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**THE EVALUATION OF TWO MODELS OF HUMAN RESOURCE ACCOUNTING USING A
SIMULATION METHODOLOGY**

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Submitted for the qualification of Doctor of Philosophy

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ABSTRACT

This research is concerned with the subject of Human Resource Accounting (HRA) and how two particular HRA models may be operationalized. The two models concerned are the "Stochastic Rewards Valuation Model" and the "Replacement Cost Model". The research takes the form of three case exercises in which managers from different organisations used a computerized simulation model to assist them in their employee resourcing. In the process of using this simulation figures were obtained that could operationalize the two HRA models under consideration. These figures and the managers explanation for their computation and application are used to compare the two HRA models and to evaluate their utility. The conclusions drawn are that whilst managers implicitly hold human resources to have value, in the normally accepted non-technical sense, the two HRA models do not provide a consistent way of measuring it. Whilst the models themselves may therefore have limited utility it was however concluded that the process of operationalising them is seen to be useful.

PART I

This part comprises four chapters. In Chapter 1 the aims and objectives of the research are set out in the context of the subject area of human resource accounting (HRA). A brief history of the development of the subject area is followed by a review of the main model types that have been developed. The effect of the use of HRA information on management decision making is then considered by reference to experiments that have been conducted in the area. The relationship between the three main discipline areas to contribute to the subject, those of economics, accounting and personnel management is then explored. Finally the contribution of the research which forms the basis of this thesis is introduced.

In chapter 2 the research design is presented. The research methodology, method and instrument are described and alternative approaches are discussed.

Chapter 3 comprises a description and explanation of the simulation model which is the primary research instrument used in this study.

Chapter 4 describes stage by stage the data collection procedure followed in the research. The final section of this chapter is devoted to describing how the data collection process contributes to the achievement of the aims and objectives of the research.

CHAPTER 1

THE AIMS AND OBJECTIVES OF THE RESEARCH IN THE CONTEXT OF HUMAN RESOURCE ACCOUNTING

1.1 AIMS AND OBJECTIVES

The overall aims of this research are to review the relationship between two models of Human Resource Accounting (HRA): the "Replacement Cost Model" and the "Stochastic Rewards Valuation Model" (SRVM), and to investigate their relative utility in particular settings.

In the process of achieving these aims the research will use a simulation model:

1. To collect the data necessary to operationalize the two HRA models,
2. To review the data collected for each model in terms of its reliability and validity,
3. To assist managers who act as subjects in the research to improve their employee resourcing.

It is through the achievement of these objectives that the aims of the research will be realized.

1.2 HUMAN RESOURCE ACCOUNTING : DEFINITION AND PURPOSE

The American Accounting Association's Committee on Human Resource Accounting (1973) defined HRA as, "the process of identifying and measuring the data about human resources and communicating this information to interested parties."

Flamholtz (1985: 25-26) states that the purpose of HRA

is:-

" ... to help human resource professionals and senior managers to use an organization's human resources effectively and efficiently. Human resource accounting is intended to provide these users with information needed to acquire, develop, allocate, conserve, utilize, evaluate and reward human resources. Human resource accounting develops measures of the cost and value of people to an organization for use in a variety of management decisions. Not only does it provide a framework for thinking about the management of people in organizations, but it also motivates management to appreciate the effects of business decisions on human assets."

When considering research in HRA Flamholtz (1974: 45-46) identifies four related objectives:-

- "1. to develop a theory that explains the nature and determinants of the value of people to formal organizations;
2. to develop valid and reliable methods for measuring the cost and value of people to organizations (both monetary and non monetary measurements);
3. to design operational systems to apply (implement) these measurement methods in actual organizations, and
4. to determine cognitive and behavioural impact of human resource accounting measurements and frameworks."

This research relates directly to the monetary measurement aspects of the second of these objectives, with particular reference to two models put forward by Flamholtz, namely the "Stochastic Rewards Valuation Model" and the "Replacement Cost Model". As such the research also has implications for Flamholtz' other three objectives noted above.

