright and Clark (1976) sent a postal questionnaire to 500 U.S. companies, based on the authors' knowledge of their involvement and concern in forecasting. Two copies of the questionnaire were sent to each company – one for a preparer and one for a user. 127 responded; 67 matched responses (from preparers and users). The main area asked about was the assessment of forecasting status; other areas were: forecasting commitment; acceptance and use of alternative forecasting methods (based on the preparers' responses); criteria for selecting a forecasting method; users' and preparers' perceptions of the company's forecasting status; differences in the ratings of users and preparers in terms of preparers' ability, users' technical ability, user-preparer interaction skills, user's management ability; and elements of effective forecasting.

Sparkes and McHugh (1984) conducted a mail survey of 300 British cost and management accountants (key positions in manufacturing industry were sought from
ICMA (UK)) and received a response rate from 76 (25.3%); the survey comprised a 10-page questionnaire to assess the level of awareness of particular techniques and the extent to which they are used in various functional applications.

Mentzer and Cox (1984) obtained 60 responses (32% 00) from US forecasting managers whom they asked about the degree of familiarity and usage, the accuracy obtained and their evaluation of different forecasting techniques.

Dalrymple (1987) also used a mail survey of marketing and forecasting managers and obtained 34 responses (16%). This survey examined how businesses prepare forecasts, in particular, sales, what methods they choose and the accuracy of forecasts.

Drury (1990) used and mailed postal questionnaires to Canadian companies in various industries such as manufacturing, oil, electrical, wholesale, mines, chemicals and utilities. These companies were randomly selected from the Dun and Bradstreet Canadian Book of Corporate Management. 234 questionnaires were completed. Some samples were returned uncompleted which made general statements about forecasting practices and some said that their forecasts were prepared by the parent company. The areas asked about in the questionnaire were the action taken on forecast errors, reasons for forecast errors; forecast revisions, forecast improvement and forecast responsibility.

Sanders and Manrodt (1994) used a 6-page questionnaire to gather information on forecasting techniques in practice, forecasting management practices, and corporate demographics. The questionnaires were posted to the highest ranking officer (president, vice-president or chief executive officer) of the 500 highest-ranking companies in the US, whom they asked to pass them on to the person most responsible for sales forecasting in the corporation. The respondents comprised

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executives such as the vice-president of marketing or director of corporate planning. The response rate was 19.2% which is lower than that of previous surveys.

Mentzer and Kahn (1994) also used a mail survey by means of an 8-page questionnaire directed to forecasting executives from 478 companies. 207 questionnaires were completed, which represents a response rate of 43%. Most of the respondents were consumer products manufacturers and the staff who completed the questionnaires was forecasting managers. The areas examined were familiarity, satisfaction, usage, measures of forecast accuracy, and criteria for evaluating forecasting effectiveness.

Duran and Flores (1998) carried out a mail survey of 1000 of the largest firms in Mexico. They used Expansion, the leading business journal in Mexico, which directed the survey to top-level executives in marketing or sales. They posed questions such as to what extent were the forecasting techniques known, to what extent were qualitative and quantitative forecasts used, and what main problems and challenges did Mexican firms face in using forecasts? The survey provides information about the extent to which forecasting techniques are being used in Mexico. Managers/directors of marketing/sales in 54 firms responded (compared to 94 in Sanders and Manrodt, 1994). By US standards, this is low, a rate of 5.4%. However, the possible reasons for this low response are that respondents are not accustomed to answering questionnaires and that the economic conditions at the time were unstable.

Sanders and Manrodt (2003) conducted a mail survey, using a four-page questionnaire on the software used, satisfaction and performance and general business information; it was sent to 2,394 heads of marketing in a wide range of US corporations, all manufacturing or retail firms. The respondents comprised vice-presidents of marketing and sales functions. 240 responded (10.3%) which is thought to be a low rate compared to previous surveys. Reminder postcards were
sent one month after the first mailing and 54 questionnaires were returned due to errors in addressing.

Many of the studies mentioned in Chapter 2, the literature review, notably surveys relating to forecasting management, do not include much consideration of mathematical models. The methodology adopted in our study, however, includes such models in order to give a different approach; it seeks to illuminate issues, which are normally addressed in forecasting management; in this case termed 'factors influencing forecasting practice'. Our aim is to interpret the results from our investigations objectively by using statistical and mathematical models.

3.5 TYPES OF STUDY ADOPTED

As we carry out four types of study in our investigation, we now explain the rationale of the process to be undertaken.

3.5.1 Pilot study

A pilot study is necessary to gather basic information about forecasting before undertaking a postal survey to obtain more detailed information, a way of 'testing the logistics of the survey' (Fink and Kosecuff, 1998, p.33).

Specifically, the pilot study is necessary for the following reasons:

1) to get initial views and collect ideas from respondents relating to forecasting and related issues;

2) to gain valuable experience of carrying out an investigation on a smaller scale so as to utilise resources efficiently when conducting larger investigations, namely, the postal survey and case study;

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
3) to gain a better direction for subsequent investigations and to help identify what other issues to raise for maximum information yield.

A pilot study is an important feature of designing a good study (Fink and Kosecoff, 1998, p.33-36). It is a feasibility study undertaken to pre-test a research instrument,

**Figure 3.3 - PILOT STUDY PROCESS (BASED ON FINK AND KOSECOFF, 1998)**

1. objective of pilot study
2. population to study
3. information to collect
4. measurement of information
5. sample size
6. data collection
7. data recording and analysis

which in this case is the questionnaire (Baker, 1994). In addition, it provides ideas as to how to expand the main study and alerts the investigators to any problems which
might possibly occur. It also gives the researchers a chance to gather basic information about the research area. As De Vaus advises (1996, p.54), 'Do not take the risk. Pilot study first.'

Subsequent data analysis reports frequency counts based on the responses to questionnaires. Basic features of the sample, for example, the size of the company, type of business and uses of forecasting functions are depicted in the form of pie charts and histograms as appropriate. The stages involved in conducting a pilot study shown above (Figure 3.3) are inspired by Fink and Kosecoff (1998). The boxes indicate what procedures and items to follow and identify in sequence.

### 3.5.2 Postal survey

The postal survey is designed to assess and appraise the practical forecasting strategies in a wide variety of UK companies, mostly in business and industry. The useful information gathered and analysed from the pilot study becomes the basis for designing the cross-sectional postal survey. The postal survey is necessary to gain a wider perspective on the forecasting issues involved in a broader spectrum of companies. This highlights and identifies any similarities and differences from the pilot study, in relation to the structures and responses to the areas under study and help to draw conclusions about their applicability to similar situations. This helps to gain a better understanding of the forecasting situation in practice, as stated in the research objectives.

The stages involved are similar to those of the pilot study given above: observing any ambiguities and addressing more relevant issues. In analysing the data, key variables are identified by cross-tabulating response variables and establishing associations by using Fisher's exact tests. To flag significant relationships between variables we work with p-values of 0.05 or less. SPSS version 11 is used for this analysis. Then, logistic regression is used to model two-factor predictors for each
key variable, this time using Minitab version 13. Only a modest sample size was available. A large sample was not possible due to limited resources, as explained further in Chapter 5 (on the postal survey).

3.5.3 Case study

The longitudinal case study here is included so as to observe forecasting in greater depth to gain a better insight (Yin, 1994, p.10), as directed by the pilot study and complementary postal survey. The case study forms a source of research work undertaken to observe forecasting practices and perceptions in the UK.

The case study attempts to consolidate findings from the postal survey, by exploring a single service organisation in depth. The aim is to examine the forecasting function in this service organisation. It enables analytical and critical explanation (Yin, 1994, p.10) by considering related areas in greater detail. This also forms a basis for future research work. Why conduct a case study? Given the nature of the problem, questions of how and when seem suitable in this context, so that the findings may be easily applied to other organisations.

In the case study, key variables are also identified and the rationale for choosing them is also provided. Cross-tabulation of the response variables is subjected to Fisher's exact tests to find significant associations between key variables and other variables based on probability values of 0.05 or less, as for the postal survey.

Since there is little or no literature related to behavioural studies in forecasting within the service sectors, this research attempts to fill the gap by conducting a case study in a university setting. The issues raised in this case study are qualitative in nature, but the analysis is quantitative and extends by consideration of elementary mathematical modelling, hence providing another significant contribution. The general idea is to relate the organisational structure with features contributing to
successful forecasting practice. For example, good communication determines the accuracy of forecasts and sufficient time ensures better feedback on forecasts before implementation. Afterwards, the analysis takes a step back to identify the mathematical models which describe how the results affect strategy and action. These also help to explain what might cause such effects and why some significant associations are observed between particular variables. The exercise is intended to identify 'what pushes forward' and 'what pulls backward' in understanding, say, the mechanism of a relationship between the number of students enrolling and the tuition fee payable per student. The consideration here is to observe the impact of increasing tuition fees which might prevent potential students from applying to the university. This of course raises some very important issues, as described in Chapter 6 (Case study: forecasting at the University) and Chapter 7 (Modelling profit forecasting).

Interviews are also used for gaining insights into forecasting practices and perceptions. These do not restrict the respondents to structured answers and permit them to offer other relevant inputs (Spradley, 1979). Interviews in this research are conducted in the investigation for the case study. The whole idea of conducting interviews in the case study is to get as much information as possible whilst ensuring that interviewees feel completely at ease. To allow for this, four types of questioning methods are suggested by Patton (1990, pp.280-290). Firstly, informal conversational interview, whereby interviewees talk freely and naturally about their related experiences at the start of the interview. Secondly, the interview guide approach, in which views and opinions of respondents are gathered for the sake of information on certain related matters. Thirdly, the standardized open-ended interview to collect facts as informed by the interviewees. Lastly, the closed quantitative interview, to ask for limited responses, for example, yes or no answers.

One of the best ways to gain a completely precise record of an interview is to use a tape-recorder (Minichiello et al., 1991, p.18) but in our case, note-taking was used in
the interview as this enabled the researcher to analyse and interpret data almost immediately. The structure of interviewing uses a recursive model (Swartz and Jacobs, 1979) to enable a free flow of responses directed towards the issue implied by the questions, thus providing direction to our research process.

The resulting interview responses are assigned into categories, which it is hoped fairly reflect the answers and opinions given by respondents. Simple linkage charts are drawn to present information summarily and graphically.

3.5.4 Follow-up survey

Having observed the practice, we came up with some propositions, based on our analysis, which we then offered to our sample again for validation. By doing this, we hoped to re-confirm what we had proposed and to identify any discrepancies between theory and practice. This would form a base for us when drawing our conclusions in the last chapter of the thesis.

The propositions we make are based on the two studies, namely, the postal survey and the case study and we ask questions complementary to the earlier questionnaire; the areas examined will be described in more detail in Chapter 8.

3.6 AREAS OF INVESTIGATION

There are three basic areas to investigate in all three types of study, shown below:

- Profiles of organisations and how they address the fundamental questions why, how, what, who and when in relation to forecasting. This includes the identification of preparers and users.
• Uses of forecasting within decision making at different levels of management.

• Lists of other factors influencing the practice and what the perceptions of forecasting are, as perceived by the people involved in forecasting.

3.7 THEORETICAL FRAMEWORK

The research framework is based on concepts drawn from the following summary and the overview depicted in Figure 3.4:

• Survey by Wheelwright & Clarke (1976)
  This survey was carried out nearly 30 years ago on American companies under American laws. Similar research has not so far been carried out in the UK, where selected public limited companies are now studied. In addition, time has passed and organisations are now continually subject to changes and new technologies, such as the exploitation of information technology and sophisticated systems; changing legislation and governing policies; and different kinds of approaches and thinking by the people involved.

• Summary of the International Symposium of Forecasting in 1991 by Mahmoud et al. (1992)
  The ISF 1991 conference proceedings related to behavioural issues: practitioners at this symposium raised interesting views. Our research addresses and establishes behavioural issues related to these views.

• Survey review of forecasting literature by Winklhofer et al. (1996)
  This review considers 41 studies conducted in various disciplines using

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various methodologies in other continents of the world. Our research extends this, by identifying weaknesses in these earlier studies and filling the gaps.

- Other related surveys (e.g. Sparkes and McHugh, 1984; Dalrymple, 1987; Sanders and Manrodt, 1994, 2003).

- Different aspects of responses to questionnaires and interviews in the studies to be conducted.

Our studies will explain the reasons, conditions and nature of forecasting and its behavioural issues in the light of their contribution to the present literature. The observations identify surprising relationships and establish differences among groups and the independence of factors in particular situations.

An examination into the qualities, characteristics and situations of the preparers, the users and the management personnel of companies is carried out. The theoretical basis and discussion of findings are derived from the survey by Wheelwright & Clarke (1976), as mentioned earlier. General perceptions of the company are also assessed, both the extent of use of forecasting methods and the people involved. Initial analysis is made with reference to why companies prepare forecasts, for what purpose, who they are for, who are the personnel preparing the forecasts, and whether remuneration packages affect the quality of forecasting as prepared by the personnel concerned.

The investigation also ascertains information such as the profile of the organisation, its forecasting status, criteria for selecting a forecasting methodology, acceptance and use of alternative forecasting methods.
Figure 3.4 - THEORETICAL FRAMEWORK FOR THE BASIS OF THE INVESTIGATION PROCESS

Basis of investigation – factors influencing forecasting practice


3. ISF conference proceedings relating to behavioural issues by Mahmoud et al. (1992).

4. Other related surveys (e.g. Sparkes and McHugh, 1984; Dalrymple, 1987; Sanders and Manrodt, 1994, 2003)

5. Examination of different aspects of responses to questionnaires and interviews.

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3.8 SELECTION OF STUDY SETTING AND SAMPLE

The study was conducted in non-contrived settings, whereas field studies for research are conducted in the natural environments in which the reported events normally occur. Cross-sectional data were gathered once for each study, over a period of several months, including the end of the year.

Bickman and Rog (1998, p.87) recognize three procedures for selecting samples, namely probability, convenience and purpose. The most popular approach is random sampling because of its appropriateness for statistical analysis. It should be noted that the intention in distributing questionnaires for the pilot study, and subsequently for the postal survey and case study, was to make observations peculiar to the populations represented by the particular samples. In addition, conducting interviews for the case study was intended to collect opinions. Therefore, convenience and purposeful sampling were chosen in combination with probability-based random sampling. Furthermore, 'it may be useful to take extreme cases of research where the topic under consideration is most evident and easily observed' (Eisenhardt, 1989).

According to Stewart (2001, p.69), 'generalisation based on statistical analysis requires a substantial sample size (usually no less than 30 is recommended, although many types of analysis require 100 or more as a minimum). Stewart (2001, p.69) also claims that 'obtaining a sufficiently large sample to achieve statistical acceptability can be difficult when using efficient instruments such as surveys. In the case of in-depth interviews and case studies it can be especially difficult and expensive due to the amount of research time required per response as well as the potential limits in terms of the number of respondents available and willing to provide the required level of detail'. In this investigation, there is also the issue of confidentiality of the information which organisations hesitate to part with. Therefore, this investigation can only consider smaller sample sizes. Yin (1994,
p.31) and Gummesson (1991, pp.78-79) pointed out that, depending on the nature of the generalisation, even one case can be sufficient to generalize the resulting observations.

It should be noted that the focus of this research as a whole is to look at ways in which forecasts can be made more reliable in terms of point predictions made by the forecasters, as well as to modify the costs of forecasting. Therefore, the expense of gathering a large sample is not warranted. The analysis, after observing significant relationships between selected variables, is redirected towards improving upon these point predictions. The concern is not to represent a large sample but rather to concentrate on each unit of analysis; therein lies this question of the reliability of point predictions mentioned above.

3.9 DATA COLLECTION AND THE VALIDITY OF DATA

The data gathering process employed is complete observation. Data collection for the pilot study and the postal survey was carried out by distributing questionnaires while for the case study it was done via questionnaires and interviews. These methods are used widely for this kind of study, as reviewed by Winklhofer et al. (1996) in their forecasting research. The selection of data collection methods takes into account which particular techniques produce 'appropriate information from the appropriate sample at the lowest cost' (Tull and Hawkins, 1993, p. 181).

The variables to be observed are drawn from the three areas of investigation given for each type of study, as follows. Since this research is primarily empirical in nature, the way in which the data were collected to produce results is very important. Four distinct sets of data were collected from the postal questionnaires via a pilot study, postal survey, case study and follow-up survey. Additional questions were
raised during interviews, to cover any other issues aired by the respondents which were not covered in the questionnaire.

McKinnon (1988) raises the issue of the validity and reliability of data. Validity is important in research as it concerns whether the researcher is truly analysing for the phenomenon or process he claims to be studying. Reliability poses the question of whether the data acquired are correct and relevant. Stake (2003, pp.147-148) and Denzin and Lincoln (2003, pp.69-70) indicate that data can be checked for their validity and reliability through triangulation and this can be done in three ways, namely:

a) Data source (persons, times, places)
b) Method (observation, interview documents)
c) Theory and data types (qualitative text, recordings, quantitative data)

One means of validating data is to stay in the field and make observations. Another way is to seek feedback after reporting. In addition to these, we take notes, examine further and probe with more questions on the basis of earlier responses (Creswell, 1994). The reliability of data depends on honest views and responses given by respondents who play a significant role in their company. In our case study, the director of finance advised us who were the key people engaged in forecasting at the various levels within the organization concerned.

3.10 UNITS OF ANALYSIS

Four types of study are carried out, the units of analysis for each being shown in Figure 3.4. The pilot study looks at inputs provided by Malaysian subsidiaries in the U.K. given by the Hydra database. The postal survey examines responses by a
Chapter 3 – Research methodology

representative sample of U.K. companies listed in the Hydra database as well. The University of Salford was chosen for the case study as a convenient and fair representative of a large component (education) of the service sector. In the follow-up survey we presented our findings to the same units contacted for the postal survey and case study, in order to obtain their appraisal of our proposals. Groups of personnel at various levels of management were interviewed and their forecasting processes observed. Since forecasting tends to relate to financial issues, the study links closely with accounting and finance work at the University, as well as with its subdivisions.

3.11 FORM OF RESPONSE

The types of response from the questionnaires take two forms, namely open-ended and closed-ended (Luck and Rubin, 1987; Aaker and Day, 1990). Respondents generally find close-ended questions easier to answer as they simply need to choose one of the multiple responses given, which are relatively short and specific. Tull and Hawkins (1993, p.352) indicate that this type of response is necessary to ‘secure adequate cooperation in self-administered surveys.’ However, open-ended questions were also chosen here to allow respondents to give their views independently without restrictions.

The response measurement employs four types of scaling. For the questionnaire, ordinal, nominal and range scales are used in the multiple-choice questions, to indicate order (for example, the ranking of first, second, third), binary (for example, yes or no) and ranges (for example 1-200, 201-299) in the responses. Additionally, for the postal survey, attitude measurement by means of a five-point Likert scale (Oppenheim, 2000, p.95; Fowler, 1995, p. 53; Churchill, 1995, p. 481) is used to measure the degree of satisfaction, use, feeling and importance with respect to
certain issues. Consistency in using Likert scales is favoured because they allow for a wider range of responses than other forms of response.

3.12 QUESTIONNAIRE DESIGN

In designing the questionnaire, reference was made to Luck and Rubin (1987), Churchill (1995) and Malhorta (1993). This study adopts the questionnaire design process as presented by Churchill (1995) and given in Figure 3.5.

Our questionnaires were designed to meet the requirements of all four types of study, namely the pilot study, postal survey, case study and follow-up survey, as set out earlier in this chapter. The questionnaires are semi-structured to allow for any views not covered in the questions posed. The design of the questions must generate the information required and this influences the measurement level of the responses (Churchill, 1995).

For each respondent, the pilot study asks questions about the background of the company, observing the type of business, size of company in terms of annual sales turnover, number of employees and definition of earnings. The study also observes the company's preparation of the earnings forecast, methods used, time factors in forecasting and qualities of the people involved. Another aspect addressed is the difference between actual and forecast performances, leading to behavioural considerations.

The cross-sectional postal survey is inspired by the results of, and observes similar accounts to, the pilot study. However, it focuses more on the forecasting function and the ways in which objectives are achieved with the aid of forecasting. The level of measurement for responses extends into a five-point Likert scale to assess the
degree of importance in this area. Staff aspects are also examined in more detail, in order to observe the understanding of forecasting, hierarchy levels and time span.

**Figure 3.5 - QUESTIONNAIRE DESIGN PROCESS (CHURCHILL, 1995, P. 397)**

Step 1  | Specify what information will be sought  
Step 2  | Determine type of questionnaire and method of administration  
Step 3  | Determine content of individual questions  
Step 4  | Determine form of response to each question  
Step 5  | Determine wording of each question  
Step 6  | Determine the sequence of questions  
Step 7  | Determine physical characteristics of questionnaire
The issues to be covered by the questionnaires are given in the following table, Table 3.1:

Table 3.1 - ISSUES COVERED BY THE QUESTIONNAIRE

<table>
<thead>
<tr>
<th></th>
<th>Pilot study</th>
<th>Postal survey</th>
<th>Case study</th>
<th>Follow-up survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Background of company</td>
<td>Company profile</td>
<td>Background of unit</td>
<td>Appraisal of our proposals</td>
</tr>
<tr>
<td>2</td>
<td>About earnings forecasts</td>
<td>Profit forecasts and forecasting function</td>
<td>Background of respondent</td>
<td>Methods of forecasting</td>
</tr>
<tr>
<td>3</td>
<td>Behavioural considerations</td>
<td>Realising profit forecasts</td>
<td>Forecast preparation</td>
<td>Results of forecasting</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>Staff aspects</td>
<td>Forecast usage</td>
<td>-</td>
</tr>
</tbody>
</table>

The longitudinal case study is also inspired by the pilot study, but focuses on the preparation and use of forecasts relating to the size of units and background of the respondents. These respondents are the people involved in forecasting at the case study site. As the interviews are carried out, the case study looks beyond the overall profile of the organization and examines more the outcomes of the forecasting function. As a result of the postal survey and the case study, we come up with some propositions and then conduct a follow-up survey to validate these propositions.

The issues covered in the questionnaires are three in number, in three areas. Firstly, we ask for details about the respondents (preparers and users), such as their age, qualification, gender, number of years of service in the organization, responsibilities and designation, training, experience and expertise and scale of remuneration. Secondly, in terms of the organisation and workplace culture, we ask the number of employees involved in forecasting, the time factor, reward system, recognition, teamwork, encouragement and motivation, support and guidance. Thirdly, we
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request information about the forecasting function for areas such as the structure of
the unit and its use of methodology, the organisation’s current status in forecasting,
the distinction between preparers and users and the links with the accounting
function.

With respect to the interviews, the questions raised are open-ended to allow for
personal and unrestricted views of issues to do with forecasting. This is felt
necessary to find what influences the related work and covers several aspects.
Among others, there is what business plans are prepared and what activities are
carried out at management level, faculty level, school level, any other level (support
services); also, whether there is a sample available (of a business plan) for document
observation and how these plans are prepared. Are they based on financial forecasts
or are they planned first and forwarded to the director of finance for funding and is
there a standard format to follow? Who is involved in the planning? Are the
directors alone involved or did they work with other people, and if so, who? Who
are the preparers and who are the users of the financial forecasts?

Other issues raised were how forecasts are communicated to the users, what the
general perception and reaction of preparers and users are in preparing and receiving
or implementing forecasts, whether the budget is given once or in instalments and
whether it is a fixed amount and allocated on the basis of business plans or presented
to a finance department. In addition, we also gather information on such topics as
what procedures of forecasting are being followed, whether these involve meeting
with everyone concerned or by circulation and iteration.

Theoretically, forecasts are used in an attempt to reduce uncertainty and strengthen
the reliability of forecasts for future performance; hence we examine what
techniques the companies use to make such attempts.

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3.13 DATA ANALYSIS

It is useful to look at the directions of the data analysis first. Before embarking on any fieldwork, the researcher needs to identify research issues, theories, units and levels of analysis. This will help the researcher to collect sufficient data (Creswell, 1994). After the field study, the researcher collates all the field notes from different sources in one document. This is done to provide a description of the results and to give theoretical explanations. It may involve reshuffling the theories presented in the early stages of the research.

Exploratory data analysis is done first ‘to explore and understand the data’ (Chatfield, 1995, p.137). In exploring, it is recommended that the best way to start an analysis is to examine the data informally so as to be familiar with them. Hussein (2000, p.57) suggests that analysing data by exploring ‘is better because the shape of a distribution is at least as important as its location and spread and visual representations are superior to purely numeric representation for discovering the characteristic shape of a distribution’.

The methods of analysing data for the four types of study take the following formats:

1. Directional acyclic graphs
2. Cross-tabulation tables
3. Codes and categorisation
4. Statistical analyses
5. Mathematical modelling

Responses are reported according to the research questions and objectives presented. Depending on the data collected, any analysis will be done using schematic diagrams, tables and categorisation, as appropriate. These are determined as the data

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are collected and depend on the extent and amount of responses received. Any relationships from the findings of the behavioural issues and their impact on forecasts are gone into explicitly later in the thesis.

3.14 MODELLING

As described in Chapter 2 about modelling, the study uses findings from the postal survey and case study to build models to support the results of the investigations. It is felt that the models are necessary to give more weight and reliability to the interpretations of the study.

The models in use are logistic regression for the postal survey and Bayesian decision theory for the case study. More extensive descriptions of our modelling procedures are given in Chapter 7.

3.15 CONCLUSION

The research methodology described in this chapter is intended to give a clear direction for the study and is used to ensure that the steps taken follow our overall plan. It is from this platform that the next stage of investigation, i.e., the pilot study, will embark.

It should be noted that the literature review on the methodology used in previous studies has shed light on the construction of our chosen methodology itself and the way in which it complies with our research objectives. Many aspects have been considered in setting the parameters of this work, such as the basis of the methodology, the type and purpose of the investigation and the research design. The last of these offers information about the areas to investigate, the setting of the study.

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sample selection, units of analysis, questionnaire design, data analysis and modelling. The same type of methodology would be applicable and useful for any similar study.

We now proceed to the next stage of our research process, which is the pilot study, after we do some groundwork on a literature review, plan the data collection and formulate the questionnaire. We provide details about this stage in the next chapter.
CHAPTER 4

PILOT STUDY

4.1 INTRODUCTION

This chapter presents an overview of the work done in preparing for, and carrying out, the preliminary pilot study. It tells us how unresolved issues in forecasting are used to motivate and direct this initial study. Then, detailed information about the pilot study is given relating to the survey instrument, identification of sample, data collection and simple exploratory data analysis. The chapter concludes with a summary and recommendation for the next stage of investigation, which is the postal survey.

Pilot studies give first-hand experience for organizing survey investigations in terms of administration, ease of completing questionnaires and scoring returned responses (Fink, 1995). They provide preliminary results quickly and cheaply. Our pilot study instrument is the mail questionnaire. At this stage, the questionnaire acts as a draft for the main investigation and is pre-tested to learn about data collection procedures and survey instruments that are feasible under realistic conditions (Fowler, 1993, pp.94-101; Belson, 1981, pp.391-395). This also helps us to ascertain any possible limitations in our pilot study, that might become apparent in succeeding work. In particular, it is intended to affirm or refute the current deficiencies in forecasting, which we subsequently address in this thesis. Coupled with this, time scheduling is vitally important here, so we ensure that the study is monitored and executed within a short period of time.
The aim of this pilot study is to obtain general views and feelings about forecasting to identify relevant areas of investigation for the postal survey and case study. This is felt necessary as it forms a basis to extend into subsequent work, i.e. the postal survey and the case study, by observing any strengths and weaknesses that can be learned from the pilot study protocols.

Another reason for pilot testing is simply to identify any ambiguous questions that might exist in the questionnaire (Anderson and Lanen, 1999). As a result of this, several vague questions, repetitions and unclear questions are re-worded (Brownell, 1995) in order that subsequent sets of questionnaires are better prepared and presented.

4.2 PRELIMINARY WORK

Besides reviewing the relevant forecasting literature in detail, as given in Chapter 2, we now direct this study into an explicit area where the forecasting function plays a vital role in assisting companies to budget towards successful business in the future. This is depicted by means of the flow diagram in Figure 4.1.

As can be found in several management accounting textbooks (Drury, 2001, and Lucey, 1996), planning and budgeting are crucial in guiding business towards successful outcomes. Figure 4.1 gives a clearer picture of the process involved at the planning stage, in this case for a typical manufacturing business, in carrying out its budgeting function. The steps recognize that first, the demand for such goods must be ascertained in order to budget for the expected sales in a given period. Having identified the demand, the production budget is drawn up to determine the amount of materials and labour required, as well as to account for other related expenses.
Figure 4.1 - BASIC ELEMENTS OF A TYPICAL BUDGETING PROCESS (DRURY, 2001)

Planning

Budgeting

Predict demand (FORECAST)

1. Sales Budget

2. Production Budget

3. Cash Budget

4. Budgeted Profit and Loss Account

5. Budgeted Balance Sheet

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Chapter 4 – Pilot study

It is at the first instance in the budgeting process as highlighted in Figure 4.1 that forecasting comes into play, i.e. when predicting the demand. This involves teamwork and good relationships with different levels of hierarchy, as information is needed from various departments in the organization to generate suitable forecasts. This point is built up through using forecasting methods and models, which our whole investigation later shows improved confidence in and strengthen the budgeting process. This is then based on reliable forecast estimates.

4.3 PILOT STUDY PROCESS

The postal questionnaire designed for the pilot study poses questions to respondents in seeking information about the forecasting scenarios that the businesses are in. They are expected to describe their perceptions towards forecasting which help to assess the starting point of our investigation area and enable expansion. The sample postal questionnaire can be found in Appendix 4.1 and the process involved in this pilot study is illustrated in Figure 4.2.

The particular area of investigation in the pilot study is earnings forecasting, which relates to predicting or estimating the net profit for an accounting period. This is chosen because the bottom line of a business performance is to maximise profits. It is crucial for businesses to plan strategically and forecast as accurately as possible. In doing so, management is able to make better decisions to fulfil the intended business objectives.

As forecasting involves disclosing future information relating to business, which is deemed confidential, it is thought that responses from our sample may be limited. For this reason, we approached Malaysian subsidiaries in the U.K. in order to

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conduct our pilot fieldwork, as we have several prior recommendations from related head offices in Malaysia. Moreover, this helps us to reduce the number of non-respondents and the wastage of paper and postage. The samples chosen are based on prior telephone contact to identify participants who are willing to take part in the pilot study.

The areas to observe in the pilot study include perceptions of the respondents towards the basic idea of forecasting to assist in determining why and for what purpose companies forecast, what the ranges of forecast errors are and what other related issues must be considered. These enable us to assess whether companies have adequate knowledge about forecasting and whether they are aware of its usefulness in their business planning.

4.4 DETAILS OF SAMPLE

Figure 4.2 presents the pilot study process that is carried out here. A total of 138 companies in the UK were identified as subsidiaries of Malaysian companies, obtained from the Hydra database. We tried to contact all of these companies but managed to get only 45 companies via telephone who agreed to participate in the survey. Over the telephone, the following information was given and sought:

  1. explanation that the purpose of study is for academic research and a short questionnaire will be distributed,
  2. request for name and designation of the person responsible for profit forecasting as well as the address of the organization.

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**Figure 4.2 – PILOT STUDY PROCESS**

**Initial stage**
1. collect list of companies' names (138)
2. contact by telephone (45 agreed to participate)
3. prepare mailing list for agreed participants
4. distribute questionnaires by post, supported by covering letters

**Outcome of questionnaire distribution**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did not reply</td>
<td>27</td>
</tr>
<tr>
<td>Returned without responses</td>
<td>3</td>
</tr>
<tr>
<td>Returned with responses</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
</tr>
</tbody>
</table>

**Exploratory data analysis**

(SPSS software – descriptive frequency counts)

I. Company background by type of business, size by sales turnover and number of employees

II. Addressing
   i. basic questions of forecasting
   ii. differences between forecasts and actual earnings
   iii. forecast responsibilities and behavioural considerations

**Conclusion stage**

Extent of perceiving forecasting as a whole, drawing on behavioural issues

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After two months, only 15 returned responses were received. These came from general managers, financial controllers, accountants and executive officers, who are the top management in their companies.

4.5 TIME SCHEDULE

The time taken to carry out the pilot study spanned over the months shown in Table 4.1. This table shows the duration of time taken to carry out the tasks involved, as indicated by the shaded areas. It can be seen from the above that a considerable amount of literature review was done before preparing the questionnaire. This process took two months and involved not just reviewing the literature on forecasting but also the literature on the conduct of pilot studies (Oppenheim, 2000, Churchill, 1995, Fowler, 1993, and Fink, 1995). At the same time, suitable companies were identified and listed. Then, telephone calls were made and immediately questionnaires were posted. The lead time for response was two months for the companies to return their questionnaires. As soon as we received any response, we organized the data into SPSS spreadsheets, ready for analysis.

<table>
<thead>
<tr>
<th>Year: 2000</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review literature and prepare questionnaire</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact companies by telephone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post blank questionnaires</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recover completed questionnaires</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organise spreadsheet and data analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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4.6 LIMITATIONS

The pilot study suffers from a number of limitations due to the procedures that we chose to carry out. However, we take this positively as it helps to direct our succeeding investigations. Indeed the whole purpose of the pilot study is a test, so any weaknesses are noted and resolved to enable better focus for the next stage of investigation.

Firstly, as expected, since the questionnaire involves confidential information, most companies are not willing to part with details about their forecasting procedures, despite the fact that we indicated in our letter they were for academic purposes only. Moreover, while contacting the companies by telephone, some pointed out that it is against their companies' policies to participate in surveys like this.

Secondly, the pilot study is only intended to be a minor part of the whole research. Therefore, we allocated a relatively short period of time to it in order to free time for more beneficial and productive purposes. In addition, since the intention of the pilot study is to collect general views and test the investigation, this period of time is thought to be sufficient even though a more in-depth study would have provided more and better information.

Thirdly, much as we would like to ask about all areas relevant to forecasting, we have to limit the scope by reducing the length of the questionnaire and the number of questions. This is done so that respondents would not be discouraged from completing our questionnaire. As a result, the scope of forecasting that we wish to raise is concise whilst fully meeting the objective of this particular study.
Last but not least, because the sample obtained contains fewer companies than intended, representation of responses from the whole population might be poor. However, the study provides us with the desired experience of carrying out a large-scale survey and directs the other studies. Consequently, the sample size is acceptable for our purposes.

### 4.7 EXPLORATORY DATA ANALYSIS

Data collected from the questionnaire responses were organized and entered into an SPSS spreadsheet. They were then analysed based on descriptive statistics and frequency counts produced by SPSS, reporting the frequencies of outcomes for different responses. As the purpose of the pilot study is to assess initial views and perceptions about forecasting, this simple method of analysis is deemed suitable and adequate. The following sections report on the responses from the questionnaires.

#### 4.7.1 Background of companies

As can be seen in Table 4.2, a majority of the sample, 67%, consists of general manufacturers, followed by 23% from the service industry and 10% consumer goods.

<table>
<thead>
<tr>
<th>Category</th>
<th>Types of Companies</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>General Manufacturers</td>
<td>67</td>
</tr>
<tr>
<td>2.</td>
<td>Services</td>
<td>23</td>
</tr>
<tr>
<td>3.</td>
<td>Consumer Goods</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

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In determining the company size, the amount of sales is used as an appropriate measure. This can be seen in Table 4.3, where a majority of the companies, 70%, have annual sales turnover between £10 million - £50 million whereas 30% of the sample are below £10 million.

Table 4.3 – SIZES OF COMPANY

<table>
<thead>
<tr>
<th>Category</th>
<th>Sales Value</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>£10 mil. - £50 mil.</td>
<td>70</td>
</tr>
<tr>
<td>2.</td>
<td>Below £10 mil.</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

Another measure for the size of companies is to look at the number of employees. All companies declared that they have fewer than 500 employees.

4.7.2 Fundamentals of earnings forecasting

‘All decision making and policy making in organizations involves forecasting. The forecasting process ranges from casual to sophisticated. In either case, the usual criterion for judging the quality of the forecast is accuracy’ (Schultz, 1992). This extends into having to understand the fundamental aspects of forecasting and, since accuracy is the usual criterion, there can be other factors that influence the quality of forecasts. This principle is what this section presents in enhancing the quality of behavioural issues in forecasting, i.e. looking at ‘what, why, when, how and who’ relating to the forecasting function (Dawes et al., 1994).

It should be noted that some questionnaire respondents mis-interpreted the meaning of earnings. They thought it referred to salaries and compensation packages, instead...
of company profits. This was subsequently taken into account when preparing questionnaires for the postal survey and the case study.

A majority of the sample defined earnings as profit before tax while the remainder regarded it as profit after tax. All of these companies prepare forecasts even though they are subject to control by their holding companies in Malaysia. The main reasons for addressing why companies prepare earnings forecasts are to guide them in their operations and to help them meet budget requirements.

The most common methods used in forecasting are simple spreadsheets and judgmental methods. Forecasts are typically prepared once a year, on time before the start of the actual period. Forecasts are generally reviewed continuously throughout the year. A majority of the companies forecast by individual products, then by areas in which they operate, followed by the various departments the business is segregated into.

In identifying who are the preparers and the users, the pilot study shows that 67% of the sample prepares earnings forecasts for the use of the board of directors, while the remainder of the sample prepares them for managing directors and heads of departments. 80% claimed that their accountants and heads of departments are the forecast preparers, while 20% noted that this task is performed ‘in conjunction with colleagues’.

4.7.3 Forecast and actual earnings

This section examines the differences between forecasts and actual earnings. Most companies claimed that the reason for variation when forecasts are not met, is undue optimism, whereby they tend to over-estimate their forecasts. A minority claimed mis-information as the reason for actual earnings varying from their forecasts.
All companies aim to achieve accurate forecasts and tend to over-estimate earnings with errors between 5%-10%. 30% of the companies also aim to improve forecasts to achieve less than 5% error. Some of the respondents suggested that the key corrective actions that can be taken to rectify variations are to revise forecasts dynamically and to learn from any errors in the techniques used for forecasting. To strengthen and make reliable forecasts, companies suggested that there should be regular reviews, accountability and learning from experience.

4.7.4 Forecast responsibility

This section looks at behavioural issues: among other things, the way in which communication takes place as well as the mechanism to motivate and encourage work relating to forecasting. As frequency counts are used, we use the word ‘most’ to indicate a majority of respondents.

In examining the designations of the respondents, it can be seen that top management is in charge of forecasting. As this function is their responsibility, this shows that forecasting is crucial to the successful operation of a business.

Most respondents indicate that management usually discuss the departmental earnings’ targets with their subordinates before setting them. Most companies distribute forecasts to employees, who are given time for feedback before implementation. The forecasts usually get to the top management level except for a minority that go down to the supervisory level.

The general reactions of employees on receipt of the forecasts are positive for all companies. One third of the companies say salaries of the staff in charge of forecasts
do influence forecast accuracy, another one third says this is not so, while the other one third says sometimes it is true.

4.8 PILOT STUDY SUMMARY AND CONCLUSION

From the simple analysis above, it is concluded that there are several factors that must be considered to facilitate the forecasting function in realising organisational objectives.

There is a serious need to cultivate knowledge, nurture ability and share responsibilities among humans, to develop the niche qualities of calibre and personality. There must be an understanding between forecast users and forecast preparers where balanced knowledge of both technical methods and practical uses of forecasting exists.

Organisations should recognise performances by departments as well as achievements by the humans concerned. This is in line with the outcome of the roundtable discussions as per International Symposium of Forecasters 1991 as reported by Mahmoud et al. (1992), which established the importance of behavioural considerations in forecasting. This involves communication at all levels of management to be significant. In turn, this means that management styles where bureaucracy is minimised, and transparency of work and access of information exist, are to be encouraged.

The pilot study showed concerns about understanding forecasting in general, which goes beyond the use of established forecasting methods. The existing literature contains extensive descriptions and applications of forecasting methods, especially the model-based approaches and analytical methodology. This study lifts the veil of An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
behavioural aspects, supporting not just these quantitative forecasting methods but also the qualitative ones.

As with the International Symposium of Forecasting 1991 reported by Mahmoud et al. (1992), which presented interesting views and established behavioural considerations to a certain extent, and as a continuing effort to pursue their recommendations, this study extends further into providing the following:

1. what, why, who, when and how – in relation to forecasting perspectives;
2. qualities of forecast users and preparers;
3. detailed descriptions of the mechanisms in a forecasting process.

Apart from the useful results mentioned above, a few weaknesses relating to our pilot study were identified. Questions are now raised as to whether the companies really use forecasts or whether they prepare forecasts just to comply with the routine that companies should have forecasts for accounting completeness. This shows that companies are unsure about the need for forecasting, even perhaps understanding the fundamentals underlying the purpose.

The choice of an appropriate technique, in terms of use and suitability is also questionable as the companies do not consistently adopt any particular forecasting methods. This raises the question of whether or not they are aware of the availability of sophisticated, even simple, methods of forecasting. If they are aware of these methods, we then ask why they are not using these methods – are they perhaps too complicated, unreliable or not user-friendly? Do the companies not have skilled personnel to exercise forecasting? Do they see their current forecasting function as a problem? What are they doing about this? How can they improve their current forecasting practice? These questions lead to probing more into what is being practised in relation to forecasting in the companies.

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On the other hand, the companies admit preparing and using forecasts in their operations in steering management for better results. Perhaps what they need is an alternative for better forecasts and this will call on how to improve its presentation and reliability of forecast numbers.

These observations will form a base to report forecasting in practice in order to link this with previous literature and theories, so as to progress to the next step of our investigation, the postal survey, which will provide a better platform for the main investigation, our case study.

4.9 CHANGES FOR SUBSEQUENT WORK

It can be seen that the pilot study showed behavioural issues having some degree of importance in the forecasting function. At this point, the study is directed more into behavioural matters. It also shows that forecasting is not just about forecasting methods and how business performances can be improved by using these methods. Even though forecast accuracy may not be inevitable, forecasting is still crucial in business to generate profits and for guidance purposes. But there must be a blend of behaviours to complement. The organisation, especially people involved in forecasting, must understand and be aware of the qualities needed. They should also find out what else is required in a forecasting function besides using forecasting methods, as pointed out by Mahmoud et al. (1992). Having this in mind, the whole purpose is re-directed into searching for empirical evidence for the right principles, right reasons, right people and right processes for a practical forecasting situation that can be practised by organisations in general.
The responses obtained in the pilot study are used to close and summarise issues raised in the questionnaire (Brownell, 1995) so that the response task itself becomes easier for the respondents in subsequent studies (Fowler, 1993). This means that the answers to each of these questions could be targeted to better emphasize perspectives. The questions given in the questionnaire thus far are structured and without any ratings provided for the alternative answers. This does not allow for degree of importance and usefulness of the issues in context. Therefore, for the postal survey, some related questions will have a 5-point Likert scale of alternative answers for the given questions.

The pilot study has shed light into areas that must be included and also excluded. These involve building up and strengthening the areas of research into a better and wider scope. At this juncture, we are now ready to use the findings from the pilot study to prepare for our next step, i.e. the postal survey, which will be described in more detail in the next chapter.
5.1 INTRODUCTION

This chapter presents the second stage of our investigation, which is the postal survey. The methodology for carrying out this postal survey was described in Chapter 3, so this chapter concentrates on details of sampling, response rate, frequency counts and exploratory data analysis. In supporting the data analysis, statistical implications are provided to add strength to the findings.

The first part of this chapter provides information about response frequencies based on the postal questionnaire. The second part extends these into logistic regression models and identifies possible combinations of predictor variables that provide useful insights towards improved forecasting practice.

To recap, the postal survey is undertaken to gain a better understanding of the forecasting scenarios described by the pilot study results and is based on a cross-section of the business community. The pilot study was based on Malaysian subsidiaries in the U.K., which operate under the U.K. law and environment, and their responses were used to modify and improve the format of the postal survey questionnaires, which are now distributed to general U.K. companies.

The postal survey also acts as a validation checklist against results reported by the

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pilot study, such as areas that must be further expanded and areas to be excluded or given less emphasis. It allows for exploration of the data obtained to generate ideas for alternative areas that must be addressed. This provides a necessary foundation before conducting a case study, by which time we will know what relevant issues to consider.

5.2 DETAILS OF SAMPLE

Information was gathered during 2001 by means of a postal questionnaire, as per Appendix 5.1, distributed to public limited companies in the United Kingdom whose addresses were obtained from the Hydra database available from Salford University Information System Applications (2000-2003) and which comprise various representative industries. The data are processed using SPSS software. Details of sample and background are given in Appendix 5.3.

The sample chosen consists of U.K. companies operating in the U.K. in various representative industries. These include general retail, insurance, banking and timber and food processing, as shown in Figure 5.1. The number of companies obtained from the Hydra database was 161 but we managed to contact only 145 by telephone. Out of these, 64 agreed to participate in the survey. Seven of the others contacted said that it is against their companies’ policies to take part in this type of study.

5.3 ANALYSIS OF RESPONSES

The questionnaire analysis is based on 26 returned questionnaires. Ten (16%) of the 64 companies who agreed to participate gave the following reasons as to why they did not respond to the questionnaire:

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Figure 5.1 - ANALYSIS OF RESPONSE RATE FOR MAIL SURVEY (CARRIED OUT IN SUMMER 2001)

Total number of companies selected from Hydra database = 145
General retailers = 98
Insurance = 9
Banks = 11
Wood & timber = 7
Food processing = 10

Contacted by phone to get names and designations of respondents.
Total number of questionnaires posted = 64

Usable responses = 24
Not returned = 8
Returned without responses = 8

Reminders sent out = 32

Usable responses = 2
Returned without responses = 2
Not returned = 28

SUMMARY

<table>
<thead>
<tr>
<th></th>
<th>Usable Responses</th>
<th>Returned without responses</th>
<th>Not returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>26</td>
<td>10</td>
<td>28</td>
</tr>
</tbody>
</table>

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1. It is against the company's policy to participate in surveys, even for academic purposes.
2. The questions are unrelated to the respondent's business.
3. The respondents are on leave.
4. The questionnaire has been forwarded to another designation.
5. The information sought by the questionnaire is too confidential.

One of the purposes of analysing the questionnaire is to find factors accountable towards successful forecasting practice. In particular, we aim to:

1. observe consistencies in procedures and characteristics of companies relating to forecasting exercises;
2. find out what factors are involved in achieving accurate forecasts, and in over and under-estimating actual profits;
3. observe common practices of forecasting among the companies in the sample;
4. observe what are the significant associations between response variables and other variables in the questionnaire, thereafter describing the direction and strength of these associations.

The aim of the statistical analysis is to make inference about a population of public listed companies based on sample information. The following hypotheses are drawn up in an attempt to reach conclusions involving general statements about probability distributions in the population.
The statistical hypotheses in this case are:

\( H_0 \)
Null Hypothesis: there is no association between the variables;

\( H_1 \)
Alternative Hypothesis: there is an association between the variables.

In identifying a significant association between two variables, a significance level of 5% is taken. However, in this postal survey, 15% is used to indicate near significance as the sample size is unavoidably small. This means that a probability value of 0.05 or less is significant whilst a probability value of 0.05-0.15 is considered as near significant. A probability of 1.00 indicates no significance and therefore apparently no association between the variables concerned.

The key and supplementary variables are identified and tested, using Fisher's exact test, which measures the association between variables using a two-by-two cross tabulation of responses to the questionnaire. Spearman's rank correlation coefficient is used to establish the direction of association. The speciality of Fisher's exact test is that it is recommended for small-sized samples, in preference to the chi-squared test which is easier to apply and so more common, but which is only valid for large samples. The results from such tests are summarised in Appendix 5.2 where significances and near-significances are presented in order to identify possible relationships of interest.

5.4 EXPLORATORY ANALYSIS AND FINDINGS

This section reports the relationships between responses in the areas below:

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Part 1 - Company profile
Part 2 - Profit forecast and forecasting function
Part 3 - Realising profit forecasts
Part 4 - People aspects

In this case, we observe frequency counts and simple majorities of responses towards the questionnaire. Appendix 5.3 shows details of the backgrounds of companies which participated in the survey in terms of pie charts and histograms representing the basic features of the sample relating to type of retail business, sales turnover and number of employees. Appendix 5.4 summarises the response frequencies for the postal survey based on size of company. These observations form a basis that enables us to proceed with statistical descriptives as described in Section 5.7 onwards.

5.4.1 Company profile

The staff members who completed the questionnaire are finance directors, managing directors, accountants and general managers.

There are 17 companies in the consumer goods industry, 4 service industry and 5 general manufacturers. As the two latter categories were relatively small compared to consumer goods, they were reclassified as non-consumer goods. Eighteen of the total sample (69%) have sales turnovers of more than £100 million and fourteen of the companies (54%) have more than 2000 employees.
5.4.2 Profit forecast and forecasting function

The factors involved in forecasting, rated in decreasing order of importance by the respondents, are as follows:

1. people
2. rules
3. time
4. costs

Based on the above, a simple majority of responses is taken to indicate practices within the companies with reference to the framework of behavioural issues. It can be seen that in preparing profit forecasts, twenty-one of the companies (81%) use profit before tax for consideration. Computer software is used by fifteen of the sample (58%) and includes Excel, Adaytum, Vision and companies' own designs.

In answering the fundamental questions raised in our simple framework described in Chapters 2 and 3, Table 5.1 summarises the responses of the sample.
Table 5.1 - RESPONSES TO FUNDAMENTAL ISSUES IN FORECASTING

<table>
<thead>
<tr>
<th>Fundamental issues</th>
<th>Common practices by respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who prepares?</strong></td>
<td>Profit forecasts for fifteen companies (58%) are prepared by people other than accountants. No companies use external experts to do their forecasting.</td>
</tr>
<tr>
<td><strong>For whom?</strong></td>
<td>At least twenty-one of the companies (80%) agreed that profit forecasts prepared for boards of directors and managing directors are very important but there is less emphasis for financial accountants, shareholders and external users.</td>
</tr>
<tr>
<td><strong>How and what methods?</strong></td>
<td>The most popular accounting technique used is Management Accounting and this is represented by eighteen of the sample (69%) indicating that this technique is very important in their profit forecasting exercise. The most popular method of forecasting used is subjective assessment as eleven of the sample (42%) indicated that this method is frequently used. Twenty companies (77%) indicated that it is very important to forecast profits by department.</td>
</tr>
<tr>
<td><strong>Why?</strong></td>
<td>Responding to why profit forecasts are prepared, twenty of the sample (77%) agreed that this is very important for guidance to operate business. A majority of sixteen companies (61%) indicated that preparing profit forecasts is also important to meet budget requirements.</td>
</tr>
<tr>
<td><strong>When?</strong></td>
<td>Companies that forecast profits for up to three years represent twenty of the sample (77%). Twenty of the sample (77%) review and revise forecasts frequently. Fifteen (58%) prepare forecasts frequently, both quarterly and monthly, and twenty-two (85%) prepare forecasts just before the time period begins.</td>
</tr>
</tbody>
</table>
5.4.3 Realising objectives using profit forecasts

A mixture of levels of forecasts was achieved as depicted in Figure 5.2. In forecasting profits, fifteen of the sample (58%) said they tended to over-estimate, six (23%) tended to under-estimate and the remainder (19%) tended to be on target. This indicates a general tendency to be optimistic rather than pessimistic. For the purposes of identifying accurate and inaccurate forecasts, a more meaningful criterion is to regard companies with over- and under-estimates of profit with less than 5% error as having accurate forecasts. The sample shows fifteen (58%) of the companies forecast accurately and eleven (42%) forecast inaccurately.

Figure 5.2 - LEVELS OF FORECAST ACHIEVED

LEVELS OF FORECASTS

Forecast optimism

Over-estimate (58%)

Under-estimate (23%)

On Target (19%)

Forecast accuracy

Inaccurate (42%)

Accurate (58%)

It should be noted that twenty-three (88%) of the sample agreed that forecast preparers are made aware how forecasts affect their operations. Twenty-four (92%) of companies using profit forecasts to set targets for staff claimed that they aim to meet or exceed targets whilst two (8%) perform consistently.
The key corrective actions to rectify variations in forecasts may be impossible to achieve, but being sensitive to the environment and being susceptible to changes are two of the ways recommended by the respondents. Forecasts can also be strengthened and made reliable through regular discussions and revisions, as well as being aware of developments and open to lucrative ideas.

### 5.4.4 People aspects

Responses to this section are encouraging and they indicate that people are important in forecasting. Twenty (77%) of the respondents said that preparers should be accountants. In reality, the forecasts are prepared by a mixture of people, not just accountants, as indicated by twenty (77%) of the sample companies. About twenty-five (96%) of the respondents have the ability to read and understand forecasts. Sixteen of the respondents (62%) play the roles of both user and preparer. About six (23%) are just preparers and five (19%) are solely users. Despite this, fifteen (58%) said that their preparers are generally different from their users.

In terms of implementing forecasts, twenty-four (92%) of the respondents said that their managers discuss forecasts with their subordinates and twenty-one (81%) of the respondents gave time for feedback before implementation. Twenty (77%) said that the forecasts are distributed to top level management and middle managers, and six (23%) to supervisory and operational levels. The general reactions of the employees, on receipt of the forecasts, are positive as indicated by seventeen (65%) of the respondents. Only seven (27%) said that salaries might influence the achievement of profit forecasts.
5.5 DETAILED ANALYSIS OF RESPONSE FREQUENCIES

Based on the response frequencies and the extent of relevant issues in realising profit forecasts, four main factors were identified:

1. accuracy
2. optimism
3. importance of people
4. time given for feedback before implementing forecasts

Accuracy and optimism are the emphasis of any forecasting exercise in that when one makes and implements forecasts, one is interested to know whether the forecasts are subsequently met. Otherwise, one is interested to know whether the forecast under or over-estimates the actual performance. People are recognised as a backbone in any organization. Without them, machines are not workable, methods cannot be chosen and no direction is given. All questionnaire respondents indicated high importance of people involved in forecasting. It is also known that forecasting takes place in various stages that demand people to work together in a team and co-ordinate tasks. Moreover, respondents to the questionnaire are people holding high positions such as managing directors, executive directors, financial controllers, finance directors, and group accountants. These are top level people in charge of forecasting, who place commercial value and emphasis on people. As we suspect that the time given for feedback before implementation is crucial in practice, this variable is also listed as one of the main ones.

Additional factors were also identified for the purposes of observing forecasting practice and relationships between variables, as well as highlighting peculiarities. The factors typically recognised as key indicators for business performance and viability are:

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1. sales turnover
2. type of retail business
3. number of employees

The summary of SPSS output indicating direction of association between the variables is given in Appendix 5.2. The direction indicates either a positive or a negative association.

5.6 SUMMARY FROM RESPONSE FREQUENCIES

To ensure a successful exercise in profit forecasting, a great deal can be learned from this postal survey. Based on the analysis and findings above, we concluded that certain criteria should be observed to ensure smooth operation and success in forecasting. The following conclusions are derived from observations made on testing for significance of associations between the given variables, from Appendix 5.2.

Firstly, as companies grow bigger with more employees, more profits will be expected but forecast accuracy may tend to decrease. However, we have measured accuracy on a relative scale rather than absolute to avoid this problem and even then forecast accuracy decreases as company size increases. This is a strong indication that an expanding company should devote a greater proportion of resources in behavioural aspects of profit forecasting. Fulfilling the analysts’ requirements and trying to show good prospects of the company for investment purposes should not jeopardise the forecast that the company is trying to draw up for other purposes like for internal uses. Training, experience and qualifications should be acquired by the
preparers as the test shows that these qualities contribute to accuracy. Time given for feedback is important as information gained strengthens and improves forecasts.

Secondly, with forecast optimism, the tests identify criteria causing forecasts to be under or over-estimated. Companies, in forecasting profits by products tend to over-estimate profits as they are confident that their products will sell. In supporting the prudence concept, companies tend to under-estimate profits as sales increases. The fact that forecasts are projections means that sales are not yet achieved and so profits are no yet realised. As profit forecasts get reviewed and revised frequently, the forecasts are more likely to be over-estimated due to confidence in the information gained. Being conservative, accountants would realistically under-estimate profits as the forecasts are then easier to achieve. Subsequent investment in forecasting should improve forecast accuracy but would dilute the profits, so a cost-benefit analysis might be used to indicate the worth of the investment. The use of computer software does not allow much scope for human intuition and subjectivity and tends to result in over-estimation of the profits, as indicated by the tests. Profit forecasts tend to be over-estimated when prepared for shareholders, to sustain their investments. When employees are aware that profit forecasts influence their operations, the forecasts are likely to be over-estimated. Then, if time is given for feedback, more information is obtained and so forecasts again tend to under-estimate profits so that they will definitely achieve targets.

Thirdly, our observations provide evidence that financial accounting techniques do not place sufficient emphasis on people. This is because the techniques are reliable and simple to use. There is also less emphasis on the importance of people when forecasting profits by geographical area. Even when preparing forecasts for brokers, analysts and shareholders, companies are aware of what to include in the forecasts. If the leading person in a company is regarded as important, then the time he spends in forecasting is also important. The emphasis on people involved in forecasting diminishes when using time series analysis as the latter is a reliable and acceptable

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method for forecasting. In designating forecasting work, the importance of people grows from preparer to user and then onto the people who are both preparer and user.

If more time is given for feedback before implementation, more information is gathered, so forecasts become better and the company will have more motivated forecasters. There is a tendency towards more time given for feedback in a non-consumer goods type of business. This could be due to the fact that such a company can afford to spare the time, unlike a consumer goods business, which may be dealing with fast moving items. Computers would reduce the time given, as feedback could be transmitted on-line and immediate action incorporated. There is more time given for feedback when accountants prepare forecasts, as they need to scrutinise the inputs and integrate with their accounting conventions. Less time is given for feedback in companies with more products to forecast, because they already have experience in forecasting related products. The fact that time is given for feedback means that time spent on forecasting is important. If more time is given for feedback, forecasts tend to be more accurate as more information could be gained over time to improve forecasts.

The tests on supplementary variables show a variety of patterns and characteristics of these companies. In the case of sales turnover, having more employees should increase sales, as more people can be involved in generating income. The tests also showed that consumer goods companies tend to bring in more sales, as their products are presumably fast moving and popular. Then, as sales increase, it becomes more important for the company to prepare forecasts of business operations for control purposes as, when the company grows bigger, it will need more control. This expansion will result in frequent use of time series and computer technologies for efficiency and effectiveness. As a result, the importance of cost of implementation is enhanced and the use of profit forecasts reduces as the company uses sales forecasts instead.
Another key indicator for business performance is the number of employees. There is a tendency of having more people in a consumer goods business than in non-consumer goods. The frequency of preparing forecasts tends to increase as the company can afford to spare people to be involved in forecasting. However, the accuracy of the forecasts is affected, as having more people could, perhaps surprisingly, mean more errors are made.

The other key factor to ascertain business viability is type of retail business. There is an inclination towards having more sales and more people in the consumer goods business. This could be due to the fast-moving characteristics of that type of business. In addition, the importance on cost of preparing and implementing forecasts is more in consumer goods than in non-consumer goods.

These four main and three supplementary variables are not affected by other variables showing no association and therefore companies should not spend unnecessary time looking into them. We now investigate highlighted relationships in more detail.

5.7 BACKGROUND FOR EXTENSION TO LOGISTIC REGRESSION MODELLING

This section uses the findings from response frequencies described in Section 5.5 to apply logistic regression. To recap, the main response variables to observe are divided into key and supplementary variables as given below.
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1) Key variables:

- Accuracy of forecasts
- Forecast optimism
- Importance of people involved in forecasting
- Time given for feedback before implementation

2) Supplementary variables:

- Type of retail business
- Sales turnover
- Number of employees

This study observes how these variables will be influenced by certain factors that are deemed essential towards a more successful forecasting practice. The relationship of observations and outcome will be examined as this will be vital for decision-making purposes. The observed key variables are empirical evidence rather than prior belief as justifications are given in Table 5.2.

Supplementary variables are also selected to observe how relevant factors are related to various types of industry and sizes of company as measured by sales turnover and number of employees. These are examined as different features of a company may show different associations with those factors revealing, for example, how business tactics may vary with industry size. Often, there is a need to tailor recommendations to specific industry based on generalisations. These supplementary variables are given in Table 5.3.

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### Table 5.2 – JUSTIFICATION OF KEY VARIABLES FOR A COMPANY

<table>
<thead>
<tr>
<th>No.</th>
<th>Response variables</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Accuracy of forecasts</td>
<td>Accuracy is always desirable as this is an issue often highlighted in forecasting. As forecasts involve predicting the future based on available information, it is necessary to determine how accurate the forecasts are. This study observes what factors influence accuracy and whether such factors are controllable.</td>
</tr>
<tr>
<td>2.</td>
<td>Forecast optimism</td>
<td>When making forecasts, the difference between the forecast and actual performance will indicate whether forecasts have been over or under estimate. This variable is chosen to observe factors affecting each side of the target namely over-estimation and under-estimation. We also look at how behaviour affects optimism.</td>
</tr>
<tr>
<td>3.</td>
<td>Importance of people involved in forecasting</td>
<td>Even companies that are run using computerised systems still require people to initiate, monitor and maintain the systems. These contributions are essential for decision making which in turn requires people to rationalise the whole process. Among the criteria listed in tests identifying the key variables, this particular variable was commonly picked by the respondents as important. Furthermore, hypothesis tests involving it generated several significant results. This variable is selected to determine the extent of dependence with influential factors and how they relate to each other. A question is raised as to how the accuracy and optimism of forecasts are dependent on people involved in forecasting.</td>
</tr>
<tr>
<td>4.</td>
<td>Time given for feedback before implementation</td>
<td>Time is important in ensuring that the latest information and also people’s reactions towards the forecasts are allowed for when implementing any projections and recommendations. When preliminary variables were tested, this variable frequently showed up as significant. This variable is selected to see how time given for feedback is influenced significantly by other factors related to successful forecasting.</td>
</tr>
</tbody>
</table>
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Table 5.3 – JUSTIFICATION OF SUPPLEMENTARY VARIABLES FOR A COMPANY

<table>
<thead>
<tr>
<th>No.</th>
<th>Variables</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type of business</td>
<td>The type of business is often associated with how they forecast and what criteria are involved in forecasting.</td>
</tr>
<tr>
<td>2.</td>
<td>Sales turnover</td>
<td>This variable relates to the size of company and is a major contributor to the forecasting exercise.</td>
</tr>
<tr>
<td>3.</td>
<td>Number of employees</td>
<td>This variable also summarizes the size of company and may be influenced other variables than those which relate to sales turnover.</td>
</tr>
</tbody>
</table>

Our threshold for hypothesis testing is the 5% level, so tests are significant if the p-values are less than 0.05. Here we investigate associations of variables using Fisher’s exact test by way of two-by-two cross-tabulations. This is then extended for the purpose of modelling the relationships of the variables and factors as described below.

5.8 APPLICATION OF BINARY LOGISTIC MODEL

As the responses of the postal survey are dichotomous, the binary logistic models are appropriate to describe and explain the observations. Binary logistic regression examines the relationship between one or more predictor variables and a binary response of 0 or 1. We use Minitab software for the statistical analysis.

The model is defined by

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\[ y_i \sim B(p_i) \quad \text{(Bernoulli distribution – special case of binomial)} \]

for \( i = 1, \ldots, n \) where

\[
\ln \frac{p_i}{1 - p_i} = x^T_i \beta .
\] (5.1)

For estimation purposes, the probability mass function is

\[
p(y_i) = p_i^{y_i}(1 - p_i)^{1-y_i}; y_i = 0, 1
\] (5.2)

where \( 0 < p_i < 1 \).

The linear predictor satisfies \( -\infty < x^T_i \beta < \infty \)

and this matches with the logit link function because

\[
-\infty < \ln \frac{p_i}{1 - p_i} < \infty .
\] (5.3)

The logistic regression model measures the logit of probability in terms of a combination of factors and covariates, in this case two at a time, for each of the key and supplementary variables identified. Then, the log likelihood values, evaluated at the maximum likelihood estimates, are used to measure the goodness of fit for the logistic model. The largest value for the log likelihood function corresponds with the best combination of factors for the response variables, from those considered.

For each response variable, the number of combinations of factors mentioned earlier is given by

\[
\binom{r}{2} = \frac{r!}{2!(r-2)!}
\] (5.4)

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
where \( r \) is the number of predictor variables identified.

Two errors can result from performing numerical calculations of log likelihood and tests of goodness of fit when using Minitab:

i. The algorithm does not converge after 20 iterations and convergence is not reached for parameter estimation.

ii. There are no residual degrees of freedom (\( n-p = 0 \); where ‘n’ is the number of observations and ‘p’ is the number of parameters).

As our linear predictors always consist of two binary factors for this analysis, this logistic regression model is equivalent to fitting four binomial response variables.

\[
y_{i,i}^{\text{ind}} \sim B(n_{i}, p_{i,i})
\]

where

\[
\ln \frac{p_{i,i}}{1 - p_{i,i}} = \nu + \alpha_i + \beta_i.
\]

This model assumes that there is no interaction between the two factors in the linear predictor. Otherwise, the model would be over-parameterised and we could not assess its goodness of fit. This assumption is deemed reasonable, as we chose the factors carefully with orthogonality and absence of interactions as ideal goals.

For any given combination of factors in the linear predictor, we then estimate \( p_y \) using the inverse logit

\[
p_y = \frac{1}{1 + \exp(-\hat{\nu} - \hat{\alpha}_i - \hat{\beta}_i)}.
\]

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
In establishing an empirical model of this sort, the odds ratio is also taken into account. The default or null value for the odds ratio is 1, when no association exists. In a set of binary response observations of 1 and 2, this is the odds of the upper level, 2, divided by the odds of the lower level, 1. This is illustrated as follows, for looking at associations between the binary response and the first of two predictor variables, which is also a binary factor.

At level 1 : \[ \ln \frac{p_{1i}}{1 - p_{1i}} = \nu + \alpha_1 + \beta_i \] (5.8)

log odds

At level 2 : \[ \ln \frac{p_{2i}}{1 - p_{2i}} = \nu + \alpha_2 + \beta_i \] (5.9)

log odds

Given an arbitrary corner-point constraint \( \alpha_1 = 0 \), the difference is the log odds ratio

\[ \ln \frac{p_{2i}}{1 - p_{2i}} - \ln \frac{p_{1i}}{1 - p_{1i}} = \alpha_2 \] (5.10)

corresponding to the odds ratio

\[
\left[ \frac{p_{2i}}{1 - p_{2i}} / \frac{p_{1i}}{1 - p_{1i}} \right] = \exp(\alpha_2)
\] (5.11)
Some of the responses in the questionnaire have a 5-point rating between 1-5. These ratings have been recoded into binary responses of 1 and 2 for the purposes of our analysis, in order to avoid over-parameterisation when fitting models to our limited data set.

5.9 EXTENDED DATA ANALYSIS FOR KEY VARIABLES USING LOGIT PROBABILITIES

The whole idea of this analysis is to determine how pairs of other factors jointly influence the identified response variables by using log likelihood ratios. Our earlier analysis was performed using SPSS to identify links between key and supplementary variables, using a p-value of 0.05 to indicate significance. We then continued our work using Minitab software, in order to learn more about what analyses this second package can offer and to make comparisons with SPSS for general knowledge. In the current Minitab analysis for combining the explanatory effects of two of the factor variables, associations between key and supplementary variables typically became more significant. Details of all the log likelihood ratios for observed associations can be furnished by the author upon request.

The following sub-sections show only the most significant associations of predictor variables with key variables, based on highest likelihood values and supported with interpretations and further explanations. It should be noted that where tests for goodness of fit cannot be performed as there are no degrees of freedom, the combination with the largest log likelihood value is not taken. The reason for this non-performance is that there are perfect matches for the response variables with the associated factors in these cases. Explanations from the interpretations given for the associations are presented using z-tests for the maximum likelihood values. The
standard error against each log odds ratio is also given, as reported in the Minitab output.

5.9.1 Response variable 1 – accuracy

<table>
<thead>
<tr>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Log likelihood</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare forecasts for the analysts</td>
<td>Who are the preparers</td>
<td>-13.112</td>
<td>0.008</td>
</tr>
</tbody>
</table>

Key response variable: accuracy (inaccurate [1]; accurate [2])

Summary of findings: From the Minitab output, it can be seen that the combination of factors that best fits into the logistic model for explaining accuracy are:

1. Prepare forecasts for the analysts (not important [1]; important [2])
   Log odds ratio = -2.893 (s.e. = 1.458)

2. Who are the preparers (other than accountants [1]; accountants [2])
   Log odds ratio = 2.359 (s.e. = 1.187)

The logistic model for this finding is

\[
\ln \frac{p_{ij}}{1 - p_{ij}} = x_{ij}^T \beta = \nu + \alpha_i + \beta_j
\]  

where \( \alpha_i = \beta_i = 0 \)

\( \nu = -0.3865 \)

\( \alpha_2 = -2.893 \)

\( \beta_2 = 2.359 \)
Interpretation and deduction from results

There is a strong indication that 'preparing forecasts for the analysts' and 'who prepares forecasts' influence the accuracy of forecasts. There is an inverse relationship between accuracy and preparing forecasts for the analysts. However, there is a positive relationship which suggests that forecasts prepared by accountants increase accuracy.

What the above interpretation suggests is that there is a tendency that when forecasts are prepared for the analysts, the forecasts are not as accurate. This could be due to presenting forecasts which are true and fair for publishing purposes and do not show the actual internal picture of the situation. Forecasts must be prepared by qualified people, in this case the accountants, in order to produce accurate forecasts. "Qualified people" refers to those who are specialised with relevant experience and training. Coupled with this, it is also important that time should be given for feedback to modify and strengthen the forecasts before implementation in order to get accurate forecasts.

5.9.2 Response variable 2 – forecast optimism

<table>
<thead>
<tr>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Log likelihood</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecast profits by products</td>
<td>Use of computer software</td>
<td>-11.260</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Key response variable: forecast optimism (under-estimate [1]; over-estimate [2])

Summary of findings: From the Minitab output, it can be seen that the combination of factors that best fits into the logistic model for explaining forecast optimism is:

1. Forecast profits by products (not important[1]; important[2])
   
   Log odds ratio = 2.920 (s.e. = 1.286)
2. Use of computer software (no [1]; yes [2])

Log odds ratio = -2.148 (s.e. = 1.117)

Therefore the logistic model for this finding is

\[
\ln \frac{p_{ij}}{1 - p_{ij}} = x_{ij}^T \beta = \nu + \alpha_i + \beta_j
\]

(5.13)

where \( \alpha_i = \beta_i = 0 \)

\( \nu = -1.346 \)

\( \alpha_2 = 2.920 \)

\( \beta_2 = -2.148 \)

Interpretation and deduction from results

From the above, it can be seen that there is a strong association between forecast optimism and the linear predictor consisting of 'forecast profits by products' and 'the use of computer software'.