1.3

A REVIEW OF HRA MODELS AND THEORIES

Although the aim of the research is to review the

relationship between two particular HRA models (the Replacement Cost Model and the SRVM) it is useful to locate these models in the context of HRA as a subject.

1.3.1 INTRODUCTION

It is difficult to identify the starting point of HRA as a subject of study. In 1976 the journal "Accounting, Organizations and Society" published a bibliography of the subject which listed 278 references including a number of unpublished PhD theses. The earliest reference in that bibliography is to the work of Dublin and Lotka (1930)

Interest in HRA, as indicated by the number of publications on the subject, seemed to reach its height in the 1970's. Much of the early work in that decade was concerned with how human resources, or human assets as they were often referred to, could be represented in the financial statements of organisations. As research in the area developed the emphasis changed from what might be called a financial accounting bias to one concerned with decision making within firms and the development of management information systems.

Three main strands can be identified in these early contributions, namely those of behavioural scientists, economists and accountants. Likert was in the vanguard of the behaviourist approach particularly with his 1967 book "The Human Organisation : Its Management and Value". The main contribution from economics can be

found in the works of Becker (1962 and 1964) and Oi (1962). Amongst the early contributors from the discipline of accounting were those of Hermanson (1964) and Flamholtz (1969)

In the years that followed, the development of the subject of HRA was undertaken mainly by academics with a background in accounting. Notable amongst these is Eric Flamholtz who has published extensively on the subject. Over the years there have been a number of reviews of the subject including those by the American Accounting Association (1973), Flamholtz (1974), Craft and Birnberg (1976), Sydenham (1979), Tsaklanganos (1980), Dawson (1985) and Flamholtz (1985). From these the main approaches can be identified as,

- (1) economic cost models
- (2) historic cost models
- (3) replacement cost models
- (4) stochastic reward valuation models
- (5) total organisational models
- (6) a bidding model.

A brief review of each of these model types is presented below.

1.3.2 ECONOMIC COST MODELS

The economic cost model, sometimes known as the discounted cash flow model (Savich et al., 1976: 15) was first proposed by Lev and Schwartz (1971) who acknowledge the link between their own approach and the human capital theories of Becker and others. The major

objective of Lev and Schwartz was, as they noted (1972: 153)

"...to expose accountants to the economic concept and measurement procedures of human capital and in particular to point to some possible accounting implications of this concept."

They were writing at a time when the main theme of discussions about HRA was how human resources or assets could be best represented in financial statements. As Cerullo points out (1978: 199-200);

"In pursuing their model Lev and Schwartz defined capital as a source of income stream and its worth as the present value of future income discounted by a rate specific to the owner of the source. Using the present value concept, the model consists of a present value formula equating the remaining future earnings from employment of a given employee ...to the expected human capital value of a person.... - the expected human capital value of a person t years old is equal to the possibility of death not occurring prior to retirement age multiplied by the estimated future earnings discounted at a rate specific to the individual. Lev and Schwartz used general statistical tables and census earnings data based on age, sex, race, education, geography etc. to implement their model. If this data were interpreted precisely it would be possible to establish earnings profiles for very specific occupations."

In a later paper Friedman and Lev (1974) claim that the measurement of a firm's human resource investment is consistent with the economic concept of human capital. The investment, they argue, is based upon the difference between what should be paid to the employees if the investment did not take place and the actual payments. As such the measure is based upon the firm versus the market wage relationship.

These models were proposed by economists who were drawing together neo-classical "marginal theories" and human capital theories. An important issue that they highlighted was what may be termed the "problem of jointness" which is put succinctly by Friedman and Lev (1974: 243)

"At least two serious problems are encountered in trying to implement a value determination. First, we need a reliable estimate of the firm's future net earnings, which it is difficult to obtain in a world of uncertainty. Second, we need some basis for allocating the total present value of the firm among the various inputs (e.g. labor, capital, etc.). The criterion for such an allocation should obviously be the inputs' marginal productivities (i.e. marginal physical product times the price of the product). However, the interaction among inputs involved jointly in the production process makes it extremely difficult, if not impossible, to determine individual marginal productivities. For example, in most production processes, the marginal productivity of labor depends, among other things, on the quantity and quality of plant and machinery (capital) available. Thus, should an increase in total productivity be attributed to labor, capital, or both (and then in what shares)?"