Companies with more products tend to over-estimate profits. With more products, there is greater choice for the customers. They are tempted to buy other products as well, as there are different varieties to choose from. This encourages sales and leads to companies over-estimating their forecasts. In over-estimating their forecasts, companies rely more on computers as they need efficient and better information systems. This improves the tendency to produce accurate forecasts.
5.9.3 Response variable 3 – importance of people in forecasting

<table>
<thead>
<tr>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Log likelihood</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of financial accounting</td>
<td>Forecast profits by</td>
<td>-10.029</td>
<td>0.001</td>
</tr>
<tr>
<td>techniques</td>
<td>geographical area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key response variable:** importance of people in forecasting (not important [1]; important [2])

**Summary of findings:** From the Minitab output, it can be seen that the combination of factors that best fits into the logistic model for explaining forecast optimism is:

1. Use of financial accounting techniques (not important [1]; important [2])
   
   Log odds ratio = -3.301 (s.e. = 1.395)

2. Forecast profits by geographical area
   (not important [1]; important [2])

   Log odds ratio = -2.306 (s.e. = 1.248)

Therefore the logistic model for this finding is

\[
\ln \frac{p_{ij}}{1 - p_{ij}} = x_{ij}^T \beta = \nu + \alpha_i + \beta_j
\]  

(5.14)

where

\[
\alpha_1 = \beta_1 = 0
\]

\[
\nu = 3.715
\]

\[
\alpha_2 = -3.301
\]

\[
\beta_2 = -2.306
\]
Interpretation and deduction from results

The results show that there is a strong link between importance of people in forecasting and use of financial accounting techniques and forecast profits by geographical area.

This means that when preparing forecasts for the analysts, there is less emphasis on people involved in forecasting as the preparers know what to do with the information provided because using financial accounting techniques provide standards that are easy to follow. So with whatever information given, they know what to do and hence people involved in forecasting are not obligated to provide further work. In forecasting profits by geographical areas, these areas are pre-set and pre-defined so people involved in forecasting are less emphasised.

5.9.4 Response variable 4 – time given for feedback before implementation

<table>
<thead>
<tr>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Log likelihood</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason for variation – poorly</td>
<td>Type of retail business</td>
<td>-7.360</td>
<td>0.005</td>
</tr>
<tr>
<td>motivated forecasters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of computer</td>
<td>-7.360</td>
<td>0.005</td>
</tr>
</tbody>
</table>

Key response variable: Time given for feedback (no [1]; yes [2])

Summary of findings: From the Minitab output, it can be seen that the combination of factors that best fits into the logistic model for explaining time given for feedback is:

1. Reason for variation – poorly motivated forecasters (not important [1]; important [2])

   Log odds ratio = 3.418 (s.e. = 1.454)
Chapter 5 – Postal survey: forecasting in industry

2. Type of retail business ('non-consumer goods[1]; consumer goods[2])

Log odds ratio = -2.214 (s.e. = 1.508)

and

1. Reason for variation – poorly motivated forecasters (not important [1]; important [2])

Log odds ratio = 3.418 (s.e. = 1.454)

2. Use of computers (no [1]; yes [2])

Log odds ratio = 2.214 (s.e. = 1.508)

Therefore the logistic model for this finding is

\[ \ln \frac{p_{ij}}{1 - p_{ij}} = x_i \beta = \nu \alpha_i + \beta_i \]  

(5.15)

where \( \alpha_i = \beta_i = 0 \)

\( \nu = -2.120 \)

\( \alpha_2 = 3.418 \)

\( \beta_2 = -2.214 \)

and

\[ \ln \frac{p_{ij}}{1 - p_{ij}} = x_i \beta = \nu \alpha_i + \beta_i \]  

(5.16)

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
where $\alpha_1 = \beta_1 = 0$

$\nu = -4.334$

$\alpha_2 = 3.418$

$\beta_2 = 2.214$

**Interpretation and deductions from results**

It can be interpreted that there is a significantly positive relationship between time given for feedback before implementation and reason for variation (poorly motivated forecasters) but a negative significant association with type of retail business.

This goes to say that when time is not given for feedback before implementing forecasts, the accuracy of forecasts will vary more as forecasters are poorly motivated. This could be due to the fact that they have to rush their jobs. Time given for feedback is apparently not important in consumer goods companies, likely because they are usually fast-moving and transactions take place at high-speed. When time is not given for feedback, there are no modifications to the forecasts and computers are not generally needed.

**5.10 EXTENDED DATA ANALYSIS FOR SUPPLEMENTARY VARIABLES USING LOGIT PROBABILITIES**

As supplementary variables are also identified earlier, the following subsections present the most significant associations of predictor variables with these supplementary variables, based on highest likelihood values and supported with interpretations.

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
5.10.1 Variable 1 – type of business

<table>
<thead>
<tr>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Log likelihood</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of employees</td>
<td>Importance of cost of implementing forecasts</td>
<td>-12.493</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Supplementary variable: type of business (non-consumer goods [1]; consumer goods [2])

Summary of findings: It can be seen that the combination of factors that best fits into the logistic model for explaining type of business is:

1. Number of employees (not more than 2000 [1]; more than 2000 [2])
   
   Log odds ratio = 2.382 (s.e. = 1.010)

2. Importance of cost of implementing forecasts
   (least important [1]; most important [2])
   
   Log odds ratio = 2.085 (s.e. = 1.325)

The logistic model for this finding is

\[
\ln \frac{p_{i}}{1 - p_{i}} = x_{i}^T \beta = \nu + \alpha_{i} + \beta_{i} \quad (5.17)
\]

where \( \alpha_{i} = \beta_{i} = 0 \)

\( \nu = -1.5563 \)

\( \alpha_{2} = 2.382 \)

\( \beta_{2} = 2.085 \)

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
Interpretation and deductions from results

With consumer goods, there is a tendency to employ more employees. This requires more information to be communicated, which involves increased costs of implementing forecasts. As there are more people, the company must develop internal controls so more money is involved.

5.10.2 Variable 2 – sales turnover

<table>
<thead>
<tr>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Log likelihood</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare profit forecast as a guidance for business operations</td>
<td>Use of management accounting techniques</td>
<td>-11.251</td>
<td>0.008</td>
</tr>
</tbody>
</table>

Supplementary variable: sales turnover (not more than £100 mil. [1]; more than £100 mil. [2])

Summary of findings: It can be seen that the combination of factors that best fits into the logistic model for explaining sales turnover is:

1. Prepare profit forecast as a guidance for business operations
   (not important [1]; important [2])
   Log odds ratio = 2.789 (s.e. = 1.329)

2. Use of management accounting techniques
   (not important [1]; important [2])
   Log odds ratio = 2.442 (s.e. = 1.227)
Therefore the logistic model for this finding is

$$\ln \frac{p_i}{1-p_i} = x_i^T \beta = \nu + \alpha_i + \beta_i$$

(5.18)

where $\alpha_i = \beta_i = 0$

$\nu = -2.583$

$\alpha_2 = 2.789$

$\beta_2 = 2.442$

**Interpretation and deduction from results**

The above results show that there is a significant relationship between 'sales turnover' and 'prepare profit forecast as a guidance for business operations' and 'use of management accounting techniques'. Both factors relate positively to sales turnover.

This means that by having more sales, more emphasis is placed on preparing profit forecasts as guidance for business operations as companies need tighter controls. Hence, focus is in ensuring that the forecasts are prepared to guide and direct business operations. As a result of this, the use of management accounting techniques becomes very important to guarantee smooth control of the system as such a technique involves internal transactions.

**5.10.3 Variable 3 – number of employees**

<table>
<thead>
<tr>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Log likelihood</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of retail business</td>
<td>Frequency of preparing forecasts</td>
<td>-11.244</td>
<td>0.001</td>
</tr>
</tbody>
</table>

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
Supplementary variable: number of employees (not more than 2000 [1]; more than 2000 [2])

Summary of findings: It can be seen that the combination of factors that best fits into the logistic model for explaining number of employees is:

1. Type of retail business (non-consumer goods [1]; consumer goods [2])
   Log odds ratio = 2.831 (s.e. = 1.203)

2. Frequency of preparing forecasts (quarterly and monthly [2]; six months and one year [1])
   Log odds ratio = 2.479 (s.e. = 1.213)

Therefore, the logistic model for this finding is

\[
\ln \frac{p_{i|j}}{1 - p_{i|j}} = x_{i|j}^{\top} \beta = \nu + \alpha_i + \beta_i \tag{5.19}
\]

where \( \alpha_1 = \beta_1 = 0 \)

\( \nu = -2.726 \)

\( \alpha_2 = 2.831 \)

\( \beta_2 = 2.479 \)

Interpretation and deduction from results

The tests suggest that 'type of retail business' and 'frequency of preparing forecasts' affect 'number of employees'. There is an inverse relationship between type of retail business and number of employees, and a direct relationship between frequency of preparing forecasts and number of employees. This suggests that the number of...
employees depends on the nature of the business and there is a tendency to employ more employees in a consumer goods company. By having more employees, forecasts can be prepared more frequently as the employees are available to take up these tasks.

5.11 SUMMARY

It can be seen that in the first part of this chapter, response frequencies indicated common practices and perceptions of the respondents towards forecasting. From here, we picked and justified response variables that influence successful forecasting practice. These include importance of people involved in forecasting and time given for feedback before implementing forecasts besides the common criteria of accuracy and forecast optimism. These are then tested with other variables for significant and totally no associations through the Fisher’s exact tests as described and presented.

While cross-tabulating variables to look for significant relationships, Fisher-exact tests produced some results with p-values of exactly 1.00. This shows that the variables are apparently of no significance at all and do not make any difference on the response variable in question. The reason for checking these results closer is to be aware that there are variables that do not affect the main response variables. As these variables are not relevant in our study, the information concerned is not given but can be furnished by the author upon request.

The logistic regression shows the effects of relating two factors simultaneously with the response variables; it also shows whether these associations improve the degree of significance or otherwise. For example, accuracy is improved and becomes significant (p-value = 0.05), through Fisher’s exact test, when two factors namely ‘preparing forecasts for the analysts’ and ‘who prepares those forecasts’ are tested simultaneously against accuracy. The logistic regression also points the direction of

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
association of each of these two factors, i.e., whether positive or negative, so that companies are aware of the effects of such results.

5.12 CONCLUSION AND BASIS FOR CASE STUDY

Results shown by the postal survey are interesting as they demonstrate links towards effective and efficient practice of forecasting including applying skills and knowledge in forecasting. Besides preparing forecasts, what is apparent in the postal survey is the communication and distribution of the forecasts that influence reactions over such forecasts. Therefore, the issue raised in this investigation is about the forecasts or point predictions that the decision-makers have made. Cho (2002) said that, from his survey, it is apparent that more research is needed for superior financial forecasts. It would also be interesting to learn how much people involved will be affected, in terms of motivation, even behaviour, qualification and training, have on the preparation of such forecasts.

Although methods of forecasting are highlighted in most forecasting literature to date, the behavioural issues are needed to fulfil the objective of forecasting. It can be seen that this part of the investigation merits to these demands in order to work towards producing those superior financial forecasts. We now proceed to the case study where all findings from this chapter are used in perspective. It is interesting now to divert our focus onto one organisation only to study its forecasting practices and perceptions; also to check if they agree with what we have found in our investigations so far.
6.1 INTRODUCTION

This chapter presents an overview of the case study, offering insights into the forecasting practice of one single service organization, Salford University. We chose this organization for three reasons; representativeness, accessibility and availability. In this case, we observe similarities and differences from the findings of the postal survey as we make an in-depth study of the University's forecasting function.

As a result of the postal survey, we identified 15 significant associations and more than 30 near-significances between the variables analysed. After fitting logistic regression models over these associations using two-way factors, the p-values changed; some became smaller, hence more significant. Bearing these results in mind, the same procedure is adopted in finding similar associations at the University. In this case, the focus is more on significant associations only, as we draw closer to the principal issues of the research project.

The purpose of this investigation is to highlight the role of forecasting in a university. Universities in England are mainly funded by the Higher Education Funding Council for England (HEFCE) and, though budgets are allocated, it is imperative that the limited budgets are utilised with care. In supporting this,
universities via their faculties and schools must forecast their future incomes and expenditures appropriately. Wright and Mechling (2002) indicated in their study that forecasting is important for service organisations.

Our investigation here attempts to highlight the role of forecasting in a general organisation to achieve a better perspective, indicating that such a role is vital and should be executed appropriately in order to sustain, and be competitive in, its industry. This will, ultimately, be provided by the use of behavioural models to explain the scenario and observations.

The fact that the University has been long in existence (since 1967, though its predecessor is much older) is an indication that the establishment is successful in its planning and decision-making activities, including forecasting. It is also a large employer and representative of other large service companies, including schools, hospitals and council departments. Therefore, the University is suitable for a case study to observe its forecasting function and to show detailed features that it weighs and uses effectively. Of course, it is also convenient for us to investigate in considerable depth, due to geographical location and accessibility of sensitive information.

This chapter first presents the progression of the forecasting function at the University, in five phases described in the next paragraph. Based on this, the case study framework and methodology are presented, including details of sample and research instrument. After data collection, exploratory analysis of the findings identifies key variables for further analysis. We then offer justifications for the choice of these variables.

This chapter also summarises frequency responses from the questionnaires and from the interviews according to the answers solicited. Based on these and exploratory
data analysis, further work is suggested to model the forecasting issues. This will be discussed further in Chapter 7.

6.2 BACKGROUND OF FINANCIAL FORECASTING AT THE UNIVERSITY

The forecasting function that we look at in this case study stems from financial forecasts prepared by the University. An initial meeting with the Director of Finance at Salford University facilitated the identification of areas to focus on. The following information explains the relevant background.

The financial strategy of the University is to generate additional income, control expenditure to provide a surplus and to use a proportion of cash generated to finance capital expenditure. The University’s strategic framework revolves around building an enterprise university with its key objective being to generate increased income. The University manages its functions like a business but ownership is not with shareholders; instead, there is a ‘watchdog’, HEFCE, which awards grants to run universities. Just like a business, any element of profit is termed as ‘surplus’ at the University. Relevant forecasts are prepared in exercising the financial strategy and are based on the University’s resource allocation model (RAM) which is simply the income and expenditure account.

The key features which contribute to improvement in income generation are as follows:
• **Internal restructuring**

Most recently, this involved the 1999 restructuring exercise where the number of faculties reduced from eight (8) to four (4), and for schools thirty-eight (38) down to sixteen (16).

The University also top-slices academic income by 1% to provide an annual academic development fund which is then used to support new programmes and initiatives.

• **Television advertising**

This feature uses the television to promote the University’s brand image as an enterprising university whose courses are aimed at improving the job prospects of its graduates.

• **Academic enterprise**

This is to do with arranging for short courses, consultancy, ‘spin-off’ costs and business incubation, in view of income generation.

At the University, the units set aside a percentage of their academic income with the intention of achieving an operating surplus and increasing its level of discretionary resources. The University’s ability to produce surpluses is influenced by the following features:

- **Budgetary control** – using electronic funds checking before initiating orders
- **Manpower planning** – reduction in staff through natural wastage

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An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
• Collaborative procurement – leading the development of an e-procurement system

There are risks involved which are known to have material impact on the financial framework. Among others are the recruitment of home students and of international students, student debts, NHS contracts and staffing awards. The University is also aware that any unplanned spending has an impact on working capital and liquidity.

6.3 FORECASTING AT THE UNIVERSITY OF SALFORD

Whilst the University plans for its future activities, one of the key tasks involved is forecasting. It is necessary for all schools, departments and units to prepare forecasts for allocating budgets to ensure smooth running of the activities concerned. The role of forecasting at the University can be viewed in many different ways depending on the purpose of forecasting.

To explain the mechanism of the forecasting function, this study identifies five phases relating to the role of forecasting. They are thoroughly examined in order to develop models to explain observations relating to the said effects. These five phases, which extends from a review by Dawes et al. (1994), are:

1. Understanding why forecasting is necessary.
2. Identification of what to forecast.
3. Deciding when to forecast.
4. Determining how to forecast.
5. Placing importance on the people involved, who are responsible for implementation, control and monitoring.
Chapter 6 – Case study: forecasting at the University

The progression of these phases is depicted by the directed acyclic graph given in Figure 6.1, which also directs the flow of communication as well as responsibilities.

Figure 6.1 - VIRTUOUS CYCLES OF THE FORECASTING FUNCTION AT THE UNIVERSITY OF SALFORD

The virtuous cycles show the flow of the forecasting process, which is controlled by the Central Finance Department and the Central Planning Unit. These two units collect information and interact with the faculties before coming up with a master plan and forecasts. The faculties and schools produce business plans every year by

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the end of March, to be consolidated by the finance department into a main business plan by July.

The faculties exchange inputs and ideas with the schools before reporting back to the two central units. Among the information communicated are:

1. student numbers
2. teaching requirements
3. logistics
4. equipment
5. courses
6. research programs
7. staff development programmes

All these items of information are gathered and organized suitably to achieve targeted results effectively in the end. The Director of Planning plans for the University as a whole in relation to incorporating inputs to the financial forecasts. The planning unit uses time series software incorporating on-line student updates by schools using the so-called Banner system. The finance department, via the Deputy Finance Director, prepares the financial statements. The faculty accountants play the role of monitoring performances based on the forecasts and amend subsequent plans in the light of their experience based on changes and feedback from schools.

Even though forecasts are mainly based on student numbers according to the courses, part of the planning is to introduce new courses besides increasing the number of students each year.
6.4 FRAMEWORK

In facilitating the execution of this study, based on a review done by Winklhofer et al. (1996), a framework for forecasting in a university setting can be identified from the linkage chart shown in Figure 6.2.

The whole idea of this perspective model is to give direction and provide recommendations towards a successful forecasting practice taking into account accuracy, performance, constraints and resources. This contribution will show the formulation of models to support such offer.

6.5 METHODOLOGY

A single case study approach is employed which will offer a rich description of current forecasting practice in developing greater understanding of the discipline in practice (Moon and Fitzgerald, 1998).

The techniques of an exploratory case study (Winklhofer and Diamantopoulos, 1996; Miles and Huberman, 1994) are adopted owing to the fact that:

1) studies relating to forecasting in a university setting are under-explored;
2) there is scant knowledge about the nature of the problem;
3) key informant surveys are the only way to get information from an exploratory study to focus on forecasting as a whole and the people involved in a university setting.
Figure 6.2 - A PERSPECTIVE MODEL OF THE FORECASTING LOGIC FOR A UNIVERSITY

Basic perspective

WHY?
Purpose of forecasting
1. budget allocation
2. planning

Advanced perspective

WHAT?
Types of forecasts prepared
1. student numbers
2. research and teaching allocation
3. equipment

University perspective

WHEN?
Time factor
1. time horizon
2. time line and deadlines
3. feedback
4. revision

Research perspective

WHO?
People involved
1. finance department
2. planning unit
3. schools

HOW?
Methods employed
1. subjective judgment
2. spreadsheets
3. time series

Ideal allocation of time factor relating to time horizon, feedback and review period

Typical types of forecasts prepared by the units concerned

Attributes of the people involved in forecasting in a university

Best combination of methods for a particular type of forecast

Relate to departmental context and its objectives

achieve targets

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6.5.1 Research site

The University of Salford was chosen to be the research site as it is a convenient site for easy access to the respondents and information, as well as being a large representative of the service community. It is flexible enough to permit future revisits should more data need to be collected. Moreover, forecasting concerns future information that is usually confidential and that is inaccessible to outsiders.

6.5.2 Research questions

The framework given earlier addresses five main questions as set out below:

1. What are the purposes of forecasting?
2. What are the types of forecast prepared?
3. What are the time factors considered in forecasting?
4. Who are the people involved?
5. What are the methods employed?

In addition, the following questions address other related issues:

1. Is there a distinction between preparers and users?
2. What are the essential criteria that must exist in a forecasting function?
3. What is the degree of awareness relating to ‘why, what, when, how and who’ in the context of the role of forecasting in a university?
4. What is the group size or number of individuals for the preparation and usage of forecasts?

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5. What are the attributes of the people involved in forecasting in a university? (background, qualifications, experience and training of forecasters and users.)

6. Who are the forecasters and who are the users? What are their designations?

7. How important is forecasting in a university, as perceived by the various hierarchies of the organisation?

8. What is the value of forecasting in a university? How is this value estimated?

9. Are there any barriers in the forecasting process? If so, what are they?

10. How important are forecasts in carrying out daily routine work?

11. Do the forecasts act as a main medium for controlling and monitoring income and expenditure?

6.5.3 Sample selection

As forecasting at the university relates to financial matters, the Director of Finance was approached. After consulting with the Director, a sample for this study comprising 23 respondents was identified as follows:

1. Director of finance
2. Deputy director of finance
3. Director of planning
4. 4 faculty accountants
5. 16 school heads

The actual respondents who agreed and participated in the questionnaire and interview sessions were 22, which excludes one school head who did not cooperate.
The small sample size was warranted due to the nature and purpose of the study, which are to explore and explain thoroughly forecasting practice by examining the case of this under-explored area (Miles and Huberman, 1994). The fieldwork of interviewing and distributing questionnaires was considered to be a 'continuous learning process' as facts and knowledge gathered improved data collection from one interview to the next, whilst taking care to avoid any inconsistencies among responses.

6.5.4 Data collection

Data were collected via questionnaires and interviews covering the following areas:

1) Background of the unit.
2) Background of the respondent.
3) Forecast preparation.
4) Forecast usage.

The sample questionnaire can be found in Appendix 6.1 and the summary for the interviews is as per Appendix 6.2. Previous questionnaires were studied and modified according to the information required from the case study, as set out by the research questions. We approached the respondents by also giving a summary of our research and we prepared a set of related interview questions when we see them personally, especially the top management in charge of forecasting at the University. Details of the paperwork concerned can be furnished by the author upon request.

The aim of the questionnaires and the interview questions is to observe the perceptions and practices of forecasting at the University of Salford by the people involved at the strategic and operational levels in assessing the role of forecasting.
6.5.5 Data analysis

Data collected were via semi-structured questionnaires and interviews. The nominal and ordinal responses were re-categorised into binary responses (0 or 1) and entered onto a SPSS spreadsheet. These data were analysed in two principal ways:

a. frequency counts
b. cross-tabulations

Fisher-exact tests for significant associations between variables were carried out on the cross-tabulations. A p-value of at most 0.05 in the SPSS output was used to identify significant associations.

6.6 KEY VARIABLES

Five key variables were identified as indicators of favourable strategies and are used to explain the role of forecasting. The choice taken is presented in Table 6.1 along with the individual justification and expected results, in order to provide objective insights into the overall presentation of the role. Binary categorizations are employed, to avoid extracting too much detail from a small data set. The thresholds for dividing the two categories of each response variable are chosen so as to result in similar frequencies of responses in each category.
Table 6.1 – JUSTIFICATION OF KEY VARIABLES FOR A UNIVERSITY: CHOICE AND EXPECTED RESULTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Key variables</th>
<th>Justification for choosing these variables</th>
<th>Expected results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hierarchy levels</td>
<td>These are the main structure of organisational levels involved in forecasting and are perhaps the core in making decisions relating to setting targets and forecasts.</td>
<td>To show trends and practices relating to forecasting by the different levels of organisation. To show how people interact, how management regards forecasting and how the workforce regards forecasting.</td>
</tr>
<tr>
<td>2.</td>
<td>People aspects – users</td>
<td>This refers to whom the forecasts are prepared for. There is a high indication (75%) that the majority of users are senior management.</td>
<td>Tells how users use forecasts efficiently or effectively.</td>
</tr>
<tr>
<td>3.</td>
<td>People aspects – preparers</td>
<td>This relates to who prepares the forecasts and whether they are especially qualified for this task.</td>
<td>Trends and practices of preparing forecasts observed at the university in contributing towards successful forecasting.</td>
</tr>
<tr>
<td>4.</td>
<td>Time factor: frequency of preparing forecasts</td>
<td>This shows the time factor considered in preparing forecasts.</td>
<td>Any effect on successful forecasting as a result of frequency of preparing forecasts.</td>
</tr>
<tr>
<td>5.</td>
<td>Size of unit: annual income</td>
<td>This explains different sizes of the unit will produce differences in perceptions and ideas between small and large units.</td>
<td>How size of unit influences forecasting function leading to successful results (performance).</td>
</tr>
</tbody>
</table>

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The frequency counts take into account the variables that are mostly favoured by the questionnaire respondents and expressed as sample proportions. These are further explained by calculating 95% confidence intervals for the proportions of significant variables with lower and upper bounds given by:

\[ \hat{p} \pm 1.96 \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \]  

(6.1)

where \( \hat{p} \) is the sample proportion and \( n \) is the sample size.

The estimated proportion and corresponding 95% confidence interval for each key variable are given in Table 6.2.

Table 6.2 – KEY VARIABLES FOR A UNIVERSITY: ESTIMATES AND CONFIDENCE INTERVALS

<table>
<thead>
<tr>
<th>Key variable</th>
<th>Level 0</th>
<th>Level 1</th>
<th>( \hat{p} ) (estimated proportion at level 0)</th>
<th>95% confidence interval for proportion at level 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hierarchy of unit (management and faculties; schools)</td>
<td>7</td>
<td>15</td>
<td>0.32</td>
<td>(0.12, 0.51)</td>
</tr>
<tr>
<td>Users of forecasts (senior management, not senior management)</td>
<td>18</td>
<td>4</td>
<td>0.82</td>
<td>(0.66, 0.98)</td>
</tr>
<tr>
<td>Preparers of forecasts (managers, not managers)</td>
<td>14</td>
<td>8</td>
<td>0.64</td>
<td>(0.54, 0.74)</td>
</tr>
<tr>
<td>Frequency of preparing forecasts (more than twice per annum, twice per annum)</td>
<td>5</td>
<td>14</td>
<td>0.26</td>
<td>(0.06, 0.46)</td>
</tr>
<tr>
<td>Annual income (less than £5 mil., £5 mil -£10 mil.)</td>
<td>9</td>
<td>13</td>
<td>0.41</td>
<td>(0.20, 0.62)</td>
</tr>
</tbody>
</table>

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Note that, by definition, the estimated proportion, \( \hat{p} \), for each response variable lies midway between the lower and upper limits of the corresponding confidence interval.

### 6.7 EXPLORATORY DATA ANALYSIS AND RESULTS

The data are organised and analysed into significant associations, the p-values listed in Appendices 6.3. These tables also aid the construction of a framework of the study as depicted via the directed acyclic graph (Figure 6.1) and linkage chart (Figure 6.2) shown earlier.

The respondents vary in terms of designation and size of the unit, which they are attached to, with employees ranging between under 50 to more than 200 and with annual income from under £5 million to about £10 million.

All respondents are aged above 30, with a majority above 40. Seventeen of them (77%) are male. Most of the respondents comprise mature people, holding leading positions at their units, who are well educated and who have had a considerable amount of working experience.

In general, it can be said that the University makes forecasts, just like any other established firms in industry, and this is viewed as a vital exercise in the organisation. Formal methods that are suitable for the university environment are adopted but perhaps are not as sophisticated as those, which other business firms use.
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This section provides answers to respond to the framework, based on frequency responses and interviews. In responding to the framework, the interpretations of the results are presented for the following issues:

6.7.1 Understanding why forecasting is necessary

At the University, it was found that the main reasons for forecasting are:

1. For budget allocation: each academic year that runs from September to August, an amount is allocated for each unit, department or school. It is based on this amount that the unit will plan its future activities and forecast its income and expenditure for the following year.

2. As a guidance to carry out activities for the future: the forecasts are used as guides against activities that will be carried out. Resources involved are negotiated and discussed at various levels to achieve units’ objectives.

3. For users: the forecasts form the main basis which sub-units use to deliver their tasks on a smaller and detailed scale, congruent to the objectives of the unit as a whole. These users are the senior management, heads of school, faculty accountants and administrative officers.

4. For other purposes as given below:
   - for control and monitoring purposes (resources);
   - to meet external and internal requirements;
• plan for the future (using what-if scenarios to observe alternative outcomes);
• to identify weaknesses;
• to gain information in foreseeing viability to embark on a better future.

6.7.2 Identification of what to forecast

There are several types of forecasts that the University prepares. The main ones are as follows:

• student numbers
• human resources
• income and expenditure
• budget balancing forecasts

6.7.3 Deciding when to forecast

This involves the time factor that is crucial in forecasting. Forecasts are prepared on time before implementation with various levels of frequency, depending on the importance of forecasts to be prepared, the urgency of preparing and reviewing based on a time schedule an deadlines for meetings and feedback between various levels within the units and the University as a whole. In relation to the time factor, the forecasting horizon is not important but time given for feedback before forecasts are implemented seemed to be crucial.
6.7.4 Placing importance on people who are responsible for forecasts

There are two main categories of people involved, namely preparers and users. It is evident that preparers need input from users in order to produce the forecasts. Looking at the responses from both the questionnaires and interviews, respondents are not too sure themselves whether they are preparers or users or both. The users consist of faculty deans, senior management and heads of schools. Fourteen (65%) of the users claimed that users should also be preparers. Twenty-one (95%) of the users give input to preparers. Fifteen (70%) of the users use and follow forecasts in their departmental activities. The users are unsure if they are motivated by the forecasts but they say that forecasts set are sufficient for their use.

In general, a number of observations revealed a mixture of feelings amongst the forecast preparers and users towards the forecasting function as a whole. However, it is noticed that they try hard to put their best efforts into forecasting and produce results even though constrained by various resources.

The preparers consist of senior staff, management and faculty accountants. A majority of the respondents have either professional or PhD qualifications, depicting that forecasters and users are highly educated. A majority of the respondents have experience in general administration and budgeting and forecasting. Eleven (50%) said that they get training in forecasting.

6.7.5 Determining how to forecast

Formal methods are used but only to suit the units’ needs in line with fulfilling the University’s overall objectives. In selecting a forecasting method, the frequency of response towards ‘nature of problem and condition’ is highest compared to other...
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factors. Discussions and meetings are held to impart feedback in the course of reviewing and revising the forecasts throughout a given period before finalizing them. A simple presentation of the unit’s plans for its activities and resource requirements is given in statements and reports such as receipts and payments accounts, and income and expenditure accounts. These statements are brought together into one main plan for the University. Word processors and spreadsheet packages are used and at the higher level, planning unit, further analysis like time series using computer packages is used together with the ‘Banner’ system for parallel-updating of the students’ register.

The Planning Unit plans and incorporates all forecasts prepared by faculties, schools and other departments in the University. There is no particular method that the units use to make forecasts; a majority use simple spreadsheets like Excel and subjective judgement, as well as inputting a percentage for variation on previous performance.

The Finance Department uses ‘Agresso’ software. All units prepare income and expenditure forecasts. Forecasts are prepared by an officer and the manager of the particular unit. Most units prepare forecasts once a year according to courses and schools. They are usually ready just before time. The amount of time spent on forecasting varies between units. Preparers claim that they use up to 60% of the users’ input in the preparation of forecasts. Forecasts are distributed to all levels. Twenty-one (95%) of the units tend to under-estimate forecasts.

The most common reason for variations between forecast and actual performances is that the respondents are being too optimistic of achieving performances. Another reason is that forecasts fail to predict uncertain events.
6.7.6 Other issues raised from the questionnaire and interviews

There were also other issues raised from the questionnaire and interviews. The forecasting team in a unit usually consists of five people and members are usually leaders of the units. Thirteen of the respondents (59%) thought there is no need to acquire statistical knowledge. None of the team members regard themselves as statisticians. Twenty of the respondents (91%) prefer to work in a team and they usually get good participation from team members and management, a finding similar to that of Kahn and Mentzer (1994).

A mixed perception exists as to how much autonomy is given to the preparers; perhaps they were not formally informed or were unable to determine the degree of autonomy. Discrepancies among the units could also be due to subjective estimation of the percentage of autonomy.

The reaction of employees towards forecasts is negative on the part of the schools but the management and faculties seem indifferent. The management and faculties thought that salaries affect accuracy of forecasts.

More issues were also raised from the fieldwork. The respondents articulate about problems and barriers to forecasting that were found in relation to the following areas that must be addressed:

1. lack of training;
2. lack of exposure to forecasting methods and packages;
3. no freedom to set forecasts, as they are rigid because budgets are set and allocated by HEFCE council;
4. activities and expansion ideas impeded;
5. communication – grievances not addressed, as units wish to expand and engage in a lot of profitable activities;
6. top management ‘does not understand’ the unit’s potential.

Forecasting seemed to play a very important role but this is not highlighted. It is observed that forecasts are basically one of the main instruments used to run and monitor activities in a unit, the medium of controlling funding. In general, most units tend to under-estimate their forecasts which are in line with the prudence concept in statutory financial reporting (Accounting Standards Board, 2000). Forecasts of income and expenditure worked around the budget allocated to the units given based on the previous years’ student enrolments.

In an open-ended part of the questionnaire, respondents suggested that any variations due between forecast and actual results must be rectified by taking the following steps:

1. balancing;
2. finding the causes of variations;
3. control and feedback – action plans;
4. compensate and compromise;
5. meetings and discussions for negotiations.

To strengthen forecasts and make them reliable, the majority of respondents were of the opinion that:

1. there should be clarity of information and communication;
2. there should be the use of models to explain and support practices;
3. forecasting tools must be improved;
4. uncertainty and unknown factors must be incorporated.

6.8 FINDINGS

The following interpretations present results that were further analysed using the Fisher-exact test showing strong links between the five key variables and other related variables. The associations are read off from cross-tabulations as given in Appendices 6.3. We also consider outcome from the interviews as well.

6.8.1 Hierarchy levels

(Measurement: either management and faculties or schools)

For a majority of the school heads, forecasting at school level involves simple subjective estimation of student numbers, based on the previous year’s student enrolment, a similar finding by Sparkes and McHugh (1984) and Watson (1996), in their studies who found that their respondents used mainly naïve method.

As far as involvement is concerned, the school heads generally leave the forecast preparation to the administrator but under close supervision. They also forecast other things like equipment and teaching loads, which are not a major influence on management and faculties. There is a strong link between the levels of hierarchy and users who are identified as officers of the units. Perhaps an officer is the one responsible to ensure that forecast information is used and distributed appropriately.

The heads of schools tended not to have experience in accounting whereas the management and faculties have experience in accounting. This shows that forecast information at senior administrative levels is based on accounting data and people
from accounting backgrounds should take charge of this. The schools feel strongly about selection of the forecasting method and that it depends on the nature of the problem and condition but this is not the opinion of the management and faculties. The schools may be used to managing simple and routine forecasts, but the management and faculties may need to address more unusual issues.

6.8.2 People aspects – users

(Measurement: senior management or not)

An issue given in the review by Winklhofer et al. (1996) indicated that studies on forecast users are far less than that of forecast preparers. In our case study, we identify and examine who are the users and the results show that senior management are users.

The users also depend on managers and officers in the respective units to prepare forecasts that are mainly for use by the heads of schools. The senior management use the forecasts to indicate and determine the direction of the University as a whole. The heads of schools, on the other hand, use forecasts as a guide in the running of the schools.

Besides using profit forecasts, units are also required to use other types of forecasts that are relevant to their units. These will form the varied composition of the annual income and expenditure. It is the senior management’s expectation and input that are considered by the preparers in producing forecasts. How much autonomy is given to the preparers varies significantly, which reflects on the forecasts and senior management. In addition, under-estimating forecasts is also a common input amongst a majority of the users.
6.8.3 People aspects – preparers

(Measurement: manager of a unit or not)

There is a strong and positive relationship between the managers and the officers together with the accountants. This shows that managers depend on the officers and accountants to prepare forecasts. The managers identified that influential users comprised senior management, funding agencies, finance directors and heads of school (Peterson, 1993). They use selected information to prepare forecasts for income such as academic fees, support grants and research grants, except endowment income and interest receivable. There were varied treatments of income and expenditure types across various units of different sizes based on the annual incomes of the units. Managers claimed that the person in charge of forecasting is an accountant whereas non-managers said it is somebody from another background.