Though this issue was identified for economic cost models it represents a general problem for HRA, one which though circumvented by some other models remains largely unanswered.

1.3.3 HISTORIC COST MODELS

These models conform closely to the traditional accounting approach to dealing with conventional assets. The direct and indirect costs of acquiring a worker are accumulated. This asset value is then depreciated or amortized over the expected length of service of the worker provided this exceeds the

duration of one accounting period. Should the acquired worker not stay longer than a single accounting period then the costs of acquisition are "expensed" in that period.

Advocates of this type of approach (Woodruff, 1970; Pyle, 1970; Weiss, 1975) claim that it has the advantage of compatibility with existing accounting information. As such it has both financial and management accounting applications. The compatibility of this approach with *financial accounting arrangements* which derives from the treatment of human assets in the same way as conventional non-human assets concentrates attention on the differences between these two types of asset. One such difference relates to ownership since workers unlike non-human assets are not owned by the organisation that employs them, and therefore cannot normally be disposed of to raise cash as can conventional assets. Another issue which is not easily addressed by historic cost models is that of the appreciating rather than depreciating human asset. Where appreciation occurs as a result of expenditure on training and development such investments can be capitalized. Where appreciation occurs as a result of what might be termed learning curve factors unattributable to direct investment in training these models have difficulty in representing the added value whilst maintaining compatibility with the principle

that investments involve either direct or indirect expenditure.

1.3.4 REPLACEMENT COST MODELS

Some replacement cost models are little more than historic cost models incorporating the ideas of inflation accounting (Fadel 1977). The approach put forward by Flamholtz (1973) is however more than just a "price adjusted" historic cost model. As Flamholtz notes (1977: 10);

"Positional replacement cost refers to the sacrifice that would have to be incurred today to replace an individual in a specified position with a substitute capable of providing an equivalent set of services in the given position. It refers not to replacing a given individual but to the cost of replacing the set of services required of any incumbent in a specified position."

In calculating replacement costs Flamholtz uses outlay and opportunity costs. The use of opportunity costs within this model means that figures generated are not appropriate for use in financial accounting applications. The reason for this is that replacement costs are in their computation incompatible with other data generated for financial accounting purposes. With replacement cost models not only does the emphasis of application move to management accounting but it also has the effect of de-coupling management accounting information from financial accounting data. In practical terms such a de-coupling is not particularly significant since even in their conventional areas of application these two aspects of accountancy have only

a tenuous unity. It is the broadening of the concept of cost which is the significant difference between this approach and that of historic cost models. Flamholtz said of this approach (1973: 11) " ... there may be as many appropriate replacement costs concepts as there are functions for the construct."

This is an important claim since it implies that the value (for which cost is used as a surrogate measure) can be computed differently depending on the use to which it is being put. In other words the value of a worker depends upon the purpose to which the valuation is to be put.

In his replacement cost model applied to personnel in a medium sized insurance company, Flamholtz (1973) identifies three components; acquisition costs, learning and separation costs. Each of these components is further subdivided. Acquisition costs are made up of the direct costs of recruitment, selection, hiring and placement together with the indirect costs of promotion or transfer from within the organisation. The learning costs are made up of the direct costs of formal training and on the job training costs and the indirect costs of the trainer's time. The separation costs are the total of the direct costs of separation pay and the indirect costs of loss of efficiency prior to separation and the costs of the vacant position during the period of search for a replacement. In another study Flamholtz and Geiss (1984) calculated the

value of naval personnel using the replacement costs model but on this occasion separation costs were not included.