There was also a mixed perception towards the levels of organisation to which forecasts are distributed as well as different reactions towards forecasts given. Respondents were not sure if training would be required, which is a factor influencing the preparers. There were various personalities, qualities and situations observed about the people involved in forecasting, which significantly affect the preparers (Fildes and Hastings, 1994 and Wheelwright and Clarke, 1976). There were also several differences of opinion with respect to the purpose of preparing forecasts, what to forecast and time factors in forecasting which may affect the level of motivation to ensure that all related forecasting matters are included. Being a leader or a member of the forecasting team also considerably influences the preparers as this affects the amount of autonomy that the preparer has in producing the forecasts. The reasons for variation of ‘being too optimistic’ and ‘mis-information’ showed a significant impact on preparers as the latter are more cautious with the forecasts.
6.8.4 Time factor - frequency of preparing forecasts

(Measurement: more than twice a year or up to twice a year)

Fildes and Hastings (1994) recommend time management to improve forecasting, alongside other issues such as a blend of related skills, expertise and organisation structure. In our case study, all the units, which prepare forecasts frequently are prepared by the accountants and the ones less frequent are by people from other backgrounds. Frequently prepared forecasts are for the use of external funding agencies, the finance director and other units such as planning and other departments. There were variations in the treatment of composition of annual income and expenditure depending greatly on how frequently forecasts are prepared. The person in charge of forecasting at the units that prepare forecasts frequently tends to be an accountant but those units with less frequent forecasts have people from other backgrounds.

Forecasts distributed to middle managers have a significant impact simply because they are at the level where operations are supervised and they are in the capacity to understand what is happening on their own ground floor. Less frequently prepared forecasts get accepted easily by employees due to the fact that influential factors have been carefully considered in the forecasts.

Less frequently prepared forecasts get accepted easily by employees rather than frequent ones, as simple routine sets of forecasts are manageable frequently and may not require training.

There were also strong links on the qualities of people involved such as age, experience, rewards, methods used, basis of selecting method and support from top management. The purpose of preparing forecasts and whether forecasts are sufficient
to produce good results depend strongly on how frequent they, the forecasts, are prepared. Whether forecasts are prepared frequently or less frequently significantly affects the reason for variation which is either ‘too optimistic’ or ‘failing to predict uncertain events’.

6.8.5 Size of unit - annual income

(Measurement: up to £5 mil. or more than £5 mil.)

We now relate the size of the units with forecasting practice (Sanders and Manrodt, 1994). In general, the factors that are significantly influenced by the size of unit vary among the people involved and the practices involved in forecasting. Bigger units tend to have people from other backgrounds as opposed to smaller units, which have accountants to prepare forecasts. Both managers and officers in the units acting in the capacity of preparers do impact significantly on the size of the units, as the amount of responsibility is more for the bigger units to produce forecasts based on bigger monetary values and more items to look into.

Users identified are funding agency, finance director and heads of school, reflecting that different sizes of units prepare forecasts for different types of users. The forecasts prepared range from general profit forecasts to detailed forecasts of units, again depending on the size of the unit. Different compositions of annual income and expenditure are taken into account that differ significantly over the various total incomes.

The bigger the units, the more agreeable employees are towards the forecasts given. Salaries do influence forecast accuracy in bigger units, as more work may be needed that demands responsibility and motivation. Training is an issue as bigger units encourage their preparers to attend formal training in forecasting, whereas the
smaller units do not. Smaller units tend to give up to 50% autonomy to preparers, unlike bigger units that allow for more than 50%.

The size of the units involved is also shown to have a substantial effect on the background of people; relevant qualities and experiences are raised. In addition, the methods used and application of software depend on the size; bigger units use time series and software for forecasting but smaller units do not.

Units with high values of income regard cost, nature and condition of problem, and users’ ability to understand forecasting methods as important in selecting them. The numbers of people involved, when forecasting by courses and forecast horizons as well as frequency of preparing forecasts, are significantly related to the size of the units. Other considerable issues include timely forecasts, people’s input and reasons for variation. The question of rewards was also raised, which affect the bigger units that tend to believe that performance must be rewarded.

6.9 INTRODUCTION OF MODELLING INTO CASE STUDY

This case study raises the awareness of knowing what the criteria for successful forecasting are, for example resources like people, time, methods and other qualitative issues.

It can be seen that all respondents agreed that variations are possible. Strategies and actions will observe rates of change by assigning weightage on people and other resources and how these might influence actions and strategies, for example:

1. whether having more people will increase successful forecasting;
2. whether having more qualified people will increase successful forecasting;
3. whether having more experienced people will increase successful forecasting.

In order to understand the relationships better between key variables and response variables, a mathematical model is used, thus enabling behavioural events to be interpreted.

To enhance the findings of the case study, models are now used and explained. It is observed that forecasting at Salford University involves decision-making. This is where models are introduced so as to gain a more objective perception of the forecasting process as a whole.

This model is inspired by Bayesian decision theory in explaining the expected cost function for having a range of likelihoods for prediction made as shown below:

\[
E[c(x)] = \sum_x c(x) f(x) \tag{6.1}
\]

\[
E(x) = \sum_x xf(x) \tag{6.2}
\]

where \(c(x)\) is the cost or loss function of the actual forecast, \(x\), and \(f(x)\) is the normal probability density function of \(x\), defined by

\[
f(x) = \frac{1}{\sigma \sqrt{2\pi}} \exp \left\{ -\frac{1}{2} \left( \frac{x-\mu}{\sigma} \right)^2 \right\} \tag{6.3}
\]

for \(x \in \mathbb{R}\).
The whole idea of this model is to explain the cost of not being on target. Suppose, for example, a unit predicts to make £100,000 profit in year 1 but the actual profit turns out to be £125,000. On the surface, this is good as the actual profit achieved is more than planned. On the other hand, the difference between the actual and predicted profits must be examined to find out what causes the difference, as it could result in lost opportunity. Therefore, there must be an element of cost associated.

In addressing what to forecast, this involves producing types of forecasts such as student numbers, income and expenditure accounts and teaching requirements. Forecasters tend to make point estimates based on prior information and subjective judgements. What this study attempts to suggest is that those estimates could be expanded into assigning probabilities to the likelihood of achieving them. For example, suppose a surplus of £5,000 is forecast for year one. A range of limits for the probability of achieving this target is assigned in order to make the forecast more informative and reliable. We expand on this point in Chapter 7.

6.10 CONCLUSION

In line with Sparkes and McHugh (1984) and Watson (1996), the University does recognize the importance of forecasting in their organization. Even though the respondents are aware of and have knowledge of the techniques, little is still used; this in line with the findings by Duran and Flores (1998). As recommended by Fildes and Hastings (1994), the links between forecasters and users must be ascertained, and Wheelwright and Clarke (1976), Mahmoud et al. (1992) and Lawrence (1993) also encourage that preparers and users must have good relationship in the forecasting process. Our case study shows that preparers are also users and the University does not employ any external experts to do its forecasting.
Although some of the respondents try to claim they are only preparers or only users, they do not realise that they are all involved in the forecasting function, in the capacity of both preparers and users. The forecasts produced are based on naïve method, and subjective judgement and contributions from all involved in forecasting, a combination of methods suggested by Goodwin (2002), that is deemed to be practical.

Even though self-sufficient, where budget allocations are 'ready' funds available for use, the University must ensure that budgets are used appropriately, hence the need to produce reasonable and effective forecasts. If any extra funding were required, the University would need to find the funds to support other activities deemed essential.

Forecast accuracy is not all that matters in the case of a university. Other crucial factors that are deemed to be of priority such as who is involved, concerning various designations, background, experience and training related to forecasting. Other factors include performance of the University in terms of student numbers, teaching load and entreprise, including forecast optimism, as well as utilisation of resources available. These observations are made in line with a review by Dawes et al. (1994), in which Ord posed basic questions of 'who and why' relating to the forecasting practice which an organisation should be aware of.

In addressing forecasting issues in a university, there are certain distinct features that must be observed to ensure successful forecasting as discovered by the case study. These relate to the people involved and other resources required which even in other industries are regarded as important in this new millennium. The key concern here is to take forecasting in the perspective of a university so that its peculiar features observed can be customised and dealt with appropriately.
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The general view from the analysis is the key variables that showed significant impacts on the qualities of the people involved and the general practices of forecasting in the University. Rewards and salaries were also another issue that was commonly presented by tests and which may be a backbone for better motivation. Though people involved in forecasting may personally have their own way of, and perception towards, executing tasks based on a set of rules, they must 'agree' towards achieving objectives. How this is done may not be easy to establish but hopefully the pre-modelling results will help to identify suitable models to resolve the problem.

The University seems to maintain pace in advancement and development, in line with technologies to date. According to the finance department, a financial package 'Adaytum' will be used and implemented in the very near future. It will be interesting to find out how this system improves further the forecasting system as a whole, as this system allows adjustments and revisions on forecasts rather easily and more efficiently. It can also be seen that a lot of the activities undertaken depend on how managers frame their decisions and thereafter implement them. Both the system and people play important roles in realising the objectives of an organisation through the planning and forecasts prepared. In essence, balancing those roles may sometimes conflict but is usually overcome through an organization system; this is where mathematical models will be developed to put such variance into a formal angle, as explained in the next chapter.
CHAPTER 7

MODELLING PROFIT FORECASTING

7.1 INTRODUCTION

This chapter extends the findings of the postal survey and case study, as set out in the previous chapters and addresses modelling issues deemed essential for the forecasting scenarios given. Its intention is to raise awareness of various modelling approaches that can be used to enhance the quality of forecasting processes, rather than to identify specific models, which tend to be user-specific.

It has been noted that organisations make forecasts and that forecasting accurately is rarely achieved. As many business decisions involve forecasting, successful forecasting practice is crucial to reduce or close the gaps in this process (Drury, 1990).

Most importantly among the reasons given in both the postal survey and case study relating to why variations occur between actual and forecast performances is the failure to predict uncertainty. Stekler (2003) indicated that this failure is due to the behaviour of forecasters. Three reasons are offered here, namely:

- the process of interpreting data;
- forecaster bias;
- forecaster preferences.
Using a Bayesian approach to understand and interpret the above, subjective probabilities for the likelihood of an event are elicited and revised as new information is received. In support of this approach, Stekler (2003) also emphasised the need to consider the individual's role in the forecasting process.

This chapter enhances the modelling issues in Chapters 5 and 6 on the postal survey and the case study respectively. This topic is singled out as it contributes significantly to the existing literature in forecasting. In addition, it supports our explanation of the behaviour patterns of variables.

Observing the practice, and learning about the perceptions, of forecasting from the study samples are not complete if the practice and perceptions are not represented by models. Once these are captured by functions objectively, these models can be applied to many similar situations. Ultimately, an organisation or a unit could forecasts for profits, sales, investments, cash flow surplus, student numbers, teaching loads and other resources using such models and, depending on the nature of its activities.

Recalling the modelling issues that are discussed briefly in earlier chapters, forecasts are prepared based on estimates, which, in practice, correspond with point predictions. Typically, a single estimate is obtained as a result of group decision-making in predicting future performance. This group decision-making is done through members offering their expert opinions with regard to a particular issue. The group holds discussions before agreeing on a figure and this is usually endorsed by authorised personnel in the group, usually the leader. In our postal survey, this would be the manager of a department. In our case study at the university, this would be the head of a unit. However, when reporting to the managing director or
chief executive of a company, or the vice-chancellor in the case of a university, he or she can change the decision unilaterally.

Forecasts are said to be imperfect when actual performances do not turn out as predicted. This chapter offers some mathematical modelling and consideration of cost implications for this forecasting scenario.

7.2 THE ISSUE OF MODELLING

How and why modelling comes into play for forecasting functions in commercial and service industries were explained in Chapters 5 and 6 respectively. One particular situation identified is where the reactions of the forecasting team towards a set of available information can affect the initial forecast predictions, which are usually inaccurate. The team members give their input and exchange ideas to forecast future results based on existing practice. These results are usually single point predictions, as in the case of the university, and our models attempt to introduce an acceptable variation to these predictions.

For the postal survey in Chapter 5, we applied logistic regression analysis to extend the measures of association amongst the variables by showing the effects of combining three factors simultaneously in one model. This emphasises the factors that are significant predictors and enables the companies to give due emphasis on these factors in order to be successful in their forecasting practice. Furthermore, p-values of 1.00 alert companies to be aware of factors that appear not to influence a response variable, so that they might pay less attention to such variables.
In Chapter 6, the case study made use of Fisher’s exact test to delineate significant associations in order to identify important variables. Logistic regression was not applied in this case for the simple reason that there was no need to assess the degree of influence between response variables and several factors, as there was with the postal survey for establishing logit probabilities.

There are various models that can be used, but which are suitable for our situation? Many models are presented in the literature for other application areas, and these offer some insights and suggestions for our research. What we observe is the weakness in estimating forecasts using single point predictions, and our study should offer possible and reliable solutions to overcome this weakness. What interest us are issues relating to the outcome of the forecasting teamwork and what forecast estimates are involved. This is where mathematical modelling steps in. Three parts contribute to our analysis, namely:

1) mathematical modelling involving establishing a suitable probability distribution and loss function in order to apply Bayesian decision theory;
2) cost implications with respect to imperfect forecasts;
3) differential equations involving rates of change among variables, to describe and explain the underlying structural behaviour.

7.3 BAYESIAN APPROACH FOR ENHANCING POINT PREDICTIONS

From the investigations carried out, we observed that targets or single point predictions determined by an organisation, or particular unit within an organisation, become the platform towards which actual performances are inclined (Goodwin, 1996). Even at the setting stage of targets and forecasts, the process of decision-
making can be demanding to ensure crucial factors are not excluded. Single point predictions also add to the mood and motivation of people involved with the forecasts, be they preparers or users. These single point predictions do not allow for variations in case the outcomes of the actual performances turn out different from planned due to uncontrollable factors. Once the actual results are noted, the management will look back at their forecasts to identify what and why are the differences. By looking at just one figure, any deviation may incur costs and thereafter affect the people involved. Additionally, single point predictions influence the behavioural issues which include 'why, when, how, what and who' relating to the forecasting scenario as given in Chapter 2 and the framework of 'perspective model of the forecasting logic' found in Chapter 6. This is the reason why point predictions become central in this investigation.

Clemens et al. (1996) indicated that an essential aspect of decision-making involves consulting experts, who usually give differing opinions of information. A considerable volume of literature is available to provide solutions addressing this problem. It is recommended that expert opinions be treated as data for further analysis in arriving at more reliable point predictions. In this analytical part of the research, three aspects of modelling, namely a probability distribution, cost function and Bayesian decision analysis are described.

### 7.3.1 Probability distribution

At the University, the current forecasting situation is that point predictions are prepared and then passed on to users. As these are invariably inaccurate, we regard this as a flaw and now propose that forecasts should consist of probability distributions rather than point predictions to allow for this in accuracy. Our emphasis is on the outcome from the interaction of people, not only on the results achieved.
We believe that there must be a build up of managerial structures and communication networks to increase and improve stability in the forecasting function. On the basis of extensions to the central limit theorem, the normal distribution is deemed appropriate here. This choice is supported by general theory relating to the laws of error as described by Eisenhart (1983).

Adopting the normal distribution, we assume $X|\mu,\sigma \sim N(\mu,\sigma^2)$ where $X$ is the actual profit, which is an unknown random variable at the time of preparing a forecast, $\mu = \hat{x}$ is a point forecast for the value of $X$ and $\sigma$ is the standard deviation which measures the uncertainty of our point forecast.

The benefits of establishing variations from point predictions and assigning normal distributions to these point predictions are now given. Firstly, as forecast accuracy is unexpected, the variation will improve motivation and drive. There is still room for expansion or reduction of results giving a better picture of the whole outlook and better perspective in terms of allowing for differences between actuals and forecasts. Most importantly, by having a normal distribution, the forecasting process generates credible results allowing for extremes considering any uncertainties. As such, management is better prepared in all kinds of possible situations and this does not affect forecasters' capability as a measure of improving the accuracy of forecasts.

7.3.2 Cost function

The element of costs is introduced and illustrated here as funding and money are important sources of running the business. When actual performance conflicts against forecasts, there is a loss involved and this results in a cost to the organisation (Goodwin, 1996). This also affects the motivation of forecasters, which in turn jeopardises their forecasting success. This aspect of loss may take the form of
functional relationships which, in their simplest but most common form, are bilinear. The following illustration explains this situation:

Let the forecast be \( \hat{x} \) and the actual be \( x \); when the actual conflicts with the forecast, there is a difference and an element of cost is involved. Therefore, for example,

\[
\begin{align*}
&\text{if } \hat{x} = £1000; x = £500 \quad \text{cost is 5 units} \\
&\text{if break-even i.e. } \hat{x} = £1000 \text{ and } x = £1000 \quad \text{cost is 0 units} \\
&\text{if } \hat{x} = £1000; x = £1200 \quad \text{cost is 2 units or less}
\end{align*}
\]

Figure 7.1 shows a graph depicting the above effects. We measure cost in units to indicate that the costs involved are not just monetary, but include time and effort wasted. Therefore, a measurement for these must be devised collectively by the people involved. This may mean that the cost involved is less when actual is more than forecast rather than when actual is less than forecast. This difference may be due to intangibles and may represent the hidden costs. As long as the difference between actual and forecast results is material, further breakdown of the costs involved must be scrutinised and addressed to find solutions to improve future forecasts. For example, when \( \hat{x} = £1000 \text{ and } x = £500 \), this is a situation of over-forecasting. Among the consequences of this condition are:

1) employees will be demotivated as their high expectation of the company to perform is diminished. As a result, this might lead to a high turnover of employees;
2) resources will be over-utilised as unrealised provisions are used;
3) the reliability of forecasts will be in question;
4) the forecasting exercise will not be cost-effective.

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Similarly, when $\hat{x} = £1000$ and $x = £1200$, this is a situation of under-forecasting. The consequences of this condition are:

1) underutilisation of resources;
2) potential investments will be withdrawn;
3) doubts about the reliability and cost effectiveness and cost-effectiveness of forecasting will arise.

**Figure 7.1 - GRAPH SHOWING THE COST OF UNDER- AND OVER-FORECAST OF PROFITS**

7.3.3 Bayesian methodology

The classical, or frequentist, approach to estimation corresponds here to the generation of point predictions enhanced by prediction intervals, though managerial
decisions are usually based on the point predictions only. Regarding the observed profit as arising from a normal distribution, however one can establish a subjective predictive distribution by looking at the chances or likelihoods of achieving various targets away from this point prediction. This variation provides an indication of how the actual outcome evolves around its forecast. This explains and allows for the differences between the actual and forecast values.

For example, we might present forecasts in terms of relative likelihoods like this: it is twice as likely to achieve a profit of £10,000 than a profit of £15,000. Better still, we could present quantiles or even the full distribution for profit. Bayesian decision theory allows distributions of predictions to model possible departures from point forecasts like this to make sure that the uncertainty of achieving them is considered. This uncertainty is here expressed using a normal distribution of relative likelihoods for the probability density function of profits. As for any density, the area under the normal curve is one. For a simplified analysis, one could consider a two-phased outcome, or binary response, so that if there is two-thirds of a chance that the profit is at least £10,000, then the chance of not making that amount of profit is one third. This enhances the quality of forecasts but ignores system feedback, which we consider shortly.

The distribution for the variation of profits can be obtained in two ways: subjectively or objectively. For example, we might establish a normal distribution with associated loss function objectively. Using an ARIMA model requires no subjective devising, revising and adjusting. At this point, the expected cost of a poor forecast can be calculated. If profits are more than £2500, for example, the cost involved is proportional to the difference between the point prediction and the actual profit achieved.
Applying the recommendation given by Goodwin (1996), the mathematical functions involved in this modelling of imperfect forecasts take the following forms for this application, where \( \hat{x} \) is a point prediction and \( x \) is the actual profit:

1. Normal distribution function for profits

\[
 f(x) = \frac{1}{\sigma \sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} ; -\infty < x < \infty 
\]  
(7.1)

2. Cost function for this application is the bilinear form

\[
 c(x) = \begin{cases} 
 c_1(\mu - x); x < \mu \\
 c_2(x - \mu); x > \mu 
\end{cases} 
\]  
(7.2)

which is illustrated in Figure 7.1.

This means that there is a cost involved when the actual profit is more or less than the forecast profit. This cost refers to the cost associated with imperfect forecasting. The costs in this study may include time, effort wasted, opportunity loss, penalty loss, and also not being able to invest in fixed assets, projects and profitable contracts.

Then, decision analysis is based on minimising the expected cost

\[
 E(c(x)) = \int_{-\infty}^{\infty} c(x) f(x) dx 
\]

\[
 = \int_{-\infty}^{\mu} c_1(\mu - x) \frac{1}{\sigma \sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} dx + \int_{\mu}^{\infty} c_2(x - \mu) \frac{1}{\sigma \sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} dx 
\]  
(7.3)
The loss function \( c(x) \) can be bilinear, as in our analysis, or of some other unspecified form. The bilinear cost function shows a proportionate increase in cost with the difference between actual and forecast performances. This is true for both sides of the relationship, \( x > \mu \) and \( \mu > x \). However, it does not assume symmetry unless \( c_1 = c_2 \) above.

To evaluate equation (7.3), we make the substitution

\[
y = \left( \frac{x - \mu}{\sigma} \right)^2 \quad \Rightarrow \quad dy = \frac{2}{\sigma^2} (x - \mu) \, dx
\]

in both integrals, so that

\[
E\{c(X)\} = \int_{-\infty}^{c_1} \frac{\sigma^2}{2\sqrt{2\pi}} \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{y}{2}} \, dy + \int_{c_2}^{\infty} \frac{\sigma^2}{2\sqrt{2\pi}} \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{y}{2}} \, dy
\]

\[
= \frac{(c_1 + c_2)\sigma}{2\sqrt{2\pi}} \int_{0}^{\infty} e^{-\frac{y}{2}} \, dy
\]

\[
= \frac{(c_1 + c_2)\sigma}{2\sqrt{2\pi}} \left[ -2e^{-\frac{y}{2}} \right]_{0}^{\infty}
\]

\[
= \frac{(c_1 + c_2)\sigma}{2\sqrt{2\pi}}
\]

where \( c(x) = \begin{cases} c_1(\mu - x); x < \mu \\ c_2(x - \mu); x > \mu \end{cases} \) and \( X|\mu, \sigma \sim N(\mu, \sigma^2) \)

This clearly illustrates how, under the assumption of a normal distribution and bilinear loss function, the expected cost of inaccurate forecasting is directly proportional to the standard deviation of the predictive distribution.
7.3.4 Feedback issue

Feedback from distributing forecasts before implementation may affect company policy and hence actual profits. Consequently, what was an excellent forecast might subsequently differ substantially from the actual observed value. This bias can cause problems when assessing the effectiveness of forecasting procedures.

Suppose the point prediction for a cash flow surplus is £3000 but an actual surplus of £4000 is achieved. It is also discovered that just before implementation, there was an intervention by the managing director or vice-chancellor who injected the cash flow surplus forecast. Hence the actual surplus is given by \( y = x + \partial x \) where \( x \) is the surplus that would have been observed without feedback and \( \partial x \) is the feedback element. The prepared forecast was \( \hat{x} \approx x \), which ignored the effect of feedback.

As far as the preparers are concerned, they have forecast to the best of their ability but because the managing director or vice-chancellor, in the case of the University, intervened, this causes the results to differ from the forecasts. This is not the fault of the preparers. Therefore, these differences are also relevant costs that must be accounted for when forecasts are seemingly not achieved.

Top management tends to intervene and change forecasts at the last minute when there is a need, especially when new information is learned that might affect the future. This involves the cost of forecasting, and when forecasting for sales, management should be aware that forecasts might not affect actual sales but it might affect other areas or organisations, like banks, creditors and shareholders.
It is interesting to ask what the cost of forecasting is. Preparing forecasts must influence companies' actions otherwise they would not forecast. When preparing forecasts, the preparers must have in mind that it is not just for the purpose of preparing, say, sales forecasts and that they also have effects on sales performance. Other factors may also be affected, such as credibility of the organisation, funding applications and utilisation. A sales forecast will give an indication as to the stability of the organisation to cope with any changes or considerations for investment and purchase of lease of fixed assets, product development and diversification. Remuneration packages, including bonus and benefits, may also be reflected as sales forecasts give indications as to whether there are any potential revisions of initial forecasts.

Since forecasting considers the future, which is usually unpredictable, any incidences of unexpected outcomes should be precautioned and any remedial actions should be recommended. These initiatives are taken so that organisations will be ready to face the future. Any strong form of information, available at the last minute, may force the organisation to change forecasts abruptly. It is at this point that top management intervenes to allow forecasts to reflect reality. As events like this may be difficult to measure, the use of modelling will be a helpful support tool for guiding calculations.

7.4 EXPLANATIONS FOR AND COST EFFECTS OF IMPERFECT FORECASTS

To explain the cost implications of imperfect forecasts, we now consider these in the context of service industries and then for manufacturing and trading.
7.4.1 Service industries

For service industries, there are various indicators that can be used to measure performance, such as patients per day for hospitals, customers per hour of service utilities and passengers per destination for the flight industry, to name a few. In our case, we consider the university scenario in terms of student numbers as a performance measure. If the actual number of students is more than the forecast number of students, there is a need for extra logistics, including space, rooms, lecturers, time-tableing, accommodation, computer facilities and administration. The quality of teaching and success of graduates might be compromised because of mass production. There will be more drop-outs and a higher failure rate which will affect the image of the university.

While universities commit themselves to provide facilities for the extra students, it may be for the short-term only. There will be insufficient budget available to sustain over-capacity as a result of inefficiency on the part of management not being able to forecast and cater for extra students.

However, if the actual number of students is less than the forecast number, this results in under-capacity, as facilities are under-utilised or idle. The university over-pays the lecturers in terms of salary per student and so the marginal cost per student is higher.

The whole idea of this modelling is to arrive at not just effective and efficient solutions to account for and minimise the total loss, but also to be aware of situations and consequences arising from inaccurate forecasting.
7.4.2 Manufacturing and trading industries

In the manufacturing and trading industries, if actual profits are more than forecast profits, liquidity will be at stake as working capital may be too tight to cover current liabilities. This also affects bank balances and the company concerned might need to look for more funding. More fees are involved and terms for credit must be sought for both debtors and creditors. This might cause inconveniences, a need for new terms and delays in granting extra terms.

In manufacturing, availability of raw materials and readiness of direct labour to work extra hours to cover for extra demand or extra sales would be compromised. Moreover, productivity and efficiency might also be affected and quality control might be jeopardised due to mass production or mass sales. This might mean squeezing the workforce to cater for the unexpected increase in sales and production, also causing increased step-fixed costs as more supervision overheads are required.

There will also be reductions in holding stocks, as any extra units required may eat into buffer stocks. The business might be over-trading and since the Economic Order Quantity (EOQ) will be affected, reorder costs will increase and stock levels will fluctuate severely. In the short-term while you have accommodated for increases, it may turn out that it will cost you more in the long-term as you will be tied up with the extra capital expenditure committed.

The fixed overhead cost per unit is reduced because more units absorb the same amount of fixed costs, which will therefore increase the profit per unit. The business may compromise on customer demands as it needs to reorganise existing supplies with new ones, to gain confidence from new customers.
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If actual profit is less than forecast profit, the business will then be under-capacity. This means that the fixed overhead cost per unit is more as fewer units absorb the fixed overheads. This will reduce the per unit profit. The holding stock may be too high because storage costs increase to keep unsold stocks. Idle capacity is inevitable as labour is idled, and raw materials are kept above stock levels causing extra storage and extra handling costs.

7.4.3 Monetary implications for student numbers

In explaining the cost factors in terms of units as above, and retaining the theme of our case study, the following illustration presents the cost and revenue implications for a typical school at a university. We let $x$ be the actual number of students and we let $\mu = \hat{x}$ be the forecast number of students.

Firstly, we show the typical relative income and cost per student in Table 7.1 (Drury, 2001; Lucey, 1996), scaled for easy and standard comparisons.

Table 7.1 – STATEMENT OF NET INCOME PER STUDENT

<table>
<thead>
<tr>
<th>No.</th>
<th>Particulars</th>
<th>£ (Average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Income per student per year (proportion of fees and grants as allocated to each student)</td>
<td>1000</td>
</tr>
<tr>
<td>2.</td>
<td>Variable cost per student: (typically 40% of the total cost) - teaching, resources, maintenance</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td>Net income per student</td>
<td>660</td>
</tr>
</tbody>
</table>

We then present the break-even chart, Figure 7.2, based on the scales given in Table 7.2, to indicate the total income and costs for different numbers of students. The
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Figure 7.2 - BREAK-EVEN CHART OF STUDENT NUMBERS AGAINST TOTAL INCOME AND COSTS

Table 7.2 - INCOME STATEMENT SHOWING SCALES OF STUDENT NUMBERS AGAINST INCOME AND COSTS

<table>
<thead>
<tr>
<th>Level of activity:</th>
<th>1</th>
<th>300</th>
<th>400</th>
<th>500</th>
<th>700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>£</td>
<td>£</td>
<td>£</td>
<td>£</td>
<td>£</td>
</tr>
<tr>
<td>Less: Variable cost</td>
<td>1000</td>
<td>300000</td>
<td>400000</td>
<td>500000</td>
<td>700000</td>
</tr>
<tr>
<td>Contribution</td>
<td>660</td>
<td>198000</td>
<td>264000</td>
<td>330000</td>
<td>462000</td>
</tr>
<tr>
<td>Less: Fixed cost</td>
<td>260000</td>
<td>260000</td>
<td>260000</td>
<td>260000</td>
<td>260000</td>
</tr>
<tr>
<td>Net income</td>
<td>-259340</td>
<td>-62000</td>
<td>4000</td>
<td>70000</td>
<td>202000</td>
</tr>
</tbody>
</table>

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chart gives the break-even point at which number of students the performance starts giving profits or surpluses.

The following terms define corresponding parts of the graph:

A Break-even point
B Losses range
C Profits range

In operating the break-even analysis, the following assumptions are used up to 700 students:

1) Income and variable costs per student are fixed up to 700 students;
2) Fixed costs remain constant;
3) The only factor affecting change in income and costs is change in number of students.

The calculation for the break-even point is given as follows:

Break-even point (number of students)

= Fixed costs/ Contribution per student
= £260000/£660
= 394 students

Secondly, we show the effect on cost when the actual number of students is less than forecast, i.e. \( x < \mu \). For example, we might forecast 2000 students and only register 1000, so \( x = 1000 \) and \( \mu = 2000 \). We would expect the
number of students forecasted based on input from offers made by admissions and from interviews to turn up, but in reality not all may do so. In this case, there will be an apparent loss from the actual business that could bring in the income, the effect of which is shown in Table 7.3 in terms of costs per student.

Table 7.3 – STATEMENT OF NET INCOME SHOWING THE EFFECT OF $x < \mu$

<table>
<thead>
<tr>
<th>No.</th>
<th>Particulars</th>
<th>£ (Average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Loss of revenue per year (proportion of fees and grants as per allocated)</td>
<td>-1000</td>
</tr>
<tr>
<td>2.</td>
<td>Savings in variable costs</td>
<td>+340</td>
</tr>
<tr>
<td></td>
<td>Unavoidable fixed costs</td>
<td>-510</td>
</tr>
<tr>
<td></td>
<td>Loss of return on investments</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>Net cost per student</td>
<td>-1180</td>
</tr>
</tbody>
</table>

The above effect shows the hidden costs that are involved when there is under-utilisation. We assign a measure to indicate inability to make investments due to loss of revenue per student. The possibility of investment is hindered as income due becomes less. This is also called cost of under-utilisation.

Thirdly, we look at the other alternative, which is $x > \mu$. The outcome of this is presented in Table 7.4.
Table 7.4 - NET INCOME STATEMENT SHOWING THE EFFECT OF $x > \mu$

<table>
<thead>
<tr>
<th>No.</th>
<th>Particulars</th>
<th>£ (Average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Increase in revenue per year</td>
<td>+1000</td>
</tr>
<tr>
<td></td>
<td>(proportion of fees and grants as per allocated)</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Increase in costs</td>
<td>-850</td>
</tr>
<tr>
<td></td>
<td>Measure of cost of over-utilisation</td>
<td>-500</td>
</tr>
<tr>
<td></td>
<td>Net cost per student</td>
<td>-350</td>
</tr>
</tbody>
</table>

It can be seen from the above that the increase in revenue as a result of more students than expected will increase costs of running the courses, for example more resources needed. There is also the factor of over-utilising these resources and a measure for this is given. The end effect of this results in a net cost, instead of a gain.

Finally, we show the effect of $x = \mu$, i.e. when actual is equal to forecast, depicted in Table 7.5 below.

Table 7.5 - STATEMENT OF NET INCOME SHOWING THE EFFECT OF $x = \mu$

<table>
<thead>
<tr>
<th>No.</th>
<th>Particulars</th>
<th>£ (Average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Income per student per year</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>(proportion of fees and grants as per allocated to each student)</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Variable cost per student:</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td>(typically 40% of the total cost)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- teaching, resources, maintenance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Net income per student</td>
<td>660</td>
</tr>
</tbody>
</table>
When the actual number of students equals the forecast number, the net income per student is assured and the organisation proceeds as planned with minimum adjustments.

The above alternative illustrations were based on one student scenario. By having different ranges of student numbers, the end result for the net income will be different, as fixed costs will come in. If there are more students, the fixed cost per unit will reduce as these students share the fixed cost amount. Hence, one might consider extending the bilinear loss function to a biquadratic form to reflect this non-linearity.

7.5 APPLICATION OF DIFFERENTIAL EQUATIONS

As forecasting partly involves assessing functional relationships between variables, some mathematical modelling of rates of change of profits etc. with respect to specified predictor variables might prove beneficial. We have already mentioned regression models and time series analysis in this context. However, ordinary and partial differential equations are also suitable for this purpose, as they represent the rates of change of response variables with respect to changes in one or more explanatory variables. For our study, these variables are to be identified and quantified. Graphs showing these representations can then also be drawn. In this section, we illustrate the development and application of simple differential equations to particular aspects of profit forecasting, in order to demonstrate their potential for more general use in related areas.
7.5.1 University setting

There are various angles from which forecasting can be viewed and, for illustration purposes, we choose to use the university scenario. From the perspective model of the forecasting logic for a university (Figure 6.2 in Chapter 6), we identified the components of the basic questions of 'what, when, who, why and how' relating to forecasting. Then by testing for significant associations between factors gathered from the questionnaire analysis, we identified the key variables of hierarchy levels, users, preparers, times and sizes of unit. We also observed that forecasts prepared are the output of communication and teamwork. These forecasts may take the following form:

1. student numbers (intake and graduates)
2. resources and equipment
3. teaching loads
4. research exercise results
5. entrepreneurship

The above types of forecasts can be associated with income and costs among other factors that may be involved. For the purpose of illustration, let us analyse the relationship between student numbers and tuition fees payable by students. When tuition fees are low, we would expect that the number of students will go up, since many people can afford low fees. On the other hand, when tuition fees are high or when they increase, student numbers will be compromised. There are many possible functions that might be suitable for modelling the association between tuition fees and numbers of students, as illustrated in Figure 7.3. The mechanism of this relationship is explained using a differential equation as given below.
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Let

\[ y = \text{‘number of students enrolling’} \]
\[ x = \text{‘tuition fee payable per student’} \]

Then \( y \) is inversely related to \( x \), and so we now raise the question of how this relationship is represented mathematically. Figure 7.3 depicts two possible models for the inverse relationship, which satisfy these criteria, subject to arbitrary scaling on both axes.

**Figure 7.3 - POSSIBLE MODELS FOR DEPENDENCY OF \( y \) ON \( x \)**

![Graph showing possible models for the inverse relationship between \( y \) and \( x \)]

We now investigate this scenario from first principles to determine the most suitable function for modelling this dependency. If \( x \) is small, then an increase in \( x \) will reduce \( y \) substantially, so \( \frac{dy}{dx} \) is large (though finite) and negative. Conversely, when \( x \) is large, then a change in \( x \) will hardly affect \( y \), so \( \frac{dy}{dx} \) is small and negative.