1.3.5 STOCHASTIC REWARDS VALUATION MODELS (SRVM)

The stochastic rewards model for human resource valuation was first presented by Flamholtz in 1971. This model represents one of the more sophisticated approaches to the subject of HRA. Flamholtz and Wollman (1978) claim that the benefits to be derived for personnel managers using this model are both in terms of the measurement process required to implement the SRVM as well as the numbers derived from it. They describe the conceptualisation underlying the model and its variables in the following way (1978: 21-22):

"The model views the movement of people through an organisational hierarchy as a stochastic process. Individuals have specified probabilities of remaining in their present positions, being promoted to higher level positions, transferred laterally, or leaving the organisation. Thus the states which people may occupy in the system include positions and the final state of 'exit' (occupied when a person leaves an organisation). 'Rewards' are derived by the organisation when individuals occupy a service state for a specific time period. The magnitude of the reward depends upon the state occupied. However we assume that when a person 'occupies' the state of exit, the reward derived by the organisation is 'zero'. There are two related dimensions of a person's value to an organisation: (a) expected conditional value, and (b) expected realisable value. Expected conditional value is the maximum expected potential value of an individual to an organisation. It is the mathematical expectation of an individual's potential value to an organisation, under the assumption that the person does not leave the organisation. Expected realisable value is the expected value of a person to an organisation if we take into account the

likelihood that he (she) may leave during the anticipated service life ... The end result or ultimate measure of a person's value is the expected realisable value - the present worth of service actually expected to be derived during an individual's anticipated tenure in the organisation.... The difference between the expected realisable value and the expected conditional value is imputed cost of turnover."

In order to operationalize the model for any particular individual within an organisation the following information is required:-

- (1) the mutually exclusive sets of states that the individual may occupy within the organisational system;
- (2) the value of each of these states to the organisation;
- (3) the estimated expected tenure of the person in the organisation;
- (4) The probability that the person will occupy each of the possible states, noted in (1) above, at specified future times, and
- (5) the discount rate to be applied to future cash flows to determine their present value.

A variation on this model was put forward by Jaggi and Lau in 1974 when they proposed that groups rather than individuals should be the unit of valuation since these could be manipulated through the use of a Markov chain model. A suggested refinement of their model was published by Lau and Lau in 1978 when the use of probabilistic depreciation procedures was proposed.

With all these models there is a requirement to measure the value of the service states. When discussing this

Flamholtz notes that ideally this is the discounted future earnings derived by the firm, resulting from the individual's occupation of the service state. He states that in principle this can be measured by either the price quantity method or the income method. The former, he says, involves the determination of the price per unit of human services and the quantity of the human services. This may be possible in jobs that interface directly with paying customers, such as salespersons, but even then an adjustment would have to be made for the support of non-interfacing colleagues, since it would be unrealistic to attribute all the worth to one job. How should such an adjustment be made? Transfer pricing is suggested, but if this is to be acceptable, the transfer price must itself be justified, which would involve the determination of the worth of its service state.

The alternative approach, the income method, is no less problematical. This method according to Flamholtz (1988 : 201) " ... involves forecasting the expected earnings of a firm and allocating them between human and other resources and further allocating them among specified people."

This is the problem of jointness identified by Friedman and Lev which is outlined in section 1.3.2. Flamholtz acknowledges that there are many organisations in which it is very difficult, if not impossible, to obtain a

measure of service state value using either price quantity or income methods. In these cases, he suggests the use of surrogate or proxy measures. Possible surrogates are, he suggests, original costs, current costs, replacement costs, compensation and opportunity costs.

The SRVM can be said to be a combination of the historic or replacement cost models, (depending upon which is chosen to provide a surrogate measure of service state value) and the economic cost model with its discounting of future potential earnings/contribution up to the point that the individual quits or exits from the organisation.

1.3.6 TOTAL ORGANISATIONAL MODELS

The best known total organisation approaches are those of Hermanson (1964) and Giles and Robinson (1972). Hermanson's unpurchased goodwill method relates the performance of income to owned assets of the organisation to the average for comparable organisations. Any performance in excess of the norm is attributable to the human resources and this difference in performance is capitalised to represent the value of the human resources.

In the Giles and Robinson model the going concern value for the organisation is obtained by using the appropriate price earnings ratio and after tax profits, which is reduced by the net assets of the business to yield the human asset value. This human asset value

figure is further divided amongst the various types of labour employed in the firm by a device referred to as a human asset multiplier which is akin to relative values under a job evaluation scheme.

1.3.7 COMPETITIVE BIDDING MODEL

The competitive bidding model was put forward by Hekimian and Jones in 1967. They proposed that all investment centre managers within a company are encouraged to bid for any scarce employee they want. The manager whose bid is successful then includes the bid price in his or her investment base. In such a way a "market" value of the employee is determined.

Whereas the Hermanson total organisational model bases its valuations on the apportionment of the value of outcomes actually achieved this model bases the valuation on anticipated outcomes expected to be achieved by the utilization of specific human resources. The judgements are made by the managers responsible for the resources when they make their bids. So it is their perception of value that is important. There are four implications of this viz:

- (1) those who have responsibility for the human resources are in the best position to establish their worth;
- (2) the value of an employee need bear no relationship to the cost of his/her acquisition;
- (3) the value of the same employee to an organisation

will differ from profit centre to profit centre and maybe within the same profit centre over time, depending upon the needs of that profit centre;

(4) the value of an employee at any moment in time is influenced by the other assets, both human and non-human that are available for utilization by the decision maker whose bid is used to establish the worth of the individual.

1.3.8. AN OVERVIEW OF HRA MODELS

The purpose of each of the models described in the previous sections is to provide a way of measuring/calculating the value of workers to the organisations in which they are employed. With the variety of approaches offered it is unlikely that any two would yield the same results in a given situation. This suggests that the various models are not offering different methods of computing the same value but are offering different definitions of value.

As the published material on HRA expanded it became apparent that some fundamental considerations of measurement were needed. Both Sydenham (1979) and Grove et al (1979) considered the question of measurement. Sydenham (1979: 11) noted;

"Many different measurement methods exist in accounting. Criteria are required to select the best measurement method. The usefulness of the data for a particular purpose is an important criteria. Objectivity and reliability are both considered important aspects of usefulness."

This criterion of usefulness can be applied to each of

the models. Grove et al have classified models as being based either upon input attributes : which could include the economic cost models, historic cost models and replacement cost models, or based upon output attributes, as in the case of stochastic rewards valuation models, total organisation models and competitive bidding models. They noted that there is a trade off between reliability and validity in each of the two classifications of models. They conclude that the reliability of input measurement is quite good because cost measures are generally verifiable but the validity of employing an input attribute as a surrogate of human value to an organisation is questionable. Conversely output attribute models have lower reliability but higher potential validity in terms of measuring the human value attribute. The major measurement problem of the output attribute models is that of assigning numbers, especially monetary values to output attributes of interest but without sufficient investigation of causal networks. This limitation is more than just the "problem of jointness" already discussed, rather it centres upon the concept of value itself. Value is a complex social construct. Conventionally, a distinction is drawn between use value (utility) and exchange value. The two, though conceptually different, are expected to be practically the same, since rational decision makers would only pay the amount (the price at purchase representing the

exchange value) that equals their anticipated utility from the purchase. Under these circumstances, the utility value of anything can be deduced from its exchange value and vice versa. Because utility may be idiosyncratic, it is normal to construct theories based on exchange value. Such theories explain the effects on value of various conditions relating to supply and demand by a logic that assumes that decision makers act in an economically rational way. This rationality is of central importance to the sustenance of economic theory. In circumstances where actual exchange behaviour is uncommon, rationality is determined by belief rather than experience of behaviour.