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such that \( \frac{dy}{dx} \to 0 \) as \( x \to \infty \). Moreover, it is reasonable to suppose that \( \frac{dy}{dx} \) is a concave function of \( x \) for simplicity, which implies that

\[
\frac{d^3 y}{dx^3} < 0
\]  

(7.7)

for all \( x > 0 \) in this context. Restricting likely functions to just two parameters for reasons of parsimony, there are two obvious candidates:

(i) \( \frac{dy}{dx} = -\frac{a}{1 + bx} \) for \( a, b > 0 \) (7.8)

(ii) \( \frac{dy}{dx} = -ae^{-bx} \) for \( a, b > 0 \) (7.9)

(so that \( dy/dx = a \) when \( x = 0 \) for both (i) and (ii))

Both are similar in appearance as depicted in Figure 7.4, which shows the functions of \( dy/dx \) in terms of \( x \) for the cases where \( a=b=1 \).
Figure 7.4 - ALTERNATIVE MODELS FOR DEPENDENCY OF \( dy/dx \) ON \( x \)

(i) In the first case, we solve this first order ordinary differential equation to obtain

\[
y = \int \frac{-a}{1 + bx} \, dx = c - \frac{a}{b} \ln(1 + bx) \tag{7.10}
\]

for \( x > 0 \) with \( a, b > 0 \). On re-defining \( a \) to be \( a/b \), this function simplifies to

\[ y = c - a \ln(1 + bx). \]
(ii) In the second case, we solve this first-order ordinary differential equation to obtain

\[ y = \int -ae^{-bx} \, dx \]

\[ = \frac{a}{b} e^{-bx} + c \]  

(7.11)

for \( x > 0 \) with \( a, b > 0 \). On re-defining \( a \) to be \( a/b \), this function simplifies to

\[ y = ae^{-bx} + c. \]  

(7.12)

Notes:

(i) Since \( \ln(1+bx) \to \infty \) as \( x \to \infty \), \( y \) goes negative for large \( x \) and so we would truncate the first function thus:

\[ y = \begin{cases} 
   c - a \ln(1 + bx) & ; \quad 0 < x < \frac{1}{b} \left( e^{1/a} - 1 \right) \\
   0 & ; \quad x > \frac{1}{b} \left( e^{1/a} - 1 \right)
\end{cases} \]  

(7.13)

(ii) Since \( y \to c \) as \( x \to \infty \) for the second function, we set \( c=0 \) for general applicability, giving

\[ y = ae^{-bx} ; \quad x > 0 \]  

(7.14)
Due to the smooth nature of $y$ and existence of two parameters rather than three, we regard (7.14) as a suitable model for the relationship between student numbers and tuition fees. This corresponds with one of our two suggestions in Figure 7.3.

Note that, for this model,

$$\ln y = \ln a - bx$$

$$= c + dx$$

(7.15)

where $c = \ln a$ and $d = -b$. Hence, we might use simple linear regression and the methods of least squares to estimate these parameters from data, with $\ln y$ as the response variable, rather than $y$ itself.

### 7.5.2 Industry setting in general

Let us now shift our focus and apply differential equations to a more general setting with an intention to value the cost of forecasting, in terms of a monetary value. The rationale for doing this is to establish the hidden costs, which are not usually reflected or reported anywhere. We can often associate time spent and effort contributed in the forecasting function but what about the price?

For illustration purposes, let us use the university scenario and consider one of the key variables identified in Chapter 6 (Case study: forecasting at the University). We asked the respondents, in the questionnaire, how forecasting is valued. The majority responded that there is no cost involved and that it is part of their salary. There were a few who specified a monetary value, which was based on a rough and very subjective guess. No external experts are employed because they feel they are more confident and competent to be doing their own forecasting as this function involves internal information, which is thought to be confidential. Yet no cost of forecasting is charged in the profit and loss account as the salaries have been included.
We now consider one of the key variables given in Chapter 6, size of units in terms of annual income, and relate this to a factor of direct dependence, annual salary of respondents. To recap, Fisher's exact test showed that these two variables have significant association, with a p-value of 0.00. Since the response in our questionnaire is binary, the annual income is either up to £5 million or between £5 million to £10 million, and the annual salary of the respondents is either up to £40,000 or more than £40,000. The cross-tabulation of these two variables shows (Appendix 6.3 on page 312) that units with an annual income of up to £5 million pay each of their forecasting employees no more than £40,000 annually, whereas units with an annual income of £5 million to £10 million pay more than £40,000 annually. These salaries are not paid for the work of forecasting only. In order to calculate the cost of forecasting, we use the salaries as a basis. We can see that the people involved are relatively highly paid as they sit on the higher echelons of management. They are well educated with a fair amount of training and experience. This shows the difference in the salary range, being the dependent variable, with respect to size of the unit, being the independent variable.

What we are trying to demonstrate is that the salaries paid to people involved in the forecasting function increases from smaller units to larger ones. In other words, smaller units pay lower salaries and larger units pay higher. This could be due to the fact that a company, for example, is in a smaller town so the cost of living there is lower. The employee concerned originates from that town and is satisfied with where he is and with the salary he gets. On the other hand, larger units may probably need more people who are more experienced and hence offer higher salaries to cope with higher turnover and higher demands.

We now model the above situation using the following notations and assumptions.
For a specified forecasting function, let

\[ y \] be the forecasters' salaries

and let

\[ x \] be the level of annual income or turnover

We assume that when there is no income, the salaries will still need to be paid, so the curve relating \( y \) to \( x \) starts above the origin on the vertical axis. This amount remains roughly constant, with a gradient of about zero, for a low level of income until it reaches a higher amount where the salaries will start to increase, as more people are employed to cope with higher income. Moreover, the increase in \( y \) is asymptotically a linear function of \( x \), so that forecasting costs are a fixed proportion of turnover, at least for this first-order model. The functional form deemed suitable for modelling the behaviour of these variables is inspired by Percy (1993), who analysed intrinsic weight gain for an experiment involving drying and humidity in pipe laggings. The function used in this experiment was based on differential equations and takes the following form

\[
y = \frac{ax}{2} - \frac{b}{4}(3 - e^{-\frac{ax}{b}})(1 - e^{-\frac{ax}{b}})
\]  

(7.16)

for unknown parameters \( a \) and \( b \).

The graph to depict this form is reproduced in Figure 7.5.
We can now consider how this function might apply to our setting. To illustrate the behaviour of salaries and annual income, we reproduce the above equation in our context by adding $\frac{3b}{4}$ to $y$, offering the following form

$$y = \frac{ax}{2} + be^{-\frac{ax}{b}} - \frac{b}{4}e^{-\frac{2ax}{b}}$$

(7.17)

The above function is convex increasing with $\left[\frac{dy}{dx}\right]_{x=0} = 0$ and is asymptotically linear with intercept at the origin. This curve is depicted in Figure 7.6.
We now verify the properties of the derivatives for the above function. The first derivative is

\[
\frac{dy}{dx} = \frac{a}{2} - ae^{-\frac{ax}{b}} + \frac{a}{2} e^{-\frac{2ax}{b}}
\]

Hence

\[
\left[ \frac{dy}{dx} \right]_{x=0} = 0
\]

(7.19)

so the gradient is zero at \( x = 0 \). Also,

\[
\left[ \frac{dy}{dx} \right]_{x \to \infty} \to \frac{a}{2}
\]

so the gradient tends to \( \frac{a}{2} \) as \( x \to \infty \).
The second derivative is

\[
\frac{d^2 y}{dx^2} = \frac{a^2}{b} e^{\frac{ax}{b}} - \frac{a^2}{b} e^{\frac{2ax}{b}} \\
= \frac{a^2}{b} e^{\frac{-ax}{b}} (1 - e^{\frac{-ax}{b}})
\]

(7.20)

\[> 0 \ \forall x \ (\text{since } a, b > 0)\]

so \( y \) is convex.

The model shows how salaries shift with sizes of units or companies. The above procedures offer descriptions of how one factor can affect another. By doing this, management will have better insights into understanding the behaviour of two factors at a time. Thus, the management will be more aware of what factors can be vulnerable in forecasting scenarios so that more attention can be paid towards the variables concerned.

7.6 CONCLUSION

Modelling in our case attempts to describe the mechanism of relationships between variables that operate in practice. In demarking the selected variables, we use the law of parsimony or Occam’s Razor in that the model includes only required and important variables and does not include all reasonable predictor variables automatically. It should also be noted that parsimony is a principle in science where the simplest answer is always preferred.
Several aspects constitute the modelling process. We first saw how single point estimates or predictions can be improved by assigning probability distributions to describe variations that may be possible, hence increasing the reliability and credibility of the forecasts. Then, we saw the measure of loss functions as a result of imperfect forecasts and how it can be quantified, using Bayesian decision theory, according to whether actual results are less than forecast or vice-versa. It could be seen that even the feedback issue has a large impact on the forecasts as they may be changed at the last minute due to unforeseen circumstances.

The effects of imperfect forecasts were also explained for both service industries, and manufacturing and trading industries. The cost factor came in as a break-even analysis and differential equations were introduced to render the whole modelling aspect complete. They give a clearer perspective of empirical evidence cultured with mathematics and functional relationships objectively. It can be seen that outcomes of improved teamwork and decision making, for example, are related in this way.

Last but not least, we show that these differential equations are applicable in almost all aspects of associating variables and changes in behaviour patterns for related variables. In order to get a total picture of the whole research, the next chapter will summarise and present an overview of our work. It will also reflect on the impact of our studies upon business and will offer recommendations for future research work. It will also lead us into appreciating how the theory is actually applicable in practice.
8.1 INTRODUCTION

In chapters 4, 5 and 6, we presented information about the three types of study that we have carried out. In addition, in Chapter 7, we modelled the responses and associations of respective variables in explaining the costs of under and over-forecasting as well as explaining the effects of changes certain variables upon the relevant response variable. We then came up with some original propositions and set out to confirm our interpretations with our respondents, by carrying out a follow-up survey.

This chapter presents detailed information about the follow-up survey with respect to the following:

a. Areas examined  
b. Details of respondents  
c. Analysis of responses  
d. Interpretations

What we hope to find is that the results of this follow-up survey reinforce our propositions given in earlier chapters as we try to gain insights into the practice of
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forecasting. In this way, we attempt to highlight any peculiarities and inconsistencies between the theory and practice.

8.2 PROPOSITIONS

In an attempt to understand the behaviour patterns and effects of the variables influencing forecasting practice as identified, from the postal survey and case study, we came up with the following subjective interpretations.

8.2.1 Postal Survey

We justified the choice of seven (7) variables, as listed below, in analysing our data in the postal survey and subject them to logistic regression that produced significant associations with the related predictor variables; the interpretations of which are given:

Accuracy
There is a tendency that when forecasts are prepared for analysts rather than for the purposes of meeting budget requirements, as a guidance to run and operate activities, for the market place and brokers, the forecasts are not as accurate. As time is given for feedback on the forecasts, the accuracy of the forecasts increases.

Forecast optimism
Companies with more products tend to over-estimate profits. As a result, they are more likely to use computers as they need efficient and better information systems in order to obtain accurate forecasts.
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People involved in forecasting
When preparing forecasts for analysts, there is less emphasis on the people involved in forecasting as the analysts are better aware of what to do with the information provided. Therefore, people are an important factor in the forecasting function.

Time given for feedback before implementing forecasts
As time is given for feedback before implementing forecasts, the forecasts tend to be more accurate.

Type of business
With consumer goods, there is a tendency to employ more staff. This requires more resources to communicate information, which increases the costs of implementing forecasts.

Sales turnover
By having increased sales, more emphasis is placed on preparing profit forecasts as guidance for business operations. This is because companies need to exercise greater control over larger amounts of sales.

Number of employees
The number of employees depends on the nature of the business. There is a tendency towards employing more staff in a consumer goods company and fewer employees in a non-consumer goods company, for example, service and manufacturing.

8.2.2 Case study

We observe that preparers are also users at the University of Salford and that the University does not employ any external experts to do its forecasting. There are

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other crucial factors, besides forecast accuracy, that are deemed to be of priority. These include who is involved in the forecasting function; what are their designations, background, experience and training? In addition, further considerations must be given to forecast performance, including forecast optimism and utilisation of resources available.

The case study indicates that the key variables showed significant impacts on the general practices of forecasting in the University and qualities of people involved.

We observe that several activities depend on how managers frame their decisions and thereafter implement them. Both the system and people play important roles in realising the objectives of an organisation through planning and forecasting. In essence, those roles may sometimes conflict but are usually overcome through an organized structure; this is where mathematical models are appropriate.

This case study raises the awareness of knowing what the criteria for successful forecasting are; for example resources like people, times, methods and other qualitative issues.

It can be seen that all respondents agreed that variations are possible. Different strategies and actions affect the rates of change between certain variables; for example whether size of unit affect salaries.

8.3 AREAS EXAMINED

In the follow-up survey, we ask complimentary questions via postal questionnaires to validate our interpretations in Chapters 5 and 6, also our modelling in Chapter 7.
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The sample questionnaire given is as per Appendix 8.1. The questions we ask cover the following issues:

a. Use and familiarity of forecasting techniques  
b. Forecasting preparation and use of computers  
c. Forecasting problems and forecast improvement

These issues have been raised in the literature as they often pose inconsistencies and continue to be unresolved. The literature indicates that despite various available advanced and sophisticated forecasting methods, the practice prefers simple and easy-to-understand methods. The practitioners are familiar with most methods but these are not put into much use, unfortunately. The literature encourages probing into what the practice is like, what problems practitioners face and what improvements might be useful.

8.4 DETAILS OF SAMPLE AND RESPONDENTS

The sample comprises respondents who participated, as usable responses, in our earlier investigation. We sent out a total of one hundred questionnaires. These respondents are companies’ executives (80 in number) and Salford University’s management (20 in number). As an incentive, we offered a small token to show our appreciation in the hope that they will return our questionnaires, this being inspired by Cui (2003).
8.5 ANALYSIS OF RESPONSES

A total of sixteen usable responses, comprising of nine (9) staff from the University's top management and seven (7) companies executive officers, were received and the frequencies of individual answers are given in Appendix 8.2. Seven respondents returned blank questionnaires, giving reasons such as addressee no longer employed and company ceased operations or merged with another business. We now analyse the questionnaire according to our propositions identified earlier.

8.5.1 Use and familiarity of forecasting techniques

We asked the respondents whether they use several forecasting methods. Nine out of sixteen respondents said that they use naïve time series methods; seven out of sixteen use trend exploration time series and exploration technological methods; none uses econometric methods or multiple regression methods or state space models. At least three use other methods such as expert systems, neural network, life cycle analysis and simulation.

As for familiarity, eleven out of sixteen respondents are familiar with life cycle analysis methods of forecasting but only five of them use this approach in practice.

It is clear that most of the respondents are familiar with most of the methods but only a few respondents use them in practice. More than seven of the respondents indicated that they are familiar with the following:

a. Qualitative methods:
   i. Technological - exploration method
   ii. Technological – normative method
   iii. Subjective assessment - decision trees
iv. Subjective assessment - sales force estimates
v. Subjective assessment – juries of executive opinion
vi. Subjective assessment – anticipatory surveys and market research
vii. Subjective assessment – customer expectations

b. Quantitative methods:
   i. Time series – naïve method
   ii. Time series – trend exploration
   iii. Time series – smoothing

c. Other formal forecasting methods: combination of qualitative and quantitative methods
   i. Expert systems
   ii. Neural networks
   iii. Life cycle analysis
   iv. Simulation

The analysis shows that only four and five out of sixteen respondents are familiar with econometric and regression methods respectively. However, none use them in practice, so we explain to the practitioners how these methods can be used to explain behaviour of relationships between variables, as shown in Chapter 7 earlier.

8.5.2 Forecast preparation and use of computers

Nine out of sixteen respondents indicated that they prepare profit forecasts and human resources forecasts, eight prepare sales forecasts and seven prepare market forecasts. There were three respondents who prepared other forecasts such as cash flow and management information for not-for-profit organisations.
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Eleven of the respondents prefer to use simple methods and only four prefer advanced methods. Among the reasons given by respondents for preferring simple methods over the advanced ones are:

- Ease of use and understanding
- Best for simple businesses
- Easier to get others to contribute
- Easier to explain outcomes
- Easy to incorporate human inputs
- Less prone to mis-interpretation
- Simple to understand for contributors

On the other hand, one respondent indicated that it is not easy to choose between simple or advanced methods. The approach to use depends on what is needed or which is appropriate in the circumstances.

Only four out of sixteen respondents prefer advanced methods, the comments given for these methods are as follows:

- Best for complicated businesses
- Detailed forecasts may require a certain degree of sophisticated forecasting methods
- They may be difficult to explain to others
- They might give more accurate results
- They might be necessary in complex business situations
- They might pull you into a false share of intellectual genius
- Sophisticated methods can give a false impression of accuracy

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We then asked whether the respondents are satisfied with the current methods of forecasting used. Seven said yes, another seven were neutral and one said no, while one did not respond. The ones who said yes gave the following comments:

- Accurate results
- Experience tends to bear out forecasts
- Good degree of accuracy
- Methods used across the group as merited by circumstances
- They are understood, appropriate and work
- They work accurately enough

The respondents who were neutral had the following comments:

- Based to some extent on custom
- Can always improve – speed of preparation, accuracy etc.
- They do most of what is needed but improvements could be made
- They produce regular forecasts within required time parameters but could be better understood
- Would benefit from greater input from schools and faculties in relation to market information and competitor analysis

We also asked respondents if they are satisfied with the communication and feedback system relating to forecasts, in their organisations; only four said yes, five said no, six were neutral and one did not respond. We then asked why and the general comments given were as follows:

- Provides information
- Enhances accuracy of forecasts
- Has worked well for some years

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- Shows trends

Thirteen out of sixteen respondents indicated that they use computer software to prepare their forecasts, such as Excel and SPSS. Out of these, only two use software developed internally.

Nine out of sixteen respondents tend to rely, with high priority, on computers for forecasting. Ten respondents indicated that they need efficient and better information systems. In using forecasting software, the features ‘ease of use’ and ‘easily understandable results’ are priorities for thirteen respondents; these accords with the findings by Sanders and Manrodt (2003). However, a low cost of maintaining forecasting software is not a priority for most of the respondents.

8.5.3 Forecasting problems and forecast improvement

Eight respondents indicated that the biggest challenge in their forecasting function is to obtain sufficient data to produce accurate forecasts. More than nine agreed that the following criteria would ensure better forecasting practice:

i. Better training and exposure for the people involved in forecasting
ii. Better coordination of accounting and forecasting methods
iii. Proper documentation of procedures to support forecasting practices.

Twelve out of sixteen respondents agreed that giving time for feedback on forecasts prepared improves forecast accuracy.

We stated in our questionnaire that single forecasts would almost certainly be wrong. In order to make forecasts more reliable, more than eight out of sixteen respondents agreed to consider using simple formulae to allow for the uncertainty of forecasts, by

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specifying confidence limits and assigning probabilities for forecasts. Thirteen out of sixteen respondents do not perform any cost-benefit analysis of under- and over-forecasting to avoid unnecessary errors and inefficiencies.

### 8.6 RECOMMENDATIONS OF BEST PRACTICES FOR FORECASTING

Though accuracy is the summit in any forecasting exercise, there are also other issues that support achieving accuracy. Despite various calls from current literature to shift emphasis in researching in forecasting practice as a move to complement improving forecasting methods, our observation of the practice reveals that there has not been much change over time. As we saw the various angles of forecasting management that can be examined, we offer the following insights towards best practices of forecasting:

- Though a number of respondents indicated familiarity with methods, they should practise and use those methods. The survey showed a discouraging number of people who are knowledgeable and familiar with the methods but who apparently wasted learning these skills. Our research offers various approaches to study behaviour patterns of factors involved, based on the following:

  - Application of logistic regression to significant associations in providing the link between response variables and other defined variables
  - Assigning of probabilities and distribution functions to enhance point forecasts (Goodwin, 2002)
  - Application of a mathematical model (Percy, 1993) to show how the change in one factor might affect another. This is more objective and can provide a better understanding on the part of the management.
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- We recommend that the organisations carry out cost-benefit analysis in their forecasting function and this is an important tool in business planning as given by much literature; we show an application of Goodwin’s (2002) cost function to account for under- and over-forecasting so that organisations realise how much ‘cost’ is involved if forecast accuracy is not achieved.

- We observe from the literature review and our investigation that computers are much used and therefore proper information systems must be maintained. Also continuous audits in the forecasting practice should be carried out. Better participation by the people involved from various units in the organisation should be coordinated. Better training and education should be made available to the people involved in forecasting.

8.7 CONCLUSION

It can be seen that many alternative forecasting methods are available and practitioners are generally aware of these. However, many of these methods are not commonly used. The simpler methods, e.g. naïve methods seem to attract practitioners more due to ease of use, also because they can understand these methods better, a similar observation found by Sparkes and McHugh (1984).

As previously stated by the literature, present management still fails to recognize the use of forecasting methods and they are contented with the current methods of forecasting that they are using. This finding is similar to those studies of Drury (1990), Fildes (1994), and Duran and Flores (1998). In order to encourage the implementation of better techniques in industrial and commercial settings, we have
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identified a gap in the market for the provision of centralized, short courses on forecasting techniques, perhaps most suitably held at regional universities.

The next chapter concludes and summarises our study. In addition, we offer some insights into the impact on practice and offer suggestions for future research.
9.1 INTRODUCTION

The purpose of this thesis is to observe empirically the current forecasting practice in the U.K. by observing factors that can be associated in the industry and in a service organisation. Our literature review pointed out that even though the practice and research gave a considerable amount of commitment to forecasting to improve accuracy, the result is still disappointing. This problem could be due to several reasons, as given in Chapter 2 and several studies showed that organisational considerations are a key influence in such a problem (Galbraith and Merrill, 1996).

By tradition, research in forecasting has emphasised the use of techniques and systems in order to improve forecasting in an organisation. The studies in these areas have attempted to increase the accuracy of forecasts. Nevertheless, it is now apparent that there are other factors, which are just as important, in the development and application of forecasting methods. For managers, a better insight in considering specific factors affecting forecasting may lower costs of having imperfect forecasts.

This chapter is divided into two parts; the first part offers summaries and conclusions from the overall findings of the whole study. The second part presents an overview of the impact on practice and recommendations for future research.
We take up and continue this inspiring research work started by Wheelwright and Clarke (1976) who raised concerns about the practice rather than the methods of forecasting. We also push on from here by looking empirically into practice. We then follow through ‘why and what’ issues as discussed by Ord (1994) in Dawes et al. (1994) relating to forecasting practice, and extend our investigations into further basic questions of ‘who, how and when’, by offering explanations supported by applications of statistical and mathematical modelling and decision theory. In the course of our investigation, we identify other factors, besides those already examined in previous studies that might be of importance to the practitioners, and we then offer another way of understanding the behaviour patterns of these factors in order to improve the forecasting practice.

This research is one that is multi-disciplinary in nature, in that it brings three distinct theoretical areas together into practical use. These areas are as follows:

- forecasting and estimation, and
- statistics, mathematics and decision theory.

The research looks from the inside of management, relating to planning and accounting, in particular budgeting, then links this to forecasting. Noticing the weakness in such procedures, an objective function is included to make the whole process complete, and suitable for practical use, not just for theoretical purposes. The research shows the importance of forecasting and how this is improved with the use of statistical models and mathematics. What the thesis offers are logical explanations of these procedures which are easily understood.

We have seen, in the last eight chapters, how this research is nurtured from a simple idea developed from a broad review of the available literature and how this task
grows into stages of empirical investigation. This then leads to a collection of numerous forms of data and information which are re-coded and processed using exploratory analysis via SPSS and Minitab packages. Findings are then interpreted and supported by statistical and mathematical models before conclusions and recommendations are suggested.

9.2 SUMMARY FROM INVESTIGATIONS

Our literature review reveals numerous studies relating to strengthening of forecasting methods but very few of these emphasise organisational factors and those that influence forecasting practice in order to achieve the objectives of the business. Hence, we attempt to fill this gap with findings from three types of study as briefly described below. What we observe are the forecasting practices and perceptions as portrayed by people involved in forecasting. Upon observing significant associations between selected variables, we extend the results and fit models for a more objective outlook of this research.

9.2.1 Preliminary work and pilot study

Many surveys have been conducted relating to forecasting but very few cover other factors influencing forecasting practice. Our literature review and pilot study raise concerns about these factors being under-explored and our findings show that this is just as crucial as studying forecasting methods.

9.2.2 Postal survey

In the postal survey, it could be seen that depending on the types of forecasts to be prepared, companies should use certain criteria as guidelines in realising their objectives using their forecasts. They should not get overwhelmed by numerous
related factors that can be considered but they should be cautious of any potential causes obstructing their way. A useful tool proposed here is to subject relevant factors to logistic regression analysis so as to quantify the effects of these factors on successful forecasting practice. It will be entirely the responsibility of the experienced management to delineate factors that are likely to influence forecasting practice in order to find significant associations and extend these to further analysis.

It is recommended that in appreciating the factors influencing profit forecasting, companies should be aware of the factors affecting accuracy, forecast optimism, people and time for feedback. In achieving the objectives to deal with these variables, companies should introduce incentives, plan better and be more aggressive.

9.2.3 Case study

The case study provided a single examination of a service organisation; it consolidated the practices of forecasting that are being exercised on site and it shows how the teams work together, what problems they face and how the teams might work productively. It is interesting to learn how the people involved in forecasting appreciate the value of theoretical knowledge but what actually happens in practice may not turn out as expected. Everybody is aware of theories available but very little of this knowledge is actually used in practice, due to impracticality and unsuitability for their situations.

The above conclusions came about from the results of the simple hypothesis tests carried out and research questions raised. In practice, other factors must be consistently checked and companies must keep pace with the latest developments and current issues. In this way, forecasts are achievable, if not 100%, at least near enough. In the case of preparing profit forecasts as seen in the postal survey, there
are certain accounting principles and conventions that must be complied with, which may affect actual operations. Hence, careful considerations must be made to ensure that the preparation and implementation of forecasts are not jeopardised by external and statutory requirements.

On the issue of using forecasting techniques, the reason why sophisticated quantitative methods are not in use at the university is because their forecasting function is sufficiently met by simple forecasting methods, such as naïve model and Excel or spreadsheet models. As many studies in forecasting management have indicated, the practice prefers to use methods that are 'simple to use' and 'easy to understand' (Sparkes and McHugh, 1984; Dalrymple, 1987; Drury, 1990; Sanders and Manrodt, 2003).

The case study offers insights into forecasting practices and perceptions at a single service organization, Salford University, in terms of group work. Here, instead of profits, the University uses the term surplus and as the organization provides tuition, student numbers are used in contrast to making and selling goods in the case of the manufacturers. We look at various mathematical models to describe three issues in forecasting, one of which is the outcome of the group work and communication. We also see the changes effected by differential equations of a single variable. In this case, we considered primarily how tuition fees relate to numbers of students.

The investigation carried out through the three types of study has produced several interesting results. The cross-tabulations showed various orders of practice. For example, non-managers who are preparers of forecasts tend to come from units with turnover of £5 million or below, whereas managers who prepare forecasts tend to come from units with turnover of more than £5 million. This shows that the level of responsibility for preparing forecasts depends on the size of the unit concerned. This

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determines who should prepare profit forecasts, smaller units by non-managers and bigger units by managers.

Reflecting on this research, studying the relationships between variables identified from the questionnaires has shown what areas need particular attention towards achieving successful forecasting practice. To strengthen this observation, suitable models have been introduced so as to gain better understanding of the various behaviour patterns among the variables concerned. These models are logistic regression, Bayesian decision theory, break-even analysis and differential equations.

9.2.4. Follow-up survey

The follow-up survey assists us in validating our propositions that we show from analysing the postal survey and the case study. The respondents are for the idea that we improve the way the practice looks at forecasting practice by observing objectively the behaviour patterns and consider the use of suitable models in enhancing point predictions as recommended by Goodwin (1996) and an application of a mathematical dependency model to show a relationship between two factors (Percy, 1993).

In contrast to the findings in a study by Sparkes and McHugh (1984) about 'the top management's reluctance to learn and use forecasting techniques', we find that our respondents are interested to learn relevant methods suitable for their practice.

9.3 OVERALL SUMMARY

This research looks at results produced in the scenario accessible to us using the chosen methodology in a specified period of time. Therefore, our study is subject to
these boundaries. It must be acknowledged that this study represents only a preliminary investigation of a larger, complex study of behavioural issues in forecasting, which can be very subjective. As such, it establishes an opening upon which future work can be based and further developed. This study has attempted to highlight the importance of behavioural issues that affect the practice of forecasting.

Our investigation offers an improved approach to the methodology, in that we examine three types of study that show and justify linkages between each other. This offers a step-by-step approach before moving into and examining the core issues of this work. Companies should identify and list influencing factors for improved forecasting, then follow the analytical procedures given and delineate significant variables and associations.

The logistic regression and mathematical models that we considered showed that behavioural observations from the samples taken can be described objectively. This theoretical modelling is clearly enhanced with descriptive empirical insights. These explain objectively the behavioural conditions that are subject to combinations of variables. We first tested the association of variables for significances to identify key variables. We expanded and explained the various associations so as to get a clearer picture of the whole scenario at the University.

We then take another step back and associate the number of students with tuition fees. Our analytical generalisation shows that this association can be modelled to give a better representation for this link, through differential equations. If we use other factors interchangeably, then the results will also change. Hence, the associations between selected variables should be selected and tested carefully for further analysis. We also attempted to ascertain the cost of forecasting and associate this with sizes of the units or companies, via differential equations again, to indicate
Chapter 9 - Conclusions and future outlook

the worth of the forecasting function as this is not recorded nor reflected in the financial reports. Among the reasons for doing this are the following:

1) to allocate costs for forecasting in order to determine its cost effectiveness in terms of time spent and effort contributed by employees;
2) to determine whether it is worth preparing forecasts when looking at what actually turns out in reality as opposed to what has been forecast;
3) to identify if forecasts will improve by employing one, two or more employees to prepare forecasts;
4) to ascertain if the organisation should employ external forecasters or train their own in-house employees.

We could see clearly that the models used in this study offer analytical insights into understanding behaviour patterns of factors involved in forecasting practices and how perceptions are also considered.

While this study makes no attempt to generalise findings universally, future research that examines and applies our models onto broader problems empirically will make an important contribution towards the expansion of a generic and integrative model of forecasting practice and perceptions. In this framework, it is especially crucial to take note of different practices of forecasting in different industries, as has only been addressed briefly in this study. Accordingly, a comprehensive attempt to explain the actual mechanism for each type of industry may require identification of different factors and variables for such a framework to make useful comparisons.

Since the main issue raised in collecting data is the confidentiality of information that respondents are not willing to disclose as against the company's policy, we also hope that practitioners might be more open to assist in similar studies so as to get a

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
better picture of practical situations. At least we are aware of how gaps can be closed as far as possible between the theory and practice of forecasting.

9.4 CONTRIBUTIONS

There are several contributions this study offers to existing knowledge. Firstly, the findings generate recommendations for achieving better forecasts and for improving forecasting processes and practices. In this respect, we extend the use of point predictions by using probability models to improve their utility and reliability. We also introduce cost functions to facilitate appropriate decision-making and differential equations to determine the physical dependency between related variables. These features improve the quality of forecasts, making them more reliable and credible.

Secondly, we apply and merge three different disciplines to generate an environment that can lead to better results from forecasting. Here, we introduce mathematical models in management accounting, in particular to budgeting as an objective support to increase its reliability. We also demonstrate how better to understand the behavioural patterns of influential factors for successful forecasting practice by using Fisher's exact test, logistic regression and differential equations.

We introduce a different combination of styles for our research methodology; firstly a pilot study, then a postal survey and case study, finally a validation survey. These styles are inspired by a review of several previous studies in accounting, management accounting and forecasting. Then, we attempt to fill in the gap of understanding more about the behavioural aspects of forecasting to complement other capabilities for developing and applying forecasting methods. As a continuing effort to bridge the gap between theory and practice, this study provides fundamental
principles of forecasting procedures that an organization must be aware of and not take for granted. With this in mind, the people involved, who are the preparers and users, will be able to foster better relationships in appreciating the use of more reliable forecast estimates. That this is so, is clearly demonstrated by the logistic regression analysis in the postal survey and the application of Bayesian decision theory for the case study.

Our findings attempt to open up ideas for valuing the importance of working on reliable forecast estimates even though inaccurate forecasts are inevitable when hoping for better co-ordination and communication among people involved in the organisation.

Gaps in the forecasting process must be closed so that forecasting can be made more effective (Drury, 1990). Numerous studies have been done but theory and practice still differ. Our intention is that this gap narrows as far as possible. In identifying the differences between our study and those already published in the literature, we remark that our study emphasises behavioural aspects behind forecasting methods, which generate much academic debate (Mahmoud et al., 1992; Winklhofer et al., 1996; McHughes, 2001; Fildes and Hastings, 1994; Drury, 1990; Galbraith and Merrill, 1996). Even though the existing literature recognizes the importance of behavioural issues, it fails to elaborate. So, here we list and organize in detail, with few exemptions, what these behavioural issues cover:

i. who, what, why, when and how;
ii. qualities of people involved in the forecasting process

The present literature highly recommends behavioural aspects and that managers and employees involved should learn forecasting methods, but no emphasis is made on...
the qualities of the people involved. Our contribution in this respect is to show otherwise.

In addressing why our work provides new answers, we see that since the birth and boom of forecasting, attention has been focussed on developing better and more practical models without considerable thought for the humans who are responsible for such tasks. As our work is predominantly explanatory and descriptive in nature, based on a pilot study, a postal survey, a case study and a follow-up survey, our findings produce analytical observations under current situations, present technologies and latest demands, with a future outlook for the UK ambience.

In dealing with the question of what potential results our study gives, we offer recommendations and models for the basic questions relating to forecasting, describing the qualities of forecast users and preparers and show the mechanism in a forecasting process, reinforcing principles of forecasting to both academics and practitioners.

9.5 IMPACT ON PRACTICE

The extra information for modelling variability offered by assigning normal distributions to forecasts in preference to single point predictions will not just increase reliability and credibility but will motivate users and preparers. This will improve the practice of forecasting by acting as an eye-opener and creating more awareness in the people involved.

Even though practitioners are usually academically qualified or they learn through experience about the basics of forecasting, it is good to reflect on what they actually do in practice as defined by theory in order to appreciate the whole concept in
Chapter 9 - Conclusions and future outlook

perspective. We use the university scenario to summarise our findings, with reference to why universities forecast and who is involved in the forecasting function. Respectively, we delineate meeting budget requirements to be one of the main reasons and people at the leading level of management to be involved. In relation to how forecasting is done, universities set schedules that all units comply with and the simplest forecasting methods appear to be used, by adding percentages to their previous results. What model or what theory to use can be based on the logistic regression analysis and mathematical functions presented in our previous chapters. In pointing when to forecast, we relate this to the time factors involved in forecasting. In this case study, smaller sized units tend to prepare forecasts for a period of one year with the majority preparing frequently (every month). On the other hand, the larger units prepare for a period of three years, preparing less frequently, between half-yearly to once a year.

It is recommended that the following criteria should be considered in ensuring successful forecasting practice:

- better training and exposure for the people involved in forecasting;
- better co-ordination of accounting and forecasting methods;
- more effective and efficient communication via latest technologies;
- proper and more acceptable documentation of procedures and audit guidelines to support forecasting practices.

Even though these may be implemented, exercised and documented, a more representative form of records should be filed for reference purposes. In addition, factors affecting forecasting should be delineated and valued according to their degree of influence for consideration.
Chapter 9 - Conclusions and future outlook

The models that we raised in this research are logistic regression analysis, normal distribution with cost functions for Bayesian decision theory and differential equations addressing associations of selected variables. Using these models in practice will provide the following advantages. The models will:

- become supporting tools in improving the budgeting process, decision making and planning functions in the business;
- enhance the measurement of variances relating to the differences between actual and forecast results as these models more effectively allow consideration of various hidden or inestimable factors;
- provide and improve routine guidelines and consistencies. As such, the business can maximize usage of human capabilities and resource capacity, and reduce any unnecessary routine work. These routines concern procedures and tasks in preparing forecasts.

9.6 RECOMMENDATIONS FOR FUTURE RESEARCH

More applications of analytical concepts arising from this study should be put into practice. These warrant for empirical observations and utilisation of the models suggested in the study. Questions should be raised as to how these models improve the practice and whether perceptions by the people involved in forecasting would change. Further developments in appraising this difficult concept should be encouraged and appreciated. It seems that it is especially important to focus on factors influencing practice, which continues to be extensive, questionable and immeasurable to a certain extent. Should the actual results be compared with forecasts, a more in-depth and detailed picture portraying the nature of forecasting practices and different ways of accomplishing this process are also needed. These characteristics might differ between industries.

An empirical and analytical study of forecasting practices and perceptions in the United Kingdom
This research clearly shows behaviour patterns of associations between variables relating to forecasting and the effects of combining prominent explanatory variables. Yet, the larger picture undoubtedly involves complex issues and other moderating and mediating forces. While many of these have been considered and suggested in previous research on forecasting methods only, the behavioural issues should be addressed just as much. In a similar vein, research that incorporates different emphases should be collective for a fruitful stance.

Consistent with previous studies, additional insights may be gained from exploring longitudinal data for a change, instead of cross-sectional data (Ryan et al., 2002, p.84). Furthermore, because our data represent a snapshot in time, it would be of use to follow the outcomes of series of occurrences and behaviours of variables chosen.

The follow-up survey indicated that the practice lack knowledge and application of sophisticated forecasting techniques and future work should concentrate on recommending a practical and more acceptable way to understand and use those methods that the practice are familiar with. We hope that follow-on studies will lead to improvements in both the methods and overall understanding of the forecasting practice. In particular, we hope that a better characterization of the practices will allow managers and scholars to build new tools that can incorporate the real world diversity of behaviours into broader organizational impacts.

Another potential avenue for future work is to research, in a more comprehensive setting, the control effects of forecasting, that is by comparing forecast and actual performances. Even though we have analysed forecasting practices and perceptions based on questionnaire responses, the effects we have captured and identified should be verified based on a wider range of samples. Investigation into other alternative measures of monitoring the actual performance based on forecasts is warranted.
including the feedback issue. For example, standardising guidelines and procedures is possible by documenting officially, like the Statements of Standard Accounting Practice (SSAP's), International Accounting Standards (IAS's), Exposure Drafts (ED's), Financial Reporting Statements (FRS's) and Management Accounting Statements (MAS) which are widespread in general accounting practice.

Our strategy is based on elementary mathematics and a social science area that, when combined, produce an objective basis for effective practice. Our encouraging results suggest further extensions of this work into comparing practices before and after using the models offered as well as into comparing practices between industries, including public services. Our study could be combined with other approaches to explain dynamically situations of reality and practice; perhaps even to incorporate and suggest new variables such as top-up fees and graduate tax as new forms of income, in the case of universities.

Another area worth concentrating on is the forecasting audit whereby standards of performance can be formulated, adopted and verified. These standards can be used as a benchmark for checklists against the forecasting exercises performed by the various people involved. As a result of having standards, audits can be carried out to check if practices comply with the standards adopted. Otherwise, any differences must be reported.

Our case study revealed the fact that discrepancies and variations between actual and forecast results are possible as noted by the respondents. However, very little is known as to how the companies deal with those discrepancies and variations. At Salford University, any shortfall is subsidized by other units, which means reserves have to be reduced. It is at this point that the modelling comes into effect to reduce and minimise these variations.
9.7 CONCLUSION

The practice of forecasting should be made more interesting and more acceptable to the people involved as they are the ones responsible for the success and outcome of what they do. While stakeholders are concerned with their return and managers depend on their teams to plan and forecast almost perfectly, if not perfectly, the element of returns too definitely exists in this case. This means that the managers would expect some form of recognition and satisfaction which may take the form of incentives, training, motivation, sense of belonging and being part of the system.

What this research recommends is to appreciate available resources, which may be limited to a certain extent, and to work within these limitations to maximise output. These resources can be both human, in terms of perceptions, and non-human, in terms of technology and practices. We also propose that the functions of preparers and users are inter-related and they should work together to produce better forecasts.

In addition, as an overall view, it can be seen that this investigation involves multidisciplinary research from a combination of three areas, management accounting, forecasting and mathematics, towards successful forecasting practice, as a move closer towards achieving forecast accuracy.

We believe we have achieved our objectives of observing forecasting practices and perceptions empirically and in tying these in with previous theories so as to provide supporting evidence for the right principles, right reasons, right people and right processes for a practical forecasting strategy that can be implemented by organisations, in general.
APPENDICES
21 July 2000

Dear,

SURVEY ON FORECASTING

My name is Rozainun, from Malaysia, and I am currently pursuing a program leading to a PhD degree (Accounting) at the School of Accounting, Economics and Management Science, University of Salford, Salford, Greater Manchester, U.K.

I am doing a research on Forecast Accuracy relating to earnings for UK companies and your company has been selected as a model sample. Please find, as attached, a set of questionnaires on earnings forecast, for you to answer. Your responses to the questions posed will be treated as confidential and will be used only for academic research.

Please kindly return your replies using the stamped-envelope enclosed by 31 August 2000.

Your kind co-operation in this matter is greatly appreciated and I look forward to making a follow-up on your responses later.

Thank you.

Yours faithfully,

Rozainun Aziz-Khairulfazi(Mrs.)
27 Beechfield Street
Manchester
M8 0SG
QUESTIONNAIRE ON EARNINGS FORECASTING

Note: For this questionnaire, the following definitions apply; Earnings mean the profits of a business for a given period of time. It is arrived at by taking Turnover less Total Expenses. Companies may have its own definition of the amount of turnover and total expenses considered. Forecast means the predictions of the earnings for a future period.

Instruction to respondents: Please write the relevant information on the spaces provided and/or tick in the boxes given, where appropriate.

<table>
<thead>
<tr>
<th>Part 1 – background of company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Name of company : __________________</td>
</tr>
<tr>
<td>2. Address : __________________</td>
</tr>
<tr>
<td>3. Tel. No. : __________________</td>
</tr>
<tr>
<td>4. Type of business : (a) General manufacturers (b) Construction (c) Consumer goods (d) Service (e) Others, please specify</td>
</tr>
<tr>
<td>5. What is the size of your company, in terms of annual sales turnover? (a) up to £10 mil. (b) above £10 mil. - £50 mil. (c) above £50 mil. - £100 mil. (d) above £100 mil. - £200 mil. (e) above £200 mil.</td>
</tr>
<tr>
<td>6. Could you define your earnings? (a) Profit before tax (b) Profit before tax and interest (c) Profit after tax (d) Others (please specify)</td>
</tr>
</tbody>
</table>

249
7. What is the number of your employees?
   (a) Up to 500
   (b) 501 - 1,000
   (c) 1,001 - 1,500
   (d) 1,501 - 2,000
   (e) 2,001 and above

8. Do you prepare earnings forecast?
   (a) Yes
   (b) No
      If no, please give reason why:

9. What are the methods of forecasting used in your company?
   (a) causal or explanatory
   (b) time series
   (c) subjective assessment
   (d) technological
   (e) others, please specify

10. Do you use a computer software to do your forecasting?
    (a) Yes
        If yes, what is the name of the software?
    (b) No
11. Do you forecast earnings by:
   (a) product
   (b) geographical
   (c) departmental
   (d) others, please specify

12. For what purpose(s) does your company prepare earnings forecast?
   (a) as a guidance to operate and run activities
   (b) for the market place
   (c) for the analysts
   (d) for the brokers
   (e) to meet budget requirements
   (f) others, please specify

13. How often does your company prepare earnings forecasts?
   (a) once in a year
   (b) half yearly
   (c) quarterly
   (d) monthly

14. Does your company forecast its earnings for a period of
   (a) one year
   (b) two years
   (c) three years
   (d) five years
   (e) others, please specify

15. How often does your company review and revise earnings forecasts?
   (a) every month
   (b) quarterly
   (c) half yearly
   (d) once a year
16. Does your company prepare earnings forecast

(a) on time, just before the actual period takes place?
(b) on time, way ahead before the actual period takes place?
(c) late, just after the actual period takes place?

17. For which group is the earnings forecast primarily prepared?
   (a) Board of Directors
   (b) Managing Director
   (c) Financial Accountant
   (d) Shareholders
   (e) Others, please specify

18. Who usually prepares the earnings forecast?
   (a) The budget committee
   (b) The accountant
   (c) The head/manager of department
   (d) An officer in the department
   (e) Others, please specify,

19. Ideally, do you think a person with a qualification in accounting should be the one preparing earnings forecast for your company?
   (a) Yes
   (b) No

20. Is the person in charge of forecasting at your company
   (a) A statistician
   (b) An economist
   (c) An accountant
   (d) Others, please specify

21. Does your company employ external experts to do forecasting?
   (a) Yes
      If yes, how much do you pay for their fees?
   (b) No
Part 3 – about the differences between the forecast and actual earnings

22. Should the forecasts not be met, what are the reasons for the variations?

   (a) Optimistic; tend to over-estimate
   (b) Pessimistic; tend to under-estimate
   (c) wrong technique
   (d) mis-information
   (e) others,
   please specify

23. Does your company over- or under- estimate earnings forecasts?

   (a) over-estimate
   i) with less than 5% error
   ii) with 5% - 10% error
   iii) with more than 10% error

   (b) under-estimate
   i) with less than 5% error
   ii) with 5% - 10% error
   iii) with more than 10% error

24. Does your company aim to achieve (meet) forecast or to improve forecast, during the actual forecast period?

   (a) achieve forecast
   i) with less than 5% error
   ii) with 5% - 10% error
   iii) with more than 10% error

   (b) improve forecast
   i) with less than 5% error
   ii) with 5% - 10% error
   iii) with more than 10% error

25. What are the key corrective actions taken to rectify the variations?

   ____________________________________________________________

   ____________________________________________________________

   ____________________________________________________________
26. In your opinion, how do you think forecasts can be strengthened and made reliable?


Part 4 – behavioural considerations

27. Do the managers/heads of departments usually discuss with their subordinates on the departmental earnings' targets before setting them?
   
   (a) Yes
   (b) No
   (c) Sometimes

28. Do the forecasts get distributed and given time span for feedbacks before implementation?
   
   (a) Yes
   If yes, how much time given?_______(days)
   (b) No

29. How far down and to what extent do the forecasts get distributed?

   (a) To Top level management
   (b) To Middle managers
   (c) To Supervisory level
   (d) To Operational level

30. What is the general reaction of the employees on receipt of the forecasts?

   (a) Positive
   (b) Negative
   (c) do not seem to bother
   (d) request for changes
   (e) others, please specify

   ______________________________________
31. Do the salaries of the person(s) in charge of forecasts influence forecast accuracy?

- (a) Yes
- (b) No
- (c) Sometimes

32. Any related comments

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

Please kindly fill in the following information. Thank you.

Name of respondent : ___________________ Tel. no.: ____________
Designation : ___________________ E-mail : ____________
Company stamp : ___________________
Date : ___________________
APPENDIX 5.1

Postal Survey Questionnaire

Cover letter

1 June 2001

Dear ,

SURVEY ON FORECASTING

My name is Rozainun, from Malaysia, and I am currently pursuing a program leading to a PhD degree in the School of Accounting, Economics and Management Science, University of Salford, Greater Manchester, UK.

I am doing research on 'Forecasting - Realising Corporate Profit Forecasts', relating to UK companies and have selected your company as a model sample. Please find attached a short questionnaire on profit forecasting, for you to answer. Your responses to the questions posed will be treated as confidential and will be used only for academic research.

Please kindly return your replies using the stamped envelope enclosed by 30 June 2001.

Your kind co-operation in this matter is greatly appreciated and I thank you warmly for your time.

Thank you.

Yours sincerely,

Rozainun Aziz-Khairulfazi (Mrs.)
27 Beechfield Street
Manchester
M8 0SG
QUESTIONNAIRE ON PROFIT FORECASTING

Note: For this questionnaire, the following definitions apply. Profit of a business for a given period of time is arrived at by taking turnover less total expenses. Companies may have their own definitions of turnover and total expenses. Forecast means the prediction of profit for a future period.

Instruction to respondents: Please write the relevant information in the spaces provided or tick in the boxes given or circle any number ratings, as appropriate.

<table>
<thead>
<tr>
<th>Part 1 – Company Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Name of Company: ____________________</td>
</tr>
</tbody>
</table>
| 2. Type of business : (a) General manufacture
  (b) Construction
  (c) Consumer goods
  (d) Services
  (e) Others (please specify) |
| 3. What is the size of your company, in terms of annual sales turnover?
  (a) up to £10 mil.
  (b) above £10 mil. - £50 mil.
  (c) above £50 mil. - £100 mil.
  (d) above £100 mil. - £200 mil.
  (e) above £200 mil. |
| 4. How would you define your profits for consideration?
  (a) Profit before tax
  (b) Profit before tax and interest
  (c) Profit after tax
  (d) Others (please specify) |
5. What is the number of your employees?
   (a) Up to 500
   (b) 501 - 1,000
   (c) 1,001 - 1,500
   (d) 1,501 - 2,000
   (e) 2,001 and above

6. Do you use computer software to do your forecasting?
   (a) Yes
      If yes, what is the name of the software?____________________
   (b) No

7. How often does your company prepare profit forecasts?
   (a) once a year
   (b) half yearly
   (c) quarterly
   (d) monthly

8. For what period does your company forecast its profit?
   (a) one year
   (b) two years
   (c) three years
   (d) five years
   (e) others, please specify
       __________________________

9. How often does your company review and revise profit forecasts?
   (a) every month
   (b) quarterly
   (c) half yearly
   (d) once a year

10. Does your company prepare profit forecasts
    (a) on time, just before the actual period takes place?
    (b) on time, well before the actual period takes place?
    (c) late, just after the actual period takes place?
11. Who usually prepares the profit forecast?
(a) The budget committee
(b) The accountant
(c) The head/manager of department
(d) An officer in the department
(e) Others (please specify)

12. Does your company employ external experts to do forecasting?
(a) Yes
  If yes, how much do you pay for their fees?
(b) No

13. For which group is the profit forecast primarily prepared?

<table>
<thead>
<tr>
<th></th>
<th>Least Important</th>
<th>Most Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Board of Directors</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(b) Managing Director</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(c) Financial Accountant</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(d) Shareholders</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(e) External Users</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(f) Others (please specify)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

14. Use of management techniques in your company.

<table>
<thead>
<tr>
<th></th>
<th>Not Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Management Accounting</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>b. Basic Cost Accounting</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>c. Financial Accounting</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>d. Others (please specify)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
15. What are the methods of forecasting used in your company?

<table>
<thead>
<tr>
<th></th>
<th>Rarely Used</th>
<th>Frequently Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) causal or explanatory models</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(b) time series analysis</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(c) subjective assessment</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(d) computer technologies</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(e) others, please specify</td>
<td>1 2 3 4 5</td>
<td></td>
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</tbody>
</table>

16. Do you forecast profits by:

<table>
<thead>
<tr>
<th></th>
<th>Not Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) product</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(b) geography</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(c) department</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(d) others, please specify</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

17. For what purposes does your company prepare profit forecasts?

<table>
<thead>
<tr>
<th></th>
<th>Not Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) as a guidance to operate and run activities</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(b) for the market place</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(c) for the analysts</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(d) for the brokers</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(e) to meet budget requirements</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>(f) others, please specify</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
18. How would you rate the following factors in your forecasting function?

<table>
<thead>
<tr>
<th>Factor</th>
<th>Not Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) cost of preparing the forecast</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(b) cost of implementing the forecast</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(c) time spent on forecasting</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(d) people involved in forecasting</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(e) organisational rules and policies influencing forecasting</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Part 3 - Realising Profit Forecasts

19. Does your company over- or under-estimate profits?

(a) over-estimate
   i) with less than 5% error
   ii) with 5% -10% error
   iii) with more than 10% error

(b) under-estimate
   i) with less than 5% error
   ii) with 5% -10% error
   iii) with more than 10% error

20. Should the forecasts not be met, what are the reasons for the variations?

<table>
<thead>
<tr>
<th>Reason</th>
<th>Not Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) too optimistic</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(b) too pessimistic</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(c) wrong technique</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(d) mis-information</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(e) failure to predict uncertain events</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(f) insufficient staffing levels</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(g) poorly motivated forecasters</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(h) others, please specify</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
21. Does your company use profit forecasts to set targets for staff?
   (a) Yes: (i) employees aim to meet targets
          (ii) employees aim to exceed targets
   (b) No: employees perform consistently

22. What are the key corrective actions taken to rectify the variations?

23. In your opinion, how do you think forecasts can be strengthened and made reliable?

Part 4 – People Aspects

24. Ideally, do you think the persons preparing profits forecast for your company should have a qualification in accounting?
   (a) Yes
   (b) No

25. Is your forecast preparer a different person from the forecast user?
   (a) Yes
   (b) No

26. Profits forecast at your company are prepared by
   (a) Statisticians
   (b) Economists
   (c) Accountants
   (c) A mixture of people with various disciplines
   (d) Others, please specify
27. Is the person using profit forecasts at your company

(a) able to read and understand forecasts
(b) able to understand technicalities of forecasting methods
(c) dependent on other people to interpret the forecasts

28. Would you regard yourself as

(a) forecast preparer?
(b) forecast user?
(c) both preparer and user?
(d) neither of the above?

29. Do the managers or heads of department usually discuss with their subordinates on the departmental profits targets before setting them?

(a) Yes
(b) No
(c) Sometimes

30. Do the forecasts get distributed to various levels and are they given sufficient time for feedback before implementation?

(a) Yes
   If yes, how much time is given?______(days)
(b) No

31. How far and to what extent do the forecasts get distributed?

(a) To top level management
(b) To middle managers
(c) To supervisory level
(d) To operational level

32. What is the general reaction of the employees on receipt of the forecasts?

(a) positive
(b) negative
(c) do not seem to bother
(d) request for changes
(e) others, please specify

______________________________

______________________________

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33. Do you think the salaries of the forecast preparers can influence the achievement of profit forecasts?

(a) Yes
(b) No
(c) Sometimes

Please kindly fill in the following information. Thank you for your time and patience.

Name of respondent : __________________  Contact Tel.No.: ______________
Designation : __________________      E-mail Address: ______________
Date : ______________________

Company stamp (if any) : ____________________________
## Summary of SPSS output of Fisher's exact association test

1) Response variable: Q19 – Accuracy of forecasts (1 - inaccurate; 2 - accurate)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Code</th>
<th>Scale</th>
<th>P-value</th>
<th>Direction of association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of employees</td>
<td>Q5</td>
<td>1 - less than 2000</td>
<td>0.113</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - more than 2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepare forecasts for the analysts</td>
<td>Q17c</td>
<td>1 - not important</td>
<td>0.081</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Who are the preparers</td>
<td>Q11</td>
<td>1 - other than accountants</td>
<td>0.105</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - accountants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time given for feedback</td>
<td>Q30</td>
<td>1 - no</td>
<td>0.148</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2) Response variable: Q19i – Forecast optimism (1 - under-estimate; 2 - over-estimate)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Code</th>
<th>Scale</th>
<th>P-value</th>
<th>Direction of association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecasts profits by products</td>
<td>Q16a</td>
<td>1 - not important</td>
<td>0.014</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales turnover</td>
<td>Q3</td>
<td>1 - less than £100 mil.</td>
<td>0.099</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - more than £100 mil.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance of cost of implementing forecasts</td>
<td>Q18b</td>
<td>1 - not important</td>
<td>0.069</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of computer software</td>
<td>Q6</td>
<td>1 - no</td>
<td>0.051</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review and revision of profit forecasts</td>
<td>Q9</td>
<td>1 - monthly to quarterly</td>
<td>0.069</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - half yearly to once a year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profit forecast for shareholders</td>
<td>Q13d</td>
<td>1 - least important</td>
<td>0.136</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - most important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Who are the preparers</td>
<td>Q11</td>
<td>1 - other than accountants</td>
<td>0.109</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - accountants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of profit forecasts to set targets for staff</td>
<td>Q21</td>
<td>1 - employees aim to meet and perform consistently</td>
<td>0.138</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - employees exceed forecasts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time given for feedback</td>
<td>Q30</td>
<td>1 - no</td>
<td>0.121</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3) Response variable: Q18d - Importance of people involved in forecasting (1 - not important; 2 - important)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Code</th>
<th>Scale</th>
<th>P-value</th>
<th>Direction of association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of financial accounting techniques</td>
<td>Q14c</td>
<td>1 - not important</td>
<td>0.011</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forecast profits by geographical area</td>
<td>Q16b</td>
<td>1 - not important</td>
<td>0.046</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepare profit forecast for the brokers</td>
<td>Q17d</td>
<td>1 - not important</td>
<td>0.034</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepare forecast for the analysts</td>
<td>Q17c</td>
<td>1 - not important</td>
<td>0.028</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance of time spent on forecasting</td>
<td>Q18c</td>
<td>1 - not important</td>
<td>0.036</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profit forecast for shareholders</td>
<td>Q13d</td>
<td>1 - least important</td>
<td>0.010</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - most important</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Factors

| Use of time series analysis in forecasting | Q15b | 1 - rarely used  
2 - frequently used | 0.138 | - |
| Prepare profit forecast to meet budget requirements | Q17e | 1 - not important  
2 - important | 0.110 | - |
| Designation: Forecast preparer, user or both | Q28i | 1 - preparer  
2 - user  
3 - both | 0.073 | + |
| Designation: one role as either preparer and user or both | Q28iii | 1 - preparer and/or user  
2 - both | 0.080 | - |

#### 4) Response variable: Q31 – Time given for feedback before implementation (1 - no; 2 - yes)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Code</th>
<th>Scale</th>
<th>P-value</th>
<th>Direction of association</th>
</tr>
</thead>
</table>
| Reason for variation – misinformation | Q20d | 1 - not important  
2 - important | 0.034 | - |
| Reason for variation – poorly motivated forecasters | Q20g | 1 - not important  
2 - important | 0.010 | - |
| Type of retail business | Q2 | 1 - non-consumer goods  
2 - consumer goods | 0.148 | - |
| Who usually prepares? | Q11 | 1 - other than accountants  
2 - accountants | 0.121 | + |
| Use of computer | Q6 | 1 - no  
2 - yes | 0.148 | - |
| Forecast profits by products | Q16a | 1 - not important  
2 - important | 0.128 | - |
| Importance of time spent on forecasting | Q18c | 1 - not important  
2 - important | 0.053 | + |
| Accuracy | Q19 | 1 - inaccurate  
2 - accurate | 0.148 | - |
| Forecast optimism | Q19i | 1 - under estimate  
2 - over estimate | 0.121 | - |
| Reason for variation – too optimistic | Q20a | 1 - not important  
2 - important | 0.148 | - |

#### 5) Response variable: Q2 – Type of business (1 - non-consumer goods; 2 - consumer goods)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Code</th>
<th>Scale</th>
<th>P-value</th>
<th>Direction of association</th>
</tr>
</thead>
</table>
| Sales turnover | Q3 | 1 - less than £100 mil.  
2 - more than £100 mil. | 0.009 | + |
| Number of employees | Q5 | 1 - less than 2000  
2 - more than 2000 | 0.016 | + |
| Use of time series analysis in forecasting | Q15b | 1 - rarely used  
2 - frequently used | 0.132 | + |
| Importance of cost of implementing forecasts | Q18b | 1 - least important  
2 - most important | 0.062 | + |
| Forecasts profits by products | Q16a | 1 - not important  
2 - important | 0.092 | - |
| Use of profit forecasts to set targets for staff | Q21 | 1 - employees aim to meet and perform consistently  
2 - employees exceed forecasts | 0.086 | - |
| Time given for feedback | Q30 | 1 - no  
2 - yes | 0.148 | - |
6) Response variable: Q3 – Sales Turnover (1 - less than £100 mil.; 2 - more than £100 mil.)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Code</th>
<th>Scale</th>
<th>P-value</th>
<th>Direction of association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of employees</td>
<td>Q5</td>
<td>1 - less than 2000</td>
<td>0.000</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - more than 2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of business</td>
<td>Q2</td>
<td>1 - non-consumer goods</td>
<td>0.009</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - consumer goods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepare forecast as a guidance</td>
<td>Q17a</td>
<td>1 - not important</td>
<td>0.051</td>
<td>+</td>
</tr>
<tr>
<td>for business operations</td>
<td></td>
<td>2 - important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of management accounting</td>
<td>Q14a</td>
<td>1 - not important</td>
<td>0.045</td>
<td>+</td>
</tr>
<tr>
<td>techniques</td>
<td></td>
<td>2 - important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance of cost of</td>
<td>Q18b</td>
<td>1 - least important</td>
<td>0.065</td>
<td>+</td>
</tr>
<tr>
<td>implementing forecasts</td>
<td></td>
<td>2 - most important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of profit forecasts to set</td>
<td>Q21</td>
<td>1 - employees aim to meet</td>
<td>0.086</td>
<td>-</td>
</tr>
<tr>
<td>targets for staff</td>
<td></td>
<td>and perform consistently</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - employees exceed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>forecasts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7) Response variable: Q5 – Number of employees (1 - not more than 2000; 2 - more than 2000)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Code</th>
<th>Scale</th>
<th>P-value</th>
<th>Direction of association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of retail business</td>
<td>Q2</td>
<td>1 - non-consumer goods</td>
<td>0.016</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - consumer goods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales turnover</td>
<td>Q3</td>
<td>1 - less than £100 mil.</td>
<td>0.000</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - more than £100 mil.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of preparing</td>
<td>Q7</td>
<td>1 - quarterly and monthly</td>
<td>0.045</td>
<td>+</td>
</tr>
<tr>
<td>forecasts</td>
<td></td>
<td>2 - 6 months and 1 year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy of forecasts</td>
<td>Q19</td>
<td>1 - inaccurate</td>
<td>0.113</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - accurate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 5.3

Details of Companies’ Backgrounds for Postal Survey

1. Type of Business

2. Size of Company based on Annual Sales Turnover
3. Number of Employees

Numbers in the doughnut parts show numbers of respondents
### APPENDIX 5.4

**Summary of response frequencies for postal survey questionnaire**

<table>
<thead>
<tr>
<th>Question</th>
<th>Category 1</th>
<th>Category 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Size of company</td>
<td>&gt;£100 mil.</td>
<td>&lt;£100 mil.</td>
</tr>
<tr>
<td>2. Type of retail business:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) General manufacture</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>(b) Consumer goods</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>(c) Services</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>3. What is the size of your company, in terms of annual sales turnover?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) up to £10 mil.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>(b) above £10 mil. - £50 mil.</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>(c) above £50 mil. - £100 mil.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>(d) above £100 mil. - £200 mil.</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>(e) above £200 mil.</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>4. How would you define your profits for consideration?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Profit before tax</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>(b) Profit before tax and interest</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>(c) Profit after tax</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>(d) Others (please specify)</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Cat. 1 - Profit before tax and exceptionals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Group operating result based on long-term investment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. What is the number of your employees?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Up to 500</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>(b) 501 - 1,000</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>© 1,001 - 1,500</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>(d) 1,501 – 2,000</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>(e)2,001 and above</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Question</td>
<td>Category 1</td>
<td>Category 2</td>
</tr>
<tr>
<td>----------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>6. Does your company use computer software to do forecasting?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Yes</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>If yes, what is the name of the software?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cat. 1 - excel, various</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cat. 2 – excel, vision, own design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) No</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>7. How often does your company prepare profit forecasts?</td>
<td>(a) once a year</td>
<td>3</td>
</tr>
<tr>
<td>(b) half yearly</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>(c) quarterly</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>(d) monthly</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>8. Does your company forecast its profit for a period of</td>
<td>(a) one year</td>
<td>4</td>
</tr>
<tr>
<td>(b) two years</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>(c) three years</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>(d) five years</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>(e) others, please specify</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9. How often does your company review and revise profit forecasts?</td>
<td>(a) every month</td>
<td>3</td>
</tr>
<tr>
<td>(b) quarterly</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>(c) half yearly</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>(d) once a year</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10. Does your company prepare profit forecasts</td>
<td>(a) on time, just before the actual period takes place?</td>
<td>8</td>
</tr>
<tr>
<td>(b) on time, well before the actual period takes place?</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>(c) late, just after the actual period takes place?</td>
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<td>1</td>
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(Note: cat. 1 - 1 without answer)
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<tr>
<th>Question</th>
<th>Category 1</th>
<th>Category 2</th>
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</thead>
<tbody>
<tr>
<td>11. Who usually prepares the profit forecast?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) A budget committee</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>(b) An accountant</td>
<td>6.5</td>
<td>4.5</td>
</tr>
<tr>
<td>(c) A head or manager of department</td>
<td>3.5</td>
<td>2.5</td>
</tr>
<tr>
<td>(d) An officer in the department</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>12. Does your company employ external experts to do forecasting?</td>
<td></td>
<td></td>
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<tr>
<td>(a) Yes If yes, how much do you pay for their fees?</td>
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<td>0</td>
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<tr>
<td>(b) No</td>
<td>18</td>
<td>8</td>
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<tr>
<td>13. For which group is the profit forecast primarily prepared?</td>
<td></td>
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</tr>
<tr>
<td>Least Important</td>
<td>1 2 3 4 5</td>
<td>Important</td>
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<tr>
<td>(a) Board of Directors</td>
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<td>5</td>
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<td>(b) Managing Director</td>
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<td></td>
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<tr>
<td>(c) Financial Accountant</td>
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<td>5</td>
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<td>0</td>
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<tr>
<td>(d) Shareholders</td>
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<tr>
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<td>5</td>
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<td>1</td>
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<tr>
<td>(e) External users</td>
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<tr>
<td>1</td>
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<td>5</td>
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14. What are the types of accounting techniques used by your company?

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<th>Very Important</th>
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<tr>
<td></td>
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<td>14</td>
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<td>b. Basic Cost Accounting</td>
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<td>4</td>
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<tr>
<td>c. Financial Accounting</td>
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<td></td>
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<td>13</td>
</tr>
<tr>
<td>d. Others (please specify)</td>
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*Management Accountants – key decision-makers (internally); heads of department; buying teams, regulators

** Bank; All managers and staff
15. What are the methods of forecasting used in your company?

<table>
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<tr>
<th>Rarely Used</th>
<th>Frequently Used</th>
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<tbody>
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<td>3</td>
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</tbody>
</table>

(a) Causal or explanatory models

<table>
<thead>
<tr>
<th>(b) time series analysis</th>
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<td>1</td>
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</table>

(c) subjective assessment

<table>
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<tr>
<th>(d) computer technologies</th>
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</tr>
<tr>
<td>4</td>
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<tr>
<td>5</td>
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</table>

(e) others, please specify

* past performance
<table>
<thead>
<tr>
<th>Question</th>
<th>Category 1</th>
<th>Category 2</th>
</tr>
</thead>
</table>
| 16. Do you forecast profits by:  
   Not Important 1 2 3 4 5 Important  
   Very Important | | |
| (a) product | | |
| 1 | 1 | 1 |
| 2 | 0 | 2 |
| 3 | 5 | 0 |
| 4 | 3 | 1 |
| 5 | 4 | 2 |
| (b) geography | | |
| 1 | 2 | 1 |
| 2 | 3 | 0 |
| 3 | 5 | 1 |
| 4 | 5 | 1 |
| 5 | 2 | 2 |
| (c) department | | |
| 1 | 0 | 0 |
| 2 | 0 | 0 |
| 3 | 2 | 0 |
| 4 | 8 | 2 |
| 5 | 6 | 4 |
| (d) others, please specify | | |
| 1 | 1 | 0 |
| 2 | 0 | 0 |
| 3 | 0 | 0 |
| 4 | 0 | 0 |
| 5 | 6* | 1** |

* functional unit  
** branch
<table>
<thead>
<tr>
<th>Question</th>
<th>Category 1</th>
<th>Category 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. For what purpose(s) does your company prepare profit forecasts?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Very Important 1 2 3 4 5 Very Important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) as a guidance to operate and run activities</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
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<td>0</td>
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<td>2</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>4</td>
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<td>(b) for the market place</td>
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<td>1</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>(c) for the analysts</td>
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</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
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<td>1</td>
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<td>1</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>(d) for the brokers</td>
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<td>0</td>
</tr>
<tr>
<td>1</td>
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<td>0</td>
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<tr>
<td>5</td>
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<tr>
<td>(e) to meet budget requirements</td>
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<tr>
<td>4</td>
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<td>(f) others, please specify</td>
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</tr>
<tr>
<td>5</td>
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</table>
18. How would you rate the following factors in your forecasting function?

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<tr>
<th>Question</th>
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<th>Category 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) cost of preparing the forecast</td>
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<td></td>
</tr>
<tr>
<td>1</td>
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<td>3</td>
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<tr>
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<tr>
<td>4</td>
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</tr>
<tr>
<td>5</td>
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<td>0</td>
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<tr>
<td>(b) cost of implementing the forecast</td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>6</td>
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<td>5</td>
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<td>(d) people involved in forecasting</td>
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<tr>
<td>(e) organisational rules and policies influencing forecasting</td>
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<td>Category 1</td>
<td>Category 2</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>19. Does your company tend to over- or under-estimate profits?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) over-estimate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) with less than 5% error</td>
<td>4.67</td>
<td>2</td>
</tr>
<tr>
<td>ii) with 5% - 10% error</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>iii) with more than 10% error</td>
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<td>2</td>
</tr>
<tr>
<td>(b) under-estimate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) with less than 5% error</td>
<td>2.67</td>
<td>0</td>
</tr>
<tr>
<td>ii) with 5% - 10% error</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>iii) with more than 10% error</td>
<td>0</td>
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<tr>
<td>(c) on target</td>
<td>4.67</td>
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</tr>
</tbody>
</table>
20. Should the forecasts not be met, what are the reasons for the variations?  

<table>
<thead>
<tr>
<th>Question</th>
<th>Category 1</th>
<th>Category 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) too optimistic</td>
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<td></td>
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<tr>
<td>(b) too pessimistic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) wrong technique</td>
<td></td>
<td></td>
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<tr>
<td>(d) mis-information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e) failure to predict uncertain events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(f) insufficient staffing levels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(g) poorly motivated forecasters</td>
<td></td>
<td></td>
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<tr>
<td>(h) others, please specify</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

- **Not Very Important**: 1 2 3 4 5
- **Very Important**: 1 2 3 4 5

- **Mis-information**: 1 2 3 4 5
- **Failure to predict uncertain events**: 1 2 3 4 5
- **Insufficient staffing levels**: 1 2 3 4 5
- **Poorly motivated forecasters**: 1 2 3 4 5
- **Others, please specify**: 1 2 3 4

* one off factors; external factors, products.
### Question

21. Are forecast preparers made aware of how their forecasts will affect operations (and hence actual profits)?

<table>
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<th></th>
<th>Category 1</th>
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<tr>
<td>Completely</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: For Category 1 – 1 company did not answer this question.