The beliefs of decision-making managers are likely to be influenced not only by the data that they receive as the raw material of their decision making, but also, less directly, by the beliefs embodied in the systems from which the data are generated. HRA as a field of study has sought to develop ways to quantify the value of workers. But since workers are rarely "bought" or "sold" in the conventional sense very few, if any, clear cut exchange transactions take place, so values have to be based upon synthetic beliefs rather than beliefs derived from direct experience of behaviour.

A weakness of the HRA models put forward (particularly the input based models) is that they seem to have an in-built contradiction. Can models that purport to

provide a means of determining the value of labour use, as the basis of their computation, data derived from information systems that are based on concepts that deny that value? Notwithstanding this problem there are a limited number of applications of HRA in organisations. A brief review of applications of HRA is presented in section 1.5.

1.4 EXPERIMENTS SHOWING THE EFFECT OF HRA DATA ON DECISION MAKING

The claim that the workforce of an organisation is its most valuable asset is not confined to personnel specialists. Chief executives quite frequently offer the the same opinion in their annual reports and acclaimed academics like Prahalad and Hamel (1990: 87) from disciplines other than personnel management make statements in the same vein;

"How strange that SBU managers, who are perfectly willing to compete for cash in the capital budgeting process, are unwilling to compete for people - the company's most precious asset."

This belief in the importance of the human resource is often the starting point for the claim by advocates of HRA that if these resources had their value expressed financially then their importance would be recognized by decision making managers who would, as a consequence, behave differently. Mee (1982: 46) claims that;

"The mere fact that something is measured tends to focus attention on it and since accounting is a process of information selection, that which is selected is a significant factor in determining

the focus of attention of management."

In 1975 Flamholtz put forward a model of the hierarchy of measurement effects on decisions ranging, in descending order of their impact on decision makers, through: profit; monetary; quantitative excluding money; qualitative statements about measurement; qualitative information without measurement. Though no evidence was supplied at the time to justify this claim the significance of the impact of the application of monetary values to human resources upon the decision making behaviour of managers has become almost an act of faith on the part of advocates of HRA. This may explain why there has been so little research to determine whether the use of HRA data does in practice have the impact that is supposed.

A limited number of controlled experiments have been conducted to test whether the provision of HRA type data has an influence on management decision making behaviour. The experiments to be reviewed here are those of Flamholtz, Tomassini, Harrell and Klick and Gul, all of whom have sought to demonstrate that the introduction of HRA data changes significantly the behaviour of managers.

In the first experiment (Flamholtz, 1976) 35 public accountants in a large U.S. C.P.A. firm were presented with a series of cases requiring the decision makers to choose between two individuals for a job assignment. The procedure was to present decision makers with three

sets of information cues, traditional performance appraisals, non-monetary human resource valuation information (mobility probabilities) and finally monetary human resource valuation information derived from the "Stochastic Rewards Valuation Model". The conclusion drawn was that the human resource value and numbers per se apparently influence the criteria used in reaching decisions as well as the decisions themselves.

In the second experiment (Tomassini, 1977) the area that the researchers wished to investigate was the effect of HRA cost estimates on managerial decision preferences in a personnel lay-off context. The subjects in this experiment were 52 upper division and graduate accounting majors from the University of Texas in Austin. Each subject was randomly assigned to either an experimental group which had access to both conventional accounting and HRA data, or to a control group which had access to conventional accounting data only. The experimental procedure required the subjects to read one of two case scenarios (separately designed for the two subject groups) and to respond to questions which elicited their preferences for the scenarios' decision alternatives. When reviewing the decision preferences the researchers tentatively concluded that the HRA cost estimates caused different managerial strategies to be considered.