22. Does your company use profit forecasts to set targets for staff?

   (a) Yes:
   (i) employees aim to meet targets
   (ii) employees aim to exceed targets

   (b) No: employees perform consistently

<table>
<thead>
<tr>
<th></th>
<th>Category 1</th>
<th>Category 2</th>
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<tbody>
<tr>
<td></td>
<td>5</td>
<td>3</td>
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<tr>
<td></td>
<td>12</td>
<td>4</td>
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<tr>
<td></td>
<td>0</td>
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</tbody>
</table>

23. What are the key corrective actions taken to rectify the variations?

**Category 1**
- review specific variation areas
- monthly corrective measures
- more in-depth monitoring of costs
- depends upon the variation: a) cost can be reduced (e.g. overtime stopped) b) sales – by advertising?
- Sales promotion; cost reduction
- Strategy changes
- Varies with the position: can be additional marketing and promotion to drive sales and/or appropriate cost revisions
- Varies business by business – overhead reduction, pricing, advertising budget cut, capital redirected towards cost reduction or growth initiatives and promotions
- Fix or eliminate
- Investigation, explanation and board intervention
- Implementation of rolling forecast exercise

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280
<table>
<thead>
<tr>
<th>Question</th>
<th>Category 1</th>
<th>Category 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 (continuation).</td>
<td></td>
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</tr>
<tr>
<td>• What are the key corrective actions taken to rectify the variations?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Analysis and investigation; correction where possible</td>
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<tr>
<td><strong>Category 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Budget cut backs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Business is subject to key external variables, cost of pulp (commodity); exchange rates and demand. These are very difficult to predict given current global economic uncertainties.</td>
<td></td>
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<tr>
<td>• Purchase and cost controls</td>
<td></td>
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<tr>
<td>• Cost reductions, sales promotions, change staff</td>
<td></td>
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</tr>
<tr>
<td>24. In your opinion, how do you think forecasts can be strengthened and made reliable?</td>
<td></td>
<td></td>
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<tr>
<td><strong>Category 1</strong></td>
<td></td>
<td></td>
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<tr>
<td>• People involvement</td>
<td></td>
<td></td>
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<tr>
<td>• Better communication</td>
<td></td>
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<tr>
<td>• Better financial and commercial awareness</td>
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<tr>
<td>• By instilling a culture that insists budgets are delivered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ensure that all key people are involved and given the tools to perform the task</td>
<td></td>
<td></td>
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<tr>
<td>• Incentives and accountabilities</td>
<td></td>
<td></td>
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<tr>
<td>• as much communication to the budget holders – i.e. heads of department</td>
<td></td>
<td></td>
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<tr>
<td>• quarterly and monthly forecast</td>
<td></td>
<td></td>
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<tr>
<td>• use of better techniques</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• investment in software and technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• not possible as everything really depends on new season’s merchandise and economic environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Category 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Business is subject to key external variables, cost of pulp (commodity); exchange rates and demand. These are very difficult to predict given current global economic uncertainties.</td>
<td></td>
<td></td>
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<tr>
<td>• very difficult</td>
<td></td>
<td></td>
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<tr>
<td>• difficult in the retail industry</td>
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<tr>
<td>• constantly reviewing the process</td>
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<tr>
<td>• constantly reviewing the cost base of the business</td>
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<tr>
<td>• constantly reviewing the strategic direction of the business</td>
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<tr>
<td>• impossible in retail</td>
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<tr>
<td>Question</td>
<td>Category 1</td>
<td>Category 2</td>
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<tr>
<td>-------------------------------------------------------------------------</td>
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<tr>
<td>25. Ideally, do you think the person(s) preparing profits forecast for your company should have a qualification in accounting?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Yes</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>(b) No</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>26. Is your forecast preparer a different person from the forecast user?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Yes</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>(b) No</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>27. Profits forecast at your company are <strong>prepared</strong> by</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Statisticians</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(b) Economists</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(c) Accountants</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>(d) A mixture of people with various disciplines</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>28. Is the person using profit forecasts at your company</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) able to read and understand forecasts</td>
<td>15.66</td>
<td>5.5</td>
</tr>
<tr>
<td>(b) able to understand technicalities of forecasting methods</td>
<td>1.66</td>
<td>2.5</td>
</tr>
<tr>
<td>(c) dependent on other people to interpret the forecasts</td>
<td>0.67</td>
<td>0</td>
</tr>
<tr>
<td>29. Would you regard yourself as a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) forecast preparer</td>
<td>4.5</td>
<td>1</td>
</tr>
<tr>
<td>(b) forecast user</td>
<td>3.5</td>
<td>1</td>
</tr>
<tr>
<td>(c) both preparer and user</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>(d) neither of the above</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Question</td>
<td>Category 1</td>
<td>Category 2</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>30. Do the managers or heads of departments usually discuss, with their subordinates, the departmental profits targets before setting them?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Yes</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>(b) No</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>(c) Sometimes</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>31. Are the forecasts distributed to the various levels and given sufficient time span for feedback before implementation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Yes</td>
<td>15*</td>
<td>6**</td>
</tr>
<tr>
<td>If yes, how much time is given?</td>
<td></td>
<td></td>
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<tr>
<td>*Cat. 1: 1 – 5 days</td>
<td></td>
<td></td>
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<tr>
<td>1 – 7 days</td>
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<td>3 – 10 days</td>
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<tr>
<td>6 – 14 days</td>
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<tr>
<td>1 – 30 days</td>
<td></td>
<td></td>
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<tr>
<td>**Cat 2: 2 – 14 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 – 28 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) No</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>32. How far and to what extent do the profit forecasts get distributed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) To top level management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) To middle managers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) To supervisory level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d) To operational level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) To top level management</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>(b) To middle managers</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>(c) To supervisory level</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>(d) To operational level</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>33. What is the general reaction of the forecast users on receipt of the forecasts?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) positive</td>
<td>11.5</td>
<td>6</td>
</tr>
<tr>
<td>(b) negative</td>
<td>1.5</td>
<td>0</td>
</tr>
<tr>
<td>(c) do not seem to bother</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>(d) request for changes</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>(e) others, please specify</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Cat. 1 – 1 company did not answer this question
Cat. 2 – 1 company did not answer this question

<table>
<thead>
<tr>
<th>34. Do you think the salaries of the forecast preparer(s) can influence the achievement of profit forecasts?</th>
<th>Category 1</th>
<th>Category 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Yes</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>(b) No</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>(c) Sometimes</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: Cat. 1 – 2 companies did not answer this question
APPENDIX 6.1

Case Study Questionnaire

Cover letter

1 September 2001

University of Salford
Salford M5 4WT

Dear,

SURVEY ON QUALITATIVE ASPECTS IN FORECASTING

My name is Rozainun and I am currently in my second year, pursuing a program leading to a PhD degree in the School of Accounting, Economics and Management Science, University of Salford.

My research includes a case study of the University, in an attempt to study qualitative aspects in a forecasting function. After careful consideration, you have been selected as a suitable respondent. Your honest responses will be used only to establish and support fundamental theories, and will be treated as confidential.

Please find attached a questionnaire for you to answer. There are four sections:
Section 1 – Background of university unit
Section 2 – Background of respondent
Section 3 – Forecast preparation
Section 4 – Forecast usage
Please kindly tick your responses in the boxes provided or write your answers in the spaces given, where appropriate.

Please kindly return your replies to my supervisor Dr. D.F.Percy, School of AEMS, 6th Floor, Maxwell Building, using the envelope enclosed by 31 October 2001.

Your kind co-operation in this matter is greatly appreciated and I thank you warmly for your time.

Thank you.

Yours sincerely,

Rozainun Aziz-Khairulfazi (Mrs.)
Section 1 – Background of Unit

1. Name of university: University of Salford

Name of unit:

2. Type of unit:
   (a) Management
   (b) Faculty
   (c) School
   (d) Division or centre
   (e) Others, please specify

3. What is the annual income of your unit?
   (a) up to £5 mil.
   (b) £5 mil. - £10 mil.
   (c) £10 mil. - £50 mil
   (d) £50 mil. - £100 mil.
   (e) above £100 mil.

4. What is the composition of the annual income of your unit?
   (a) Funding council grants
   (b) Academic fees and support grants
   (c) Other operating income
   (d) Research grants and contracts
   (e) Endowment income and interest receivable
   (f) Others, please specify

5. What is the annual expenditure of your unit?
   (a) up to £5 mil.
   (b) £5 mil. - £10 mil.
   (c) £10 mil. - £50 mil
   (d) £50 mil. - £100 mil.
   (e) above £100 mil.
6. What is the composition of the annual expenditure of your unit?
   (a) Staff costs
   (b) Building costs
   (c) Consumables
   (d) Other operating costs
   (e) Others, please specify

7. What is the total number of employees in your unit?
   (a) Up to 50
   (b) 51 - 99
   (c) 100 - 149
   (d) 150 - 199
   (e) 200 and above

8. What are the types of forecasts does your unit prepare?
   (a) Profit forecasts
   (b) Income forecasts
   (c) Expenditure forecasts
   (d) Others, please specify

9. Why does your unit prepare forecasts?

10. Is your forecasting function
     (a) Centralised?
        (b) Decentralised?
        (c) Partly centralised and partly decentralised?

11. For which group are the forecasts primarily prepared?
     (a) Senior management
         (b) External funding agencies
         (c) Financial directors
         (d) External financial institutions
         (e) Faculty deans
         (f) School heads
         (g) Others, please specify
12. Who usually prepares the forecasts?
   (a) The budget committee
   (b) The accountant
   (c) The head or manager of unit
   (d) An officer in the unit
   (e) Others, please specify

13. Do you think the person preparing profit forecasts for your unit should have an accounting qualification?
   (a) Yes
   (b) No

14. Is the person in charge of forecasting at your unit
   (a) A statistician?
   (b) An economist?
   (c) An accountant?
   (d) Others, please specify

15. Does your unit employ any external experts to do forecasting?
   (a) Yes
      How much do you pay for their fees?
   (b) No

16. How much does your unit spend on the overall forecasting function in a year?
   (a) Below £10,000
   (b) Between £10,000 - £20,000
   (c) More than £20,000
   (d) No cost involved

17. Does the manager or head of unit usually discuss with their subordinates about objectives before setting targets and forecasts?
   (a) Yes
   (b) No
   (c) Sometimes

18. Are forecasts distributed and given time for feedback before implementation?
   (a) Yes
   (b) No

19. How far down and to what extent do your forecasts get distributed?
   (a) To top level management
   (b) To middle managers
   (c) To supervisory level
   (d) To operational level
20. What is the general reaction of the employees on receipt of the forecasts?
   (a) Positive
   (b) Negative
   (c) Do not seem to bother
   (d) Request for changes
   (e) Others, please specify on the next line

21. Do you think the salaries of the people preparing the forecasts can influence forecast accuracy?
   (a) Yes
   (b) No
   (c) Sometimes

22. Are the preparers encouraged to attend formal training in forecasting?
   (a) Yes
   (b) No

23. Are the unit or employees rewarded when forecasts and targets are achieved?
   (a) Yes
   (b) No

24. How much autonomy do you give to your preparers in the preparation of the forecasts?
   (a) 100%
   (b) 75%
   (c) 50%
   (d) 25%
   (e) 0%
Section 2 – Background of respondent

1. Age group
   (a) 20 – 30 years old
   (b) 31 – 40 years old
   (c) 41 – 50 years old
   (d) 51 years old and above

2. Gender
   (a) Male
   (b) Female

3. Educational background: do you hold any of the following qualifications?
   (a) Professional qualifications
       (CIMA, ACCA, ICSA, CA)
   (b) Master's degree
   (c) Bachelor's degree
   (d) HND, diploma or equivalent
   (e) Others, please specify

4. Experience: do you have experience in any of the areas below?
   (a) Accounting
   (b) General administration
   (c) Budgeting and forecasting
   (d) Statistical analysis

5. Training: do you get training in forecasting, in terms of attending related conferences, seminars or workshops?
   (a) Yes
   (b) No

6. Designation:
   (a) Vice chancellor
   (b) Pro-vice chancellor
   (c) Director of Finance
   (d) Dean of faculty
   (e) Faculty accountant
   (f) Head of school
   (g) Finance officer
   (h) Accountant
   (i) Others, please specify
7. Current salary per annum:
   (a) Less than £20,000
   (b) £20,000 - £30,000
   (c) £30,000 - £40,000
   (d) Above £40,000

8. Number of years in service at your current unit:
   (a) Below 3 years
   (b) 3 – 5 years
   (c) 5 – 10 years
   (d) 10 – 15 years
   (e) more than 15 years

9. Have you ever received any reward or recognition for your job performance related to achieving targets and forecasts?
   (a) Yes
      If yes, in what form?
   (b) No

10. Would you be available for an informal follow-up meeting?
    (a) Yes
    (b) No

Please kindly fill in the following information.

Name of respondent : ______________________
Contact telephone no. : ______________________
E-mail address : ______________________
Date : ______________________
Section 3 – Forecast Preparation

1. Please write the type of forecasts you prepare – for example, sales forecasts, profit forecasts, human resource requirement forecast, etc.

2. What forecasting method do you use to prepare your forecasts?
   (a) Causal or explanatory
   (b) Time series
   (c) Subjective assessment
   (d) Technological
   (e) Others, please specify

3. Do you use any software to prepare the forecasts?
   (a) Yes
      Please name the software:

   (b) No

4. Which of the following factors would you consider as very important in selecting a particular forecasting method?
   (a) Cost
   (b) The nature of the problem and condition to be forecast
   (c) User’s technical ability to understand the forecasting method employed
   (d) Characteristics of the forecasting method

5. How many people are involved in the preparation of the forecasts?
   (a) Less than 5 people
   (b) 6 – 10 people
   (c) More than 10 people

6. For what purposes do you prepare forecasts?
   (a) As a guidance to operate and run activities
   (b) For the market place
   (c) For the analysts
   (d) For the brokers
   (e) To meet budget requirements
   (f) Others, please specify
7. Do you forecast by
   (a) courses?
   (b) schools?
   (c) departments?
   (d) other sections or items? (please specify)

8. Do you forecast for a period of
   (a) one year?
   (b) two years?
   (c) three years?
   (d) five years?

9. How often does your unit prepare forecasts?
   (a) every month
   (b) quarterly
   (c) half yearly
   (d) once a year

10. Do you prepare forecasts
    (a) on time, just before the actual period takes place?
    (b) on time, way ahead before the actual period takes place?

11. What is the average time taken in preparing a forecast?
    (a) few hours a day
    (b) once a week
    (c) few days a week
    (d) once a month
    (e) others, please specify

12. In general, how much of the users' input do you consider in preparing
    forecasts?
    (a) less than 30%
    (b) 30% - 60%
    (c) More than 60%

13. In the forecasting exercise, are you
    (a) the leader?
    (b) a member of the team?

14. Do you think a preparer should acquire knowledge about statistical
    forecasting methods?
    (a) Yes
    (b) No

15. In preparing the forecasts, do you usually
    (a) under-estimate?
    (b) over-estimate?
16. Do you prefer to work
   (a) alone?
   (b) with a team?

17. If working in a team, do you usually get good participation from team
    members?
   (a) Yes
   (b) No
   (c) Sometimes

18. Do you usually get good support from top management and your
    superiors?
   (a) Yes
   (b) No
Section 4 - forecast usage

1. For what purposes do you use forecasts?
   (a) as a guidance to operate and run activities
   (b) for the market place
   (c) for the analysts
   (d) for the brokers
   (e) to meet budget requirements
   (f) others, please specify

2. Do you use and follow forecasts closely in your daily tasks?
   (a) Yes
   (b) No
   (c) Sometimes

3. Are the forecasts sufficient for you to meet your objectives?
   (a) Yes
   (b) No
   (c) Sometimes

4. Are you usually motivated by the forecasts given?
   (a) Yes
   (b) No
   (c) Sometimes

5. Do you give any input towards the preparation of forecasts?
   (a) Yes
   If yes, go to Q.6
   (b) No
   If no, go to Q.7

6. How much of your input, do you reckon, is taken into account in the final forecasts?
   (a) Less than 30%
   (b) 30% - 60%
   (c) More than 60%

7. Do you think forecast users should also prepare forecasts?
   (a) Yes
   (b) No
   (c) Sometimes
8. Do you think forecast users should have technical abilities to understand statistical methods of forecasting?
   (a) Yes
   (b) No
   (c) Sometimes

9. If the forecasts are not met, what are the reasons for the variations?
   (a) Too optimistic
   (b) Too pessimistic
   (c) Wrong technique
   (d) Mis-information
   (e) Failure to predict uncertain events
   (f) Insufficient staffing levels
   (g) Poorly motivated forecasters
   (h) Others, please specify

10. Do you usually aim to meet forecasts or do better than forecasts, during the actual period?
    (a) Meet forecasts
    (b) Do better than forecasts

11. Do you think when forecasts are met, the employees should be rewarded?
    (a) Yes
    How should they be rewarded?
    (b) No

12. If there are any variations, what steps do you take to rectify the situation? (Please write your answer below)

13. In your opinion, how do you think forecasts can be strengthened and made reliable? (Please write your answer below)
APPENDIX 6.2

Summary of Interviews

1. Meeting with Finance Director

Outcome of discussion:

- Financial forecasts are prepared for the governing body HEFCE by the Finance Committee of the University.
- The ‘profit’ is termed as ‘surplus’. The motivation of the financial forecasts is aimed at improving the financial health of the university and generate funds for re-investment.
- Watch dog (HEFCE) – the university gets a budget allocation, in the form of grants, from HEFCE
- The university manages like in a business but ownership is not shareholders
- The faculties and schools produce business plans every year by end of March to be consolidated by the Finance department into the main one by July.
- Recommended to meet:
  1. Director of Planning (Planning for the university as a whole in relation to inputs to the financial forecasts)
  2. Deputy Director of Finance (prepares the financial forecast statements)
  3. Faculty Accountants – their role is to monitor performances based on the forecasts and amend subsequent plans in the light of their experience
- Forecasts are mainly based on student numbers according to the courses; part of the planning is to introduce new courses besides increasing number of students each year
- Users – academic staff (responsible for getting the numbers)
- Preparers – administrative support staff (incorporates users’ input)
- Questionnaire – immediate response.

Materials given:
- Financial Forecast
- Financial Strategy Statements
2. Meeting with Deputy Director of Finance

Outcome of discussions

1. HEFCE budget – formula to obtain the budget is known. It is allocated on a number of variables namely teaching, students, research, assessments (grading of 3, 4, 5 star), peer review system. HEFCE sets out parameters, the University tells them the plans. It is a static model (the budget is fixed more or less) or a funding model to gain stability with HEFCE. Calculation based on UTR (units of Teaching Resources), lab-based students, classroom-based students.

2. Statements used for different purpose – internal purpose (for SMT and Executive) and external purpose (HEFCE).

3. Collection of fees from students – retained at the university, not given to HEFCE. Home students - £1075; supporting one student – in total approximately £4000, so the University has to bear the difference.

4. The university gets their own administrative support and sets out their own activities and incentives; there is no influence by HEFCE; may offer small bursaries.

5. Accounting system – Financial and Management; Cost-centre based approach; planning and budget cycles for 3 year plan – have plans to do a 5-year plan.

6. Faculties prepare business plans/academic plans (Resource Model); they have their own portfolio and research plans; they go by student numbers. By December, finalise; work with planning unit – spreadsheets (Student Resource Model). Faculty review/modify and submit by end of February.

7. In February, there will be presentations of forecasts by the faculties; one to one basis. The Executive group (VC, PVC, Director of Finance) will critically examine.

8. Faculty – focus: on just budget setting – one year (current year)


10. Forecasts are prepared by the faculties; with the support service – not properly quantified – forecasts done/organised by the central finance department – only AIS and CARS (catering, accommodation and residential services) have accountants.

11. Basis of time series forecasting – knowledge, experience, subjective judgement, opinions, ideas, aspirations; it is a more mechanical exercise; no computerised or advanced technologies applied; admits weaknesses.

12. Forecasts are prepared internally and externally;
   Internal – executive group (major user)
   - SMT (Deans, Heads of schools)
   External – HEFCE (use this forecast to influence government spending; see the trends)

13. Techniques to reduce uncertainty: forecasts are converted into budgets; monitoring aspects; financial system Agresso, excel spreadsheets

14. have plans to change to ADAYTUM (next planning cycle) – it is a three dimensional; capable to handle a lot of data, slice and dice information at various levels and be able to summarise as well. Will make work easier.
15. Finance Department – generate income- purchasing – consortium for further education; gets commission from this; also do consultancy work (under the university)

16. Forecast – larger time scale; time series projection

17. Budget – 1 year (current)

18. Research contract – more than 1 year


3. Meeting with Director of Planning

Materials given: Business plans of the various schools (one file)
(may keep until January 2002)
The master plan is too big and is in the computer

What business plans and forecasts that the planning unit prepares?

1. Business plans comprise of faculty business plans and support service. Plans include student numbers (targets) which is 80% of total income, research (grants are limited because of rating for research by the council), academic entreprise (getting more popular, get rewards, spin-offs).

2. See the blue book – strategic framework of the university. Potential income is on teaching, research and academic entreprise (training courses and consultancy). Staff are directed to academic entreprise as minority of the staff are involved in research.

3. There is not much commercial with the support service. The catering and residential services (CARS) basically earns to cover costs but their ideas welcomed if they wish to extend outside to increase income.

4. Salford Software Limited is another commercial project to increase university’s income.

5. Behavioural issue – support service seen by the academic staff as something taxed. High proportion of indirect costs (uncontrollable) are charged to all schools on a per student basis. Same rate for all the schools or faculties.

How is planning done?
(Note: T – teaching; R – research; A-E – Academic Entreprise)

1. Forecasting student numbers (Spreadsheets) – categorised by schools and faculties. In September, after registration, compare actual and targets. The difference will be used as input to the next forecast.

2. Forecasting model (T,R, A-E) – Spreadsheets - using base line, a platform for the faculties and the central management to review and modify; prepared in November. Income resource model i.e. Income and Expenditure Account – incorporates faculty forecasts as well as central costs, taxation, IT, estate. In
December, meets faculty accountants and deans to inform, for example, VC’s message to increase student numbers by 10%. The planning unit has until Jan-Feb to change the baseline. Feb-Mac there will be dialogue and debate about the base line, then modifies and leaves for the budget for the next year. The approach is a mix of top-bottom and bottom-up.

3. After the merging of organisations in 1998 and then the major restructuring in 1999, the process and system of the university was still new; work was also directed to improve the system. The aggregate of the University plan is faculties. The support service plans are monitored and done by the Senior Management Team; IT infrastructure – it has to be centrally monitored (Central Management). Different divisions cannot have their own as they may have different networking.

4. Forecasting model – student numbers, use mainly spreadsheets. Now a new system, Banner, still at the teething stage, and has a lot of problems getting around it but will manage and get there in the end. Finance uses Agresso. Statistics are used but not extensively. The forecasting packages are not suitable and relevant to the kind of activities and services provided in the university.

Type of forecasting

1. Top-down and bottom-up (combined) – 2 approaches complement each other

Identification of preparers and users

1. preparers
   - planning team (planning unit)
   - faculty deans, heads and faculty accountants

2. users
   - senior management,
   - faculty management (to know the future direction of the faculty, assess the financial viability and as performance monitoring)
   - staff of the university (to be motivated)
   - funding bodies (HEFCE – to satisfy and justify plans)
   - private sector groups and government bodies
   - regional bodies

Summary

1. planning is done by taking one year and then go back three years
2. based on plans, do trend analysis – use statistics but not detailed/sophisticated ones; use computers/spreadsheets
3. realistic base line done by the Director of planning (presented in Autumn, explain assumptions, give good grounding; any changes must be justified by the faculties (through dialogues)
4. Planning unit has no income, they collect information from units and plan for the university as a whole
5. Basically – process is on some base lines to the faculties then get feedback, exchanging information and modify;
   ↓
   Actual
   ↓
   Compare with targets
   ↓
   Make amendments for future forecasts

6. With the merging and restructuring, a lot of things coming in, so still new

7. Information system – inadequate – not getting up-to-date or timely information about student numbers, module registration and changes, teaching units (contribution by lecturers) and not available on line.

---

4. Meeting Faculty Accountant I

Material given: Faculty business plans and budget report (with variances)

Outcome of discussions:
- Business plans – basically academic plans – prepared in November (away day to discuss)
- Academic plans
  - student numbers – increase or decrease – financial plans
  - change of philosophy
  - growth for the faculty
  - new courses
  - restructuring
- Ask each of the school what they want to do
- Supporting students is no where near the cost of running the faculty; with Health, validated by NHS; a must for 10:1 student/staff ratio. (£6.7K per student while the student pays £1075 only) so faculty needs funding from HEFCE and others.
- No. of students first, then get the budget (a bit of a chicken and an egg situation)
- When schools overspent – deficits are carried forward
- Plans to make savings not to affect teaching and quality of service; maybe delay buying computers, travels, projects etc.
- Hold monthly budget meetings (Dean, FA, Head of Schools) – platform to exchange ideas, views requirements/needs and table out problems and raise issues; come up with solutions. Finance Officer (FO) is more routine work and gets instructions from FA. Not all information is passed to the FO as they are sometimes not skilled and not necessarily should have some of those information.
- FA – goes through and keeps track with staffing, turnover, replacing and monitoring
• FA – do forecasts; prudent with income; not used Agresso, have own system; do summary of staffing to the administrator
• Business plans – derived from schools. They have their own management team comprising of senior lecturers. Top to bottom and vice versa.
• Budgets – faculty executives and management teams
• The Dean steps in to reinforce and contributes, concerns.
• FA – does the chasing; tells the heads, this is how much you have and pls. Use the budget accordingly but be careful; not to overspent.
• Preparer – FA
• User – senior management team – Dean and Head of Schools
• How to reduce uncertainty – exchanging opinions, FA picks up ideas, informal discussion, subjective judgement – informal time series; have own system/procedural
• banner – student record (still new)
• uncontrollable factors in differences between actual and forecasts due to:
  • as student numbers decrease (e.g. drop-outs), income decreases
  • as staff promotion goes through, salaries increase for the faculty
  • vacancy factors

5. Meeting with Faculty Accountant II

1. Business plans – academic plans – student numbers; more or less the same with Arts, Media and Social sciences; no contracts like the Health and Social Care.
2. Annual forecasts 1 August 01 – 31 July 02; prepared this December 00. Forecast is based on University Resource Model, i.e. Income and Expenditure Account.
3. Financial information – for external; e.g. HEFCE
4. Management information – for internal; report top the finance department; but the Finance department will incorporate all internal statements for the external reporting.
5. Information for drawing up plans –
   student numbers – student resource model – more info. From Director of Planning; incorporate drop-outs, new courses – all based on knowledge research tends to be high – gets funding from ESPRC; grade assessed and get grants
   Staffing – from the various schools
   Non-staff/ equipment – based on previous years
6. regular meetings – Dean, Associate Deans, Heads of Schools, academic staffs that the heads wish to include (usually senior staff) and FA – to discuss about the plans; FA presents plans at the meetings.
7. spending up to the school – small deficits ; make savings and work within their means
8. balanced budget/forecast – some may have deficits but overall tends to balance off; not much problem with variation and deficits since faculty gets funding by research grants (big amount)
9. no statistical package/analysis involved; use s subjective judgement/objective as well since number of students are known (central planning unit)- current year-how many will go into next year; next year’s will go into the following; start-finish incorporate drop-out rates plus and minus, including knowledge from heads of schools; simple arithmetic.

10. preparers – FA will also use forecast in deciding whether a school may pay for ad-hoc expenses (e.g. advise on whether can spend or not; computer, part-time teaching etc.; a yes and go ahead or no, we don’t have the money so to defer maybe)

11. Users – heads of schools and university senior management

12. Rolling/continuous /on-going review of current month and how it will affect the annual forecast (what it will be at the end of the year)


14. Questionnaire response was immediate.

Materials given: financial forecast and draft business plans (final one has amendments)

6. Meeting Faculty Accountant III

1. Business plans – academic plans – student numbers
2. Annual forecasts 1 August 01 – 31 July 02; prepared in December 00. Forecast is based on University Resource Model, i.e. Income and Expenditure Account.
3. Financial information – for external; e.g. HEFCE
4. Management information – for internal; but the Finance department will incorporate all internal statements for the external reporting.
5. Information for drawing up plans – student numbers – income 90%; expenditure – 75% (get from the central students record)
   Staffing – from the various schools
6. regular meetings – Dean, Heads of Schools and FA – to discuss about the plans
7. no statistical package/analysis involved; use s subjective judgement/objective as well since number of students are known. With new courses, it depends (e.g. criminology, not many takers)
8. preparers – FA will also use forecast in deciding whether a school may pay for ad-hoc expenses (e.g. advise on whether can spend or not; computer, part-time teaching etc.; a yes and go ahead or no, we don’t have the money so to defer maybe)
9. Users – heads of schools, finance section, university senior management
10. Interest receivable
11. Receive commercial income; deals with European bodies – for translation
12. Deficit affects function of faculty
13. Surplus by one school covers deficit by another school
14. Drivers (activities/items that drive the faculty/schools which costs)
15. 1/3rd of the costs are controllable; 77% is fixed – Indirect costs (central charges shared by faculties based on some measures consumed by the faculty; staff costs – salaries of lecturers)
16. faculty cuts own expenditure; but with indirect costs, there’s nothing the faculty can do.
17. Recruitment, fairs, roadshows, abroad, advertisements (Spain, Japanese, Greeks, Chinese, Japanese etc.) student number forecast are generally met, sometimes you get more students coming in.
18. Forecasting function is part of the FA’s job – at least 1/2 of the time is spent on forecasting.
19. Start off with prudent; overestimating – optimistic; gets rejected if do not put up a ‘realistic’ figure - the only way to get budgets. Sometimes the faculty window-dress; they are forced into it by the management (Finance Department)
20. Not worth doing statistics and not relevant; because the nature of activities and the kind of planning/forecasting is done requires exchanging of ideas/opinions, human intervention/coordination – student numbers and resources required are easily managed – there is not much variation and outlook for possible outcomes are determinable by simple arithmetic.
21. Block expenditure – unlike products by manufacturers, cannot simply increase student numbers – it goes by intake; so have to cut spending to make savings; it’s not like if you have less students you can send out a salesman to buy students in.
22. Behavioural aspects – influenced by organisational factors
23. What people perceive is different from what people think; theory is different from practice.
24. Questionnaire response was immediate.

Materials given: Financial Forecast and Student Number Forecast (by schools; one example and the same prepared by the rest of the schools)

7. Meeting with Faculty Accountant IV

Material given: Actual Resource Allocation Model for year 2001/02

Preparation of business plans (Income line, Expenditure line)

1. 5 schools – School of AEMS, School of Management, Information Systems Institute, Construction and Property Management, Leisure, Hospitality and Food Management
2. Resource Allocation Model (RAM): Setting the budgets for the whole of the following year. Business plan is the budget. Forecasting is comparing the budget and actual (actual position at year end) and taking remedial actions.

3. Highest proportion – Grant income and students fees; followed by educational contracts (HEFCE) for further education; commercial income (set by the associated Deans) from, say short courses, consultancy; research grants and contracts overhead income.

4. Information source for the RAM – schools come up with the RAM (Heads of schools with their finance officers) – gathering expected number of students to arrive at amount of fees (income). Grants are based on last year’s student numbers.

Communication

1. Setting budgets (RAM prepared for budget); send RAM to schools. They discuss at their level and feedback to the faculty. The FA collates all these into a master copy – balance the budget.

2. Regular discussions about the budget inputs at various levels.

3. Schools are involved with faculty senior members in the preparation of the budget and forecasts.

Identification of preparers and users

1. Preparers – Dean, Faculty Accountant, heads of Schools, Finance Officer.

2. Users – senior people in the schools, Heads of schools, Associate Heads, people in the administration roles.

Reducing uncertainty

1. No formal methods (not prescriptive) but suggesting reactions, feelings, experience, current knowledge and update of information. Budgets set – by November, when actual number of students are known, will change the model to represent a less uncertain picture of the coming year.
APPENDIX 6.3

Results summary for identified variables namely ‘hierarchy levels’, ‘users’, ‘preparers’, ‘time’ and ‘size’

Note: * significant (p ≤ 0.05)

1. Fisher-exact test for significance of associations between questionnaire response variables and the hierarchy levels (‘management and faculties’ and ‘schools’)

Section 1 - Identification of preparers

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Officer in the unit</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

Section 2 - Identification of users

No significant association

Section 3 – What forecasts prepared?

No significant association

Section 4 – Size of the units, in terms of annual income and annual expenditure

No significant association

Section 5 - Views of respondents relating to forecasting status in terms of people involved, practice, time and resources

No significant association

Section 6 - Background of respondents

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Experience – do you have experience in accounting?</td>
<td>0.00*</td>
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Section 7 - Operations and management of forecasting

1. Forecast preparation

<table>
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<th>Variable</th>
<th>P-value</th>
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<tr>
<td>1.</td>
<td>Selection of forecasting method – is ‘nature of problem and condition’ important?</td>
<td>0.04*</td>
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<td>2.</td>
<td>Do you forecast by courses?</td>
<td>0.00*</td>
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</tbody>
</table>
2. Forecast usage

No significant association

II. Fisher's exact test for significance of associations between questionnaire response variables and the users who are the senior management

Section 1 - Identification of preparers

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<th>No.</th>
<th>Variable</th>
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<tbody>
<tr>
<td>1.</td>
<td>Manager</td>
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</tr>
<tr>
<td>2.</td>
<td>Officer in the unit</td>
<td>0.00*</td>
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Section 2 - Identification of users

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<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Heads of school</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

Section 3 - What forecasts prepared?

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Profit forecasts</td>
<td>0.01*</td>
</tr>
<tr>
<td>2.</td>
<td>Others (Detailed annual budget of income and expenditure, student numbers, contribution forecasts)</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

Section 4 - Size of the units, in terms of annual income and annual expenditure

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Composition of annual income – others (budget allocation; commercial ERDF and ESF; Department of Health direct funding; income from short courses; cash from companies)</td>
<td>0.01*</td>
</tr>
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</table>

Section 5 - Views of respondents relating to forecasting status in terms of people involved, practice, time and resources

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<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Forecasts distributed to top level management?</td>
<td>0.02*</td>
</tr>
<tr>
<td>2.</td>
<td>Forecasts distributed to supervisory level?</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Forecasts distributed to operational level?</td>
<td>0.00*</td>
</tr>
<tr>
<td>4.</td>
<td>Are the units or employees rewarded when forecasts and targets are achieved?</td>
<td>0.00*</td>
</tr>
<tr>
<td>5.</td>
<td>How much autonomy do you give to your preparers in the preparation of the forecasts?</td>
<td>0.01*</td>
</tr>
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</table>
Section 6 - Background of respondents

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gender of respondent</td>
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</tr>
<tr>
<td>2.</td>
<td>Educational background</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Experience – do you have experience in accounting?</td>
<td>0.01*</td>
</tr>
<tr>
<td>4.</td>
<td>Experience – do you have experience in statistical analysis?</td>
<td>0.00*</td>
</tr>
<tr>
<td>5.</td>
<td>Received any reward relating to achieving targets and forecasts?</td>
<td>0.00*</td>
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Section 7 - Operations and management of forecasting

1. Forecast preparation

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<th>Variable</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Purpose of preparing forecast – for the market place?</td>
<td>0.05*</td>
</tr>
<tr>
<td>2.</td>
<td>In preparing forecasts, do you under or over-estimate?</td>
<td>0.05*</td>
</tr>
</tbody>
</table>

2. Forecast usage

No significant association

III. Fisher’s exact test for significance of associations between questionnaire response variables and preparer who is a manager of a unit

Section 1 - Identification of preparers

<table>
<thead>
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<th>No.</th>
<th>Variable</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Officer</td>
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</tr>
<tr>
<td>2.</td>
<td>Accountant</td>
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Section 2 - Identification of users

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<th>No.</th>
<th>Variable</th>
<th>P-value</th>
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<tr>
<td>1.</td>
<td>Senior management</td>
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<td>2.</td>
<td>External funding agency</td>
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<tr>
<td>3.</td>
<td>Finance director</td>
<td>0.02*</td>
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<tr>
<td>4.</td>
<td>Heads of school</td>
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Section 3 – What forecasts prepared?