The third experiment (Harrell and Klick, 1980) involved 166 senior U.S. Air Force colonels as subjects, who were required to make judgements on the promotability of eligible captains to the rank of major. Each subject completed a decision making exercise that contained thirty-six hypothetical cases. Twelve cases presented the replacement cost information as non-monetary numbers (number of months), 12 cases presented the replacement cost information as monetary numbers (dollars). The remaining 12 cases which were neither required nor used in the analysis had both forms of information and were included solely to emphasize the equivalent information content of the non monetary and monetary numbers. The research findings supported the proposal that monetary human asset measures possess an inherent advantage over non-monetary measures in competing for decision makers' attention. Furthermore the findings implied that this advantage is substantial enough to be of practical consequence since the experienced executives who served as subjects in the experiment reached different decisions when utilizing the two different measures.

The fourth experiment, (Gul, 1984) conducted in Australia involved 57 volunteer accountants as subjects. This experiment evaluated the usefulness of the application of HRA (specifically Human Resource Turnover Costs HRTC) to the question of labour turnover management in accounting firms, this having been

identified as a significant problem in the profession. The question of whether the HRA information was useful was determined in terms of whether its provision resulted in a perceived reduction of uncertainty and increase in relevance and sufficiency of the data by the decision making subjects. This was achieved by the provision of scenarios concerning labour turnover, with and without HRA data, in connection with which subjects were required to make a choice of action and indicate their level of certainty about its correctness. To check the relevance and sufficiency of the data provided, subjects were required to complete Likert-type scales to indicate their degree of satisfaction against these criteria for both sets of scenarios. The results confirmed the usefulness of HRA information in the form of HRTC in terms of a reduction of uncertainty and an increase in perceived levels of relevance and sufficiency.

The benefits derived from a controlled experimental approach are invariably obtained at some expense. In general terms it may be argued that such an experimental approach enjoys a high degree of reliability but that this is obtained at the sacrifice of validity.

The experiments described briefly above may to differing degrees suffer from limitations in validity. Validity is enhanced if the subjects whose decision

making is considered are the actual decision makers making real rather than hypothetical decisions and if those decisions are made in the real life context in which they may have to be defended against critics.

There is however a further point that warrants more detailed discussion, because it is of such central importance to the subject of the experiments. This relates to the generation of the costs used.

In all four experiments the researchers provided the subjects with the HRA type data they used. Although this data was presented in a variety of forms in each case it was computed by the researcher and provided to the subject. This may be important. The common purpose of all the experiments was to demonstrate the effect of the provision of HRA type data on decision making.

In each experiment the HRA type information was additional data of a novel kind that was presented to the subjects, even though in each experiment the basis of its computation was different. The very fact that such data was novel implied that the subjects would not be familiar with the basis of its computation. In each experiment what was being presented was some human resource information expressed in financial terms, when such a form of expression was not part of the subjects' normal framework of data used for decision making of the kind studied. The researchers then suggest in their conclusions that it is the effect of the provision of such data that causes the changes in the decision

making behaviour, rather than the data itself. It could be argued that to draw such a distinction is irrelevant especially if in the experimental design such factors as the ordering of data cues have been taken into account. Such a distinction is only entirely irrelevant if the data itself is valid. (In this context validity can only mean face validity). If however the validity of the data is open to question then the distinction becomes relevant.

There is no clear evidence that it is the data itself rather than its provision that caused the observed changes in decision maker behaviour. However comments by both Tomassini and Flamholtz make it reasonable to raise the question. Flamholtz (1976: 163) acknowledges that what he refers to as, "inadequate learning or comprehension of the subjects" of the HRA type data used may have had an effect. Tomassini (1977: 912) suggested that some of the subjects may have doubted the accuracy of the HRA data. No such queries were raised with the other two experiments.

These four experiments, dealing with different areas of decision making and using different methods for computing the "values" of the human resources under consideration do not provide overwhelming evidence to support the claim that the use of HRA type data significantly alters managerial decision making behaviour. However, the very differences between the

experiments raises the question of what is meant by HRA in application. This question will be considered in the next section.