<table>
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<th>No.</th>
<th>Variable</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Profit forecasts</td>
<td>0.00*</td>
</tr>
<tr>
<td>2.</td>
<td>Others (Detailed annual budget of income and expenditure, student numbers, contribution forecasts)</td>
<td>0.01*</td>
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### Section 4 - Size of the units, in terms of annual income and annual expenditure

<table>
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<th>No.</th>
<th>Variable</th>
<th>P-value</th>
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<tbody>
<tr>
<td>1.</td>
<td>Annual income</td>
<td>0.01*</td>
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<tr>
<td>2.</td>
<td>Composition of annual income – academic fees and support grant</td>
<td>0.05*</td>
</tr>
<tr>
<td>3.</td>
<td>Composition of annual income – research grants and contracts</td>
<td>0.02*</td>
</tr>
<tr>
<td>4.</td>
<td>Composition of annual income – endowment income and interest receivables</td>
<td>0.00*</td>
</tr>
<tr>
<td>5.</td>
<td>Composition of annual income – others (budget allocation; commercial ERDF and ESF; Department of Health direct funding; income from short courses; cash from companies)</td>
<td>0.00*</td>
</tr>
<tr>
<td>6.</td>
<td>Annual expenditure</td>
<td>0.01*</td>
</tr>
<tr>
<td>7.</td>
<td>Composition of annual expenditure – building costs</td>
<td>0.05*</td>
</tr>
<tr>
<td>8.</td>
<td>Composition of annual expenditure – others</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

### Section 5 - Views of respondents relating to forecasting status in terms of people involved, practice, time and resources

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Person in charge of forecasting at your unit – accountant or other background</td>
<td>0.00*</td>
</tr>
<tr>
<td>2.</td>
<td>Forecasts distributed to top level management?</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Forecasts distributed to middle managers?</td>
<td>0.02*</td>
</tr>
<tr>
<td>4.</td>
<td>Forecasts distributed to supervisory level?</td>
<td>0.00*</td>
</tr>
<tr>
<td>5.</td>
<td>Forecasts distributed to operational level?</td>
<td>0.00*</td>
</tr>
<tr>
<td>6.</td>
<td>General reaction of employees on receipt of the forecasts – do not agree or agree?</td>
<td>0.00*</td>
</tr>
<tr>
<td>7.</td>
<td>Do you think salaries of the preparers can influence forecast accuracy?</td>
<td>0.00*</td>
</tr>
<tr>
<td>8.</td>
<td>Are the preparers encouraged to attend formal training in forecasting?</td>
<td>0.01*</td>
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<tr>
<td>9.</td>
<td>Are the units or employees rewarded when forecasts and targets are achieved?</td>
<td>0.01*</td>
</tr>
<tr>
<td>10.</td>
<td>How much autonomy do you give to your preparers in the preparation of the forecasts?</td>
<td>0.00*</td>
</tr>
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### Section 6 - Background of respondents

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gender of respondent</td>
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</tr>
<tr>
<td>2.</td>
<td>Educational background</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Experience – do you have experience in accounting?</td>
<td>0.00*</td>
</tr>
<tr>
<td>4.</td>
<td>Experience – do you have experience in statistical analysis?</td>
<td>0.00*</td>
</tr>
<tr>
<td>5.</td>
<td>Training – do you get training in forecasting?</td>
<td>0.00*</td>
</tr>
<tr>
<td>6.</td>
<td>Current salary</td>
<td>0.02*</td>
</tr>
<tr>
<td>7.</td>
<td>Number of years in service</td>
<td>0.00*</td>
</tr>
<tr>
<td>8.</td>
<td>Received any reward relating to achieving targets and forecasts?</td>
<td>0.00*</td>
</tr>
</tbody>
</table>
Section 7 - Operations and management of forecasting

1. Forecast preparation

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Forecasting method used – causal or explanatory</td>
<td>0.01*</td>
</tr>
<tr>
<td>2.</td>
<td>Forecasting method used – time series</td>
<td>0.01*</td>
</tr>
<tr>
<td>3.</td>
<td>Forecasting method used – technological</td>
<td>0.00*</td>
</tr>
<tr>
<td>4.</td>
<td>Use any software for forecasting?</td>
<td>0.01*</td>
</tr>
<tr>
<td>5.</td>
<td>Selection of forecasting method – is ‘cost’ important?</td>
<td>0.00*</td>
</tr>
<tr>
<td>6.</td>
<td>Selection of forecasting method – is ‘users’ ability to understand the</td>
<td>0.00*</td>
</tr>
<tr>
<td></td>
<td>method’ important?</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Selection of forecasting method – is the characteristics of the forecasting method’ important?</td>
<td>0.06</td>
</tr>
<tr>
<td>8.</td>
<td>Number of people involved</td>
<td>0.00*</td>
</tr>
<tr>
<td>9.</td>
<td>Purpose of preparing forecast – for other reasons</td>
<td>0.01*</td>
</tr>
<tr>
<td>10.</td>
<td>Do you forecast by courses?</td>
<td>0.03*</td>
</tr>
<tr>
<td>11.</td>
<td>Do you forecast by sections?</td>
<td>0.01*</td>
</tr>
<tr>
<td></td>
<td>Do you forecast for a period of one or three years?</td>
<td>0.00*</td>
</tr>
<tr>
<td>12.</td>
<td>Do you prepare forecast on time?</td>
<td>0.00*</td>
</tr>
<tr>
<td>13.</td>
<td>How much of users’ input is considered in preparing forecasts?</td>
<td>0.00*</td>
</tr>
<tr>
<td>14.</td>
<td>In the forecasting exercise, are you the leader or a member of the team?</td>
<td>0.01*</td>
</tr>
<tr>
<td>15.</td>
<td>Do you think a preparer should acquire statistical knowledge?</td>
<td>0.05*</td>
</tr>
</tbody>
</table>

2. Forecast usage

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Are you usually motivated by the forecasts given?</td>
<td>0.05*</td>
</tr>
<tr>
<td>2.</td>
<td>How much of your input, do you reckon, is taken into account in the final forecasts?</td>
<td>0.01*</td>
</tr>
<tr>
<td>3.</td>
<td>Do you think forecast users should have the technical abilities to understand statistical methods of forecasting?</td>
<td>0.01*</td>
</tr>
<tr>
<td>4.</td>
<td>Reason for the variations – too optimistic?</td>
<td>0.01*</td>
</tr>
<tr>
<td>5.</td>
<td>Reason for the variations – mis-information?</td>
<td>0.00*</td>
</tr>
<tr>
<td>6.</td>
<td>Do you usually aim to meet forecasts or do better than forecasts?</td>
<td>0.01*</td>
</tr>
<tr>
<td>7.</td>
<td>Do you think when forecasts are met, the employees should be rewarded?</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

IV. Fisher’s exact test for significance of associations between questionnaire response variables and time (frequency of preparing forecast: more than twice a year or every six months)

Section 1 - Identification of preparers

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Accountant</td>
<td>0.01*</td>
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</tbody>
</table>
### Section 2 - Identification of users

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>External funding agency</td>
<td>0.00*</td>
</tr>
<tr>
<td>2.</td>
<td>Finance director</td>
<td>0.01*</td>
</tr>
<tr>
<td>3.</td>
<td>others</td>
<td>0.01*</td>
</tr>
</tbody>
</table>

### Section 3 – What forecasts prepared?

No significant associations

### Section 4 – Size of the units, in terms of annual income and annual expenditure

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Annual income</td>
<td>0.01*</td>
</tr>
<tr>
<td>2.</td>
<td>Composition of annual income – funding council grants</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Composition of annual income – academic fees and support grant</td>
<td>0.00*</td>
</tr>
<tr>
<td>4.</td>
<td>Composition of annual income – other operating income</td>
<td>0.00*</td>
</tr>
<tr>
<td>5.</td>
<td>Composition of annual income – research grants and contracts</td>
<td>0.00*</td>
</tr>
<tr>
<td>6.</td>
<td>Composition of annual income – endowment income and interest receivables</td>
<td>0.11*</td>
</tr>
<tr>
<td>7.</td>
<td>Annual expenditure</td>
<td>0.01*</td>
</tr>
<tr>
<td>8.</td>
<td>Composition of annual expenditure – staff costs</td>
<td>No statistics</td>
</tr>
<tr>
<td>9.</td>
<td>Composition of annual expenditure – building costs</td>
<td>0.00*</td>
</tr>
<tr>
<td>10.</td>
<td>Composition of annual expenditure – other operating costs</td>
<td>0.00*</td>
</tr>
<tr>
<td>11.</td>
<td>Composition of annual expenditure – others</td>
<td>0.05*</td>
</tr>
</tbody>
</table>

### Section 5 - Views of respondents relating to forecasting status in terms of people involved, practice, time and resources

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Person in charge of forecasting at your unit – accountant or other background</td>
<td>0.05*</td>
</tr>
<tr>
<td>2.</td>
<td>Forecasts distributed to middle managers?</td>
<td>0.01*</td>
</tr>
<tr>
<td>3.</td>
<td>General reaction of employees on receipt of the forecasts –do not agree or agree?</td>
<td>0.03*</td>
</tr>
<tr>
<td>4.</td>
<td>Do you think salaries of the preparers can influence forecast accuracy?</td>
<td>0.05*</td>
</tr>
<tr>
<td>5.</td>
<td>Are the preparers encouraged to attend formal training in forecasting?</td>
<td>0.05*</td>
</tr>
</tbody>
</table>

### Section 6 - Background of respondents

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age of respondent</td>
<td>0.00*</td>
</tr>
<tr>
<td>2.</td>
<td>Experience – do you have experience in budgeting and forecasting?</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Training – do you get training in forecasting?</td>
<td>0.05*</td>
</tr>
<tr>
<td>4.</td>
<td>Current salary</td>
<td>0.00*</td>
</tr>
<tr>
<td>5.</td>
<td>Number of years in service</td>
<td>0.05*</td>
</tr>
</tbody>
</table>
Section 7 - Operations and management of forecasting

1. Forecast preparation

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Forecasting method used – time series</td>
<td>0.05*</td>
</tr>
<tr>
<td>2.</td>
<td>Use any software for forecasting?</td>
<td>0.03*</td>
</tr>
<tr>
<td>3.</td>
<td>Selection of forecasting method – is ‘nature of problem and condition’</td>
<td>0.00*</td>
</tr>
<tr>
<td>4.</td>
<td>Do you forecast by courses?</td>
<td>0.01*</td>
</tr>
<tr>
<td>5.</td>
<td>Do you think a preparer should acquire statistical knowledge?</td>
<td>0.01*</td>
</tr>
<tr>
<td>6.</td>
<td>Do you get good support from top management?</td>
<td>0.01*</td>
</tr>
</tbody>
</table>

2. Forecast usage

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Purpose of using forecasts – to meet budget requirements?</td>
<td>0.01*</td>
</tr>
<tr>
<td>2.</td>
<td>Are the forecasts sufficient for you to meet your objectives?</td>
<td>0.01*</td>
</tr>
<tr>
<td>3.</td>
<td>Are you usually motivated by the forecasts given?</td>
<td>0.00*</td>
</tr>
<tr>
<td>4.</td>
<td>How much of your input, do you reckon, is taken into account in the final forecasts?</td>
<td>0.01*</td>
</tr>
<tr>
<td>5.</td>
<td>Do you think forecast users should have the technical abilities to understand statistical methods of forecasting?</td>
<td>0.01*</td>
</tr>
<tr>
<td>6.</td>
<td>Reason for the variations – too optimistic?</td>
<td>0.01*</td>
</tr>
<tr>
<td>7.</td>
<td>Reasons for variations – failure to predict uncertain events?</td>
<td>0.00*</td>
</tr>
<tr>
<td>8.</td>
<td>Do you usually aim to meet forecasts or do better than forecasts?</td>
<td>0.03*</td>
</tr>
<tr>
<td>9.</td>
<td>Do you think when forecasts are met, the employees should be rewarded?</td>
<td>0.05*</td>
</tr>
</tbody>
</table>

V. Fisher’s exact test of significance of associations between questionnaire response variables and size of unit (annual income)

Section 1 – Identification of preparers

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Who are the main preparers – accountant or other than accountant</td>
<td>0.01*</td>
</tr>
<tr>
<td>2.</td>
<td>Who are the main preparers – manager or not a manager of the unit</td>
<td>0.01*</td>
</tr>
<tr>
<td>3.</td>
<td>Is one of the preparers an officer in the unit?</td>
<td>0.05*</td>
</tr>
</tbody>
</table>

Section 2 – Identification of users

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Who are the users – external funding agency or not?</td>
<td>0.00*</td>
</tr>
<tr>
<td>2.</td>
<td>Who are the users – finance director or not?</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Who are the users – heads of school or not?</td>
<td>0.05*</td>
</tr>
</tbody>
</table>
Section 3 – What forecasts prepared?

No significant associations

Section 4 – Composition of annual income, annual expenditure and composition of annual expenditure

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Funding council grants</td>
<td>0.01*</td>
</tr>
<tr>
<td>2.</td>
<td>Academic fees and support grants</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Other operating income</td>
<td>0.02*</td>
</tr>
<tr>
<td>4.</td>
<td>Research grants and contracts</td>
<td>0.00*</td>
</tr>
<tr>
<td>5.</td>
<td>Endowment income and interest receivables</td>
<td>0.00*</td>
</tr>
<tr>
<td>6.</td>
<td>Others</td>
<td>0.02*</td>
</tr>
<tr>
<td>7.</td>
<td>Annual expenditure</td>
<td>0.00*</td>
</tr>
<tr>
<td>8.</td>
<td>Building costs</td>
<td>0.00*</td>
</tr>
<tr>
<td>9.</td>
<td>Other operating costs</td>
<td>0.02*</td>
</tr>
<tr>
<td>10.</td>
<td>Others</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

Section 5 – relationship between size and forecasting status relating to people involved, practice, time and resources

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Person in charge of forecasting - accountant or other background</td>
<td>0.00*</td>
</tr>
<tr>
<td>2.</td>
<td>Forecasts distributed to top level management?</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Forecasts distributed to middle managers?</td>
<td>0.00*</td>
</tr>
<tr>
<td>4.</td>
<td>Forecasts distributed to supervisory level?</td>
<td>0.05*</td>
</tr>
<tr>
<td>5.</td>
<td>Forecasts distributed to operational level?</td>
<td>0.05*</td>
</tr>
<tr>
<td>6.</td>
<td>General reaction of employees on receipt of the forecasts? Do not agree or agree?</td>
<td>0.00*</td>
</tr>
<tr>
<td>7.</td>
<td>Do you think salaries of the people preparing the forecasts can influence forecast accuracy?</td>
<td>0.00*</td>
</tr>
<tr>
<td>8.</td>
<td>Are the preparers encouraged to attend formal training in forecasting?</td>
<td>0.00*</td>
</tr>
<tr>
<td>9.</td>
<td>How much autonomy do you give to your preparers in the preparation of the forecasts?</td>
<td>0.02*</td>
</tr>
</tbody>
</table>

Section 6 - Background of respondents

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age of respondent</td>
<td>0.02*</td>
</tr>
<tr>
<td>2.</td>
<td>Gender of respondent</td>
<td>0.05*</td>
</tr>
<tr>
<td>3.</td>
<td>Educational background</td>
<td>0.05*</td>
</tr>
<tr>
<td>4.</td>
<td>Experience – do you have experience in accounting?</td>
<td>0.02*</td>
</tr>
<tr>
<td>5.</td>
<td>Experience – do you have experience in budgeting and forecasting?</td>
<td>0.02*</td>
</tr>
<tr>
<td>6.</td>
<td>Experience – do you have experience in statistical analysis?</td>
<td>0.05*</td>
</tr>
<tr>
<td>7.</td>
<td>Training – do you get training in forecasting?</td>
<td>0.00*</td>
</tr>
<tr>
<td>8.</td>
<td>Current salary</td>
<td>0.00*</td>
</tr>
<tr>
<td>9.</td>
<td>Number of years in service</td>
<td>0.00*</td>
</tr>
</tbody>
</table>
Section 7 - Operations and management of forecasting

1. Forecast preparation

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</tr>
<tr>
<td>2.</td>
<td>Use any software for forecasting?</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Selection of forecasting method – is ‘cost’ important?</td>
<td>0.03*</td>
</tr>
<tr>
<td>4.</td>
<td>Selection of forecasting method – is ‘nature of problem and condition’ important?</td>
<td>0.01*</td>
</tr>
<tr>
<td>5.</td>
<td>Selection of forecasting method – is ‘users’ ability to understand the method’ important?</td>
<td>0.00*</td>
</tr>
<tr>
<td>6.</td>
<td>Number of people involved</td>
<td>0.03*</td>
</tr>
<tr>
<td>7.</td>
<td>Do you forecast for a period of one or three years?</td>
<td>0.01*</td>
</tr>
<tr>
<td>8.</td>
<td>Frequency of preparing forecasts</td>
<td>0.01*</td>
</tr>
<tr>
<td>9.</td>
<td>Do you prepare forecast on time?</td>
<td>0.01*</td>
</tr>
<tr>
<td>10.</td>
<td>How much of users’ input is considered in preparing forecasts?</td>
<td>0.03*</td>
</tr>
<tr>
<td>11.</td>
<td>Do you think a preparer should acquire statistical knowledge?</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

2. Forecast usage

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Are you usually motivated by the forecasts given?</td>
<td>0.00*</td>
</tr>
<tr>
<td>2.</td>
<td>How much of your input, do you reckon, is taken into account in the final forecasts?</td>
<td>0.00*</td>
</tr>
<tr>
<td>3.</td>
<td>Do you think forecast users should have the technical abilities to understand statistical methods of forecasting?</td>
<td>0.00*</td>
</tr>
<tr>
<td>4.</td>
<td>Reason for the variations – too optimistic?</td>
<td>0.00*</td>
</tr>
<tr>
<td>5.</td>
<td>Reason for the variations – mis-information?</td>
<td>0.01*</td>
</tr>
<tr>
<td>6.</td>
<td>Reasons for variations – failure to predict uncertain events?</td>
<td>0.01*</td>
</tr>
<tr>
<td>7.</td>
<td>Do you usually aim to meet forecasts or do better than forecasts?</td>
<td>0.00*</td>
</tr>
<tr>
<td>8.</td>
<td>Do you think when forecasts are met, the employees should be rewarded?</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

Types of forecasts prepared:

1. student numbers
2. human resources
3. income and expenditure
4. budget balancing forecasts

Views of respondents (for forecast usage practices)

1. If there are any variations, what steps do you take to rectify the situation?
   i. balancing
   ii. causes of variations
   iii. control and feedback – action plans; compensate & compromise
   iv. meetings and discussions (negotiate)
2. In your opinion, how do you think forecasts can be strengthened and made reliable?
   i. clarity of information and communication
   ii. use models to explain and support practices
   iii. improve forecasting tools
   iv. include environment
   v. incorporate uncertainty
Dear sir/madam,

Survey on Forecasting

As part of my PhD research, we contacted you three years ago with a questionnaire about forecasting. Thank you for your reply and information. We have collated all the responses to identify some approaches for improving the quality of forecasting.

We now enclose a brief, and final, follow-up questionnaire to assess the validity of these proposals. Please kindly return the completed questionnaire, as soon as possible, in the enclosed, stamped addressed envelope.

All information submitted will be kept strictly confidential and used only for academic purposes. We thank you in advance for sharing your time and experience. Your willingness to participate enriches academic research in forecasting. We are pleased to enclose a small gift in appreciation of your contribution.

Thank you again for your cooperation.

Yours faithfully,

Mrs. Rozainun Aziz-Khairulfazi,
Dr. David F. Percy (supervisor)
**ISAGE AND FAMILIARITY RELATING TO FORECASTING METHODS**

Please kindly write the relevant numbers in the boxes provided.

<table>
<thead>
<tr>
<th>1. Qualitative methods</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. <strong>Technological</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. <strong>Normative</strong> determines future objectives and works backwards to find out what inputs are required.</td>
</tr>
<tr>
<td></td>
<td>ii. <strong>Exploration</strong> uses current information to estimate future conditions.</td>
</tr>
<tr>
<td>b. <strong>Subjective assessment</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. <strong>Decision trees</strong> assign probabilities subjectively to projected events.</td>
</tr>
<tr>
<td></td>
<td>ii. <strong>Sales force estimates</strong> involve collecting forecasts by salesmen and making judgements collectively.</td>
</tr>
<tr>
<td></td>
<td>iii. <strong>Juries of executive opinion</strong> involve seeking opinions of representatives from various functions in the organisation to prepare forecasts jointly.</td>
</tr>
<tr>
<td></td>
<td>iv. <strong>Anticipatory surveys and market research</strong> study the wants of prospective clients or market situations.</td>
</tr>
<tr>
<td></td>
<td>v. <strong>Customer expectations.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Quantitative methods</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. <strong>Time series</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. <strong>Naïve</strong> concerns basic rules to be applied, for example forecast is last year's value plus ten per cent..</td>
</tr>
<tr>
<td></td>
<td>ii. <strong>Trend extrapolation</strong> makes linear, s-curve or similar projections.</td>
</tr>
<tr>
<td></td>
<td>iii. <strong>Smoothing</strong> calculates averages of actual figures in a polynomial or exponential way.</td>
</tr>
<tr>
<td></td>
<td>iv. <strong>Decomposition</strong> splits time series data into trends of seasonal, cyclical and random fluctuations.</td>
</tr>
<tr>
<td></td>
<td>v. <strong>Filters</strong> make use of parameters to model changes in a linear pattern.</td>
</tr>
<tr>
<td></td>
<td>vi. <strong>Autoregressive moving average method</strong> bases forecasts on linear functions of past values and errors or both.</td>
</tr>
<tr>
<td></td>
<td>vii. <strong>State space models</strong> are mathematical functions that describe a set of possible states for distinct situations in feasible planning.</td>
</tr>
<tr>
<td>b. <strong>Causal or explanatory</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. <strong>Simple or multiple regression</strong> establishes relationship between dependent and independent variables in the form of equations.</td>
</tr>
<tr>
<td></td>
<td>ii. <strong>Econometric methods</strong> are simultaneous functions of multiple regression.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Other formal forecasting methods</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. <strong>Combination of qualitative and quantitative methods</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. <strong>Expert systems</strong> adopt knowledge of forecasting expertise.</td>
</tr>
<tr>
<td></td>
<td>ii. <strong>Neural network</strong> presents trends of past sales and factors to deduce relationships for forecast preparation.</td>
</tr>
<tr>
<td></td>
<td>iii. <strong>Life cycle analysis</strong> looks at the five stages of a product cycle: introduction, growth, maturity, saturation and decline periods.</td>
</tr>
<tr>
<td></td>
<td>iv. <strong>Simulation</strong> formulates actual scenario forces via computer packages in the form of models.</td>
</tr>
</tbody>
</table>
FORECAST PREPARATION AND USE OF COMPUTERS

On a scale of 1 (no, or low priority) to 5 (yes, or high priority), please kindly tick the relevant boxes provided.

1. What types of forecasts are prepared by your company?
   a. Profit forecasts
   b. Sales forecasts
   c. Market forecasts
   d. Human resource forecasts
   e. Forecasts for production resources
   f. Forecasts for customer demands
   g. Others, please specify:

<table>
<thead>
<tr>
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<th>Yes, or high priority</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1 2 3 4 5</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
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<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
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<td>1 2 3 4 5</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

2. Which type of forecasting methods do you prefer?
   a. Simple methods (please state why)
   b. Advanced and sophisticated methods (please state why)

<table>
<thead>
<tr>
<th>No, or low priority</th>
<th>Yes, or high priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

3. Are you satisfied with the current methods of forecasting used?

<table>
<thead>
<tr>
<th>No, or low priority</th>
<th>Yes, or high priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
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</tbody>
</table>

4. Please give reasons for your answer in 3. above

5. Are you satisfied with the forecasting system of communication and feedback relating to forecasts? (Please state why)

<table>
<thead>
<tr>
<th>No, or low priority</th>
<th>Yes, or high priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

6. What forecasting software packages do you use?
   a. spreadsheets – e.g. Excel, SPSS
   b. forecasting software developed internally
   c. software packages developed externally
   d. no software (go to page 3)

<table>
<thead>
<tr>
<th>No, or low priority</th>
<th>Yes, or high priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
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<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

7. Do you rely on computers to do forecasting at your company?

<table>
<thead>
<tr>
<th>No, or low priority</th>
<th>Yes, or high priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

8. With the use of computers, do you need efficient and better information systems?

<table>
<thead>
<tr>
<th>No, or low priority</th>
<th>Yes, or high priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

9. Does the use of computer packages improve the tendency to produce accurate forecasts?

<table>
<thead>
<tr>
<th>No, or low priority</th>
<th>Yes, or high priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

10. What priority do you give to the features in using forecasting software that you consider to be critical?
    a. ease of use
    b. easily understandable results
    c. low cost

<table>
<thead>
<tr>
<th>No, or low priority</th>
<th>Yes, or high priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
III. **FORECASTING PROBLEMS AND FORECAST IMPROVEMENTS**

On a scale of 1 (no, or disagree) to 5 (yes, or agree), please kindly tick the relevant boxes provided.

| a. Communication between preparer and user is inadequate to satisfy requirements of both. | 1 | 2 | 3 | 4 | 5 |
| b. Understanding advanced forecasting techniques is a problem. | 1 | 2 | 3 | 4 | 5 |
| c. The biggest challenge in your forecasting function is: | 1 | 2 | 3 | 4 | 5 |
| i. harmonising preparers' and users' objectives. | 1 | 2 | 3 | 4 | 5 |
| ii. sufficient data to produce accurate forecasts. | 1 | 2 | 3 | 4 | 5 |
| iii. effective forecasting system. | 1 | 2 | 3 | 4 | 5 |
| d. Getting the right expertise to conduct forecasting using advanced techniques is a problem in your company. | 1 | 2 | 3 | 4 | 5 |
| e. These criteria ensure better forecasting practice: | 1 | 2 | 3 | 4 | 5 |
| i. better training and exposure for the people involved in forecasting. | 1 | 2 | 3 | 4 | 5 |
| ii. better coordination of accounting and forecasting methods. | 1 | 2 | 3 | 4 | 5 |
| iii. more effective and efficient communication via latest technologies. | 1 | 2 | 3 | 4 | 5 |
| iv. proper documentation of procedures to support forecasting practices. | 1 | 2 | 3 | 4 | 5 |
| v. better rewards for achieving targets and producing accurate forecasts | 1 | 2 | 3 | 4 | 5 |
| g. Giving time for feedback on forecasts prepared, forecast accuracy. | 1 | 2 | 3 | 4 | 5 |
| h. Single forecasts will almost certainly be wrong. In order to make your forecasts more reliable, would you consider using simple formulae to: | 1 | 2 | 3 | 4 | 5 |
| i. allow for the uncertainty of forecasts? | 1 | 2 | 3 | 4 | 5 |
| ii. specify confidence limits for forecasts? | 1 | 2 | 3 | 4 | 5 |
| iii. assign probabilities to forecasts | 1 | 2 | 3 | 4 | 5 |
| i. Do you perform a cost-benefit-analysis of over-forecasting and under-forecasting to avoid unnecessary errors and inefficiencies? | 1 | 2 | 3 | 4 | 5 |
| j. Econometrics models exist for describing functional relationships between factors that influence profits. Would you, or your colleagues, be interested in attending a free, short course on econometrics? | 1 | 2 | 3 | 4 | 5 |

Name of company: ____________________________________________

Name and designation of respondent: ____________________________________________
## APPENDIX 8.2

Summary of response frequencies for follow-up survey on forecasting

### I. USAGE AND FAMILIARITY RELATING TO FORECASTING METHODS

<table>
<thead>
<tr>
<th>Method</th>
<th>Very little</th>
<th>Moderate</th>
<th>Very much</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative methods - technological - normative</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Qualitative methods - technological - exploration</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Subjective assessment - decision trees</td>
<td>15</td>
<td>0</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Subjective assessment - sales force estimates</td>
<td>10</td>
<td>1</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Subjective assessment - juries of executive opinion</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Subjective assessment - anticipatory surveys and market research</td>
<td>9</td>
<td>4</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Subjective assessment - customer expectations</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Quantitative methods - time series - naive</td>
<td>5</td>
<td>2</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>Quantitative methods - time series - trend exploration</td>
<td>7</td>
<td>2</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Quantitative methods - time series - smoothing</td>
<td>12</td>
<td>1</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Quantitative methods - time series - decomposition</td>
<td>13</td>
<td>1</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Quantitative methods - time series - filters</td>
<td>13</td>
<td>1</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Quantitative methods - time series - autoregressive moving average method</td>
<td>13</td>
<td>2</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Quantitative methods - time series - state space models</td>
<td>15</td>
<td>1</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Quantitative methods - causal or explanatory - simple or multiple regression</td>
<td>14</td>
<td>2</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Quantitative methods - causal or explanatory - econometric methods</td>
<td>16</td>
<td>0</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Other formal forecasting methods - combination of qualitative and quantitative methods - expert systems</td>
<td>9</td>
<td>4</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Method</td>
<td>Very little</td>
<td>Moderate</td>
<td>Very much</td>
<td>Total</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------</td>
<td>----------</td>
<td>-----------</td>
<td>-------</td>
</tr>
<tr>
<td>Usage - Other formal forecasting methods - combination of qualitative and quantitative methods - neural network</td>
<td>9</td>
<td>3</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Usage - Other formal forecasting methods - combination of qualitative and quantitative methods - life cycle analysis</td>
<td>8</td>
<td>3</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Usage - Other formal forecasting methods - combination of qualitative and quantitative methods - simulation</td>
<td>9</td>
<td>3</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Qualitative methods - technological - normative</td>
<td>6</td>
<td>3</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Qualitative methods - technological - exploration</td>
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<td>4</td>
<td>8</td>
<td>16</td>
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<tr>
<td>Familiarity - Qualitative methods - subjective assessment - decision trees</td>
<td>3</td>
<td>3</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Qualitative methods - subjective assessment - sales force estimates</td>
<td>7</td>
<td>0</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Qualitative methods - subjective assessment - juries of executive opinion</td>
<td>6</td>
<td>1</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Qualitative methods - subjective assessment - anticipatory surveys and market research</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Qualitative methods - subjective assessment - customer expectations</td>
<td>5</td>
<td>2</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Quantitative methods - time series - naive</td>
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<td>0</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Quantitative methods - time series - trend exploration</td>
<td>3</td>
<td>2</td>
<td>11</td>
<td>16</td>
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<tr>
<td>Familiarity - Quantitative methods - time series - smoothing</td>
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<td>3</td>
<td>7</td>
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<tr>
<td>Familiarity - Quantitative methods - time series - decomposition</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Quantitative methods - time series - filters</td>
<td>11</td>
<td>4</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Quantitative methods - time series - autoregressive moving average method</td>
<td>10</td>
<td>3</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Quantitative methods - time series - state space models</td>
<td>14</td>
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<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Quantitative methods - causal or explanatory - simple or multiple regression</td>
<td>Very little</td>
<td>Moderate</td>
<td>Very much</td>
<td>Total</td>
</tr>
<tr>
<td>Familiarity - Quantitative methods - causal or explanatory - econometric methods</td>
<td>11</td>
<td>1</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Other formal forecasting methods - combination of qualitative and quantitative methods - expert systems</td>
<td>5</td>
<td>2</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Other formal forecasting methods - combination of qualitative and quantitative methods - neural network</td>
<td>5</td>
<td>3</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Other formal forecasting methods - combination of qualitative and quantitative methods - life cycle analysis</td>
<td>3</td>
<td>2</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>Familiarity - Other formal forecasting methods - combination of qualitative and quantitative methods - simulation</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>16</td>
</tr>
</tbody>
</table>

II. FORECAST PREPARATION AND USE OF COMPUTERS

<p>| What are the types of forecasts prepared by your company? profit forecasts | No, or low priority | Neutral | Yes, or high priority | Not answered | Total |
| What are the types of forecasts prepared by your company? sales forecasts | 5 | 2 | 9 | 0 | 16 |
| What are the types of forecasts prepared by your company? market forecasts | 4 | 5 | 7 | 0 | 16 |
| What are the types of forecasts prepared by your company? human resource forecasts | 2 | 5 | 9 | 0 | 16 |
| What are the types of forecasts prepared by your company? forecasts for production resources | 9 | 2 | 5 | 0 | 16 |
| What are the types of forecasts prepared by your company? forecasts for customer demands | 7 | 4 | 5 | 0 | 16 |
| What are the types of forecasts prepared by your company? others | 13 | 0 | 3 | 0 | 16 |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>No, or low priority</th>
<th>Neutral</th>
<th>Yes, or high priority</th>
<th>Not answered</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Which type of forecasting methods do you prefer? simple methods</td>
<td>2</td>
<td>2</td>
<td>11</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Which type of forecasting methods do you prefer? advanced and sophisticated methods</td>
<td>8</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Are you satisfied with the current methods of forecasting used?</td>
<td>1</td>
<td>7</td>
<td>7</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Are you satisfied with the forecasting system of communication and feedback relating to forecasts?</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>What software packages do you use? spreadsheets - e.g. Excel, SPSS</td>
<td>1</td>
<td>1</td>
<td>13</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>What software packages do you use? forecasting software developed internally</td>
<td>13</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>What software packages do you use? software packages developed externally</td>
<td>9</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>What software packages do you use? no software (go to page 3)</td>
<td>15</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Do you rely on computers to do forecasting at your company?</td>
<td>5</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>With the use of computers, do you need efficient and better information systems?</td>
<td>2</td>
<td>3</td>
<td>10</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Does the use of computer packages improve the tendency to produce accurate forecasts?</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>What priority do you give to the features in using forecasting software that you consider critical? case of use</td>
<td>2</td>
<td>0</td>
<td>13</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>What priority do you give to the features in using forecasting software that you consider critical? easily understandable results</td>
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<td>0</td>
<td>13</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>What priority do you give to the features in using forecasting software that you consider critical? low cost</td>
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</tbody>
</table>
### III. FORECASTING PROBLEMS AND FORECAST IMPROVEMENTS

<table>
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<tr>
<th></th>
<th>no, or disagree</th>
<th>neutral</th>
<th>yes, or agree</th>
<th>Not answered</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication between preparer and user is inadequate to satisfy requirements of both</td>
<td>9</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Understanding advanced forecasting techniques is a problem</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>The biggest challenge in your forecasting function is: harmonising preparers' and users' objectives</td>
<td>8</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>The biggest challenge in your forecasting function is: sufficient data to produce accurate forecasts</td>
<td>7</td>
<td>1</td>
<td>8</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>The biggest challenge in your forecasting function is: effective forecasting system</td>
<td>6</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Getting the right expertise to conduct forecasting using advanced techniques is a problem in your company</td>
<td>11</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>This criterion ensures better forecasting practice: better training and exposure for the people involved in forecasting</td>
<td>1</td>
<td>4</td>
<td>11</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>This criterion ensures better forecasting practice: better coordination of accounting and forecasting methods</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>This criterion ensures better forecasting practice: more effective and efficient communication via latest technologies</td>
<td>3</td>
<td>9</td>
<td>4</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>This criterion ensures better forecasting practice: proper documentation of procedures to support forecasting practices</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>This criterion ensures better forecasting practice: better rewards for achieving targets and producing accurate forecasts</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>16</td>
</tr>
</tbody>
</table>
Giving time for feedback on forecasts prepared improves forecast accuracy | No, or disagree | Neutral | Yes, or agree | Total |
---|---|---|---|---|
Single forecasts will almost certainly be wrong. In order to make your forecasts more reliable, would you consider using simple formulae to: allow for the uncertainty of forecasts | 1 | 6 | 9 | 16 |
Single forecasts will almost certainly be wrong. In order to make your forecasts more reliable, would you consider using simple formulae to: specify confidence limits for forecasts | 2 | 4 | 10 | 16 |
Single forecasts will almost certainly be wrong. In order to make your forecasts more reliable, would you consider using simple formulae to: assign probabilities to forecasts | 5 | 3 | 8 | 16 |
Do you perform a cost-benefit analysis of over-forecasting and under-forecasting to avoid unnecessary errors and inefficiencies? | 13 | 1 | 2 | 16 |
Econometric models exist for describing functional relationships between factors that influence profits. Would you or your colleagues be interested in attending a free, short course on econometrics? | 8 | 4 | 4 | 16 |
BIBLIOGRAPHY


Accounting Standards Board, (2000). Generally Accepted Accounting Principles, United Kingdom.