1.5

HRA APPLICATIONS

Identifying applications of HRA is not as straightforward as may be expected. If the broad definition of the American Accounting Association quoted in section 1.2 is used then HRA is a reasonably commonplace activity in many organisations. Within many organisations records are maintained of the costs of employee acquisition and training and development and there are many published accounts of companies and public sector organisations costing their labour turnover (Buchan et al., 1988). This cost data is apparently quite widely used in personnel management and general management decision making. Whether such data and its use is what may reasonably be called the application of HRA is a moot point. In recent years managers in most organisations have shown an interest in controlling costs wherever they occur. Whether when these activities are applied to areas of personnel management the results can be classed as examples of HRA in operation calls into question the definition of the concept itself.

If a narrower definition of HRA is used then there are few organisations operating what might be called full blown systems. Nor do there seem to be many organisations in which use is made of any of the

models (either in a partial or complete form) described in section 1.3.

Flamholtz (1985) identifies four phases of application which he terms first and second generation accounting systems for human resource costs and first and second generation accounting systems for human resource value. Amongst what Flamholtz refers to as the application of first generation cost systems is the R.G. Barry Corporation, a manufacturer of soft goods. This company provided an example of one of the most comprehensive systems to be developed. In their system conventional accounts and accounts that included human resource assets and liabilities were produced. These were accompanied by a range of managerial internal control devices based upon HRA data. The approach adopted at the Barry Corporation was based on the principles of the historic cost model approach outlined in section 1.3.3.

An example of what Flamholtz refers to as a second generation cost accounting system is that of the supervisory industrial engineers employed at two U.S. Naval facilities, which is reported in Flamholtz and Geiss. (1984) This is far from being a complete system, since the application was limited to a single type of employee. There is no attempt to integrate the information obtained, which was based on the replacement cost model outlined in section 1.3.4, with

the rest of the U.S. Navy management information system.

There appears to be no difference between Flamholtz's examples of first and second generation accounting systems for human resource value. Both involve the use of the SRVM described in section 1.3.5. In what he refers to as a first generation application he cites Lester Witte and Company, a firm of accountants. This application, though developed, never reached completion. As an example of a second generation accounting system using human resource values Flamholtz offers the case of a financial services corporation that used the SRVM to determine the fair market value and related depreciation of a select group of personnel for tax purposes. The individuals were employed by an organisation that had been acquired by the financial services corporation concerned. It is unclear from the description provided whether the management's attempts to realize a cash flow saving by offsetting the depreciation of human assets was successfully achieved. Certainly there is no impression given that the corporation concerned developed and operated any comprehensive system of HRA.

It would seem that whilst there are many examples of costing human resourcing activities there are very few organisations that have developed, operated and maintained fully integrated systems of HRA which are based upon valuation of the human resources.

1.6 CONTRIBUTIONS TO HRA THEORY AND PRACTICE

1.6.1 INTRODUCTION

In section 1.3.1 it was noted that the early contributions to the development of HRA came from economics, accountancy and the behavioural sciences. Since the practical and theoretical approaches of each of these groups differ their synthesis into a single concept of HRA is not without tension.

The contributions of the three disciplines to the subject of HRA also differ. Economics provides the theoretical foundation, accounting provides the rules for generating the data for measurement purposes and personnel management is concerned with operationalisation. The link between economic theory and personnel management practice passing as it does through the measurements of accountancy is a tenuous one. Managers who take decisions on matters that would seem to be related to the concepts of HRA do so often in complete ignorance of the economic theories which underpin the concept, and sometimes with little appreciation of the principles of accountancy that might be involved.

The purpose of this section is to show how these three contributions relate to one another and where the points of tension exist.

1.6.2 THE CONTRIBUTION OF ECONOMICS

Whilst economics provides the theoretical foundation of

HRA that theoretical underpinning derives from quite basic economic ideas.

Coyne et al. (1977 p.1) have defined economics as; "the study of the allocation of scarce resources among unlimited wants."

Labour is one such a resource in which economists have taken an interest. Most economists do not concern themselves with the value of labour per se. Rather it is considered as a consequence of their attempts to understand and theorize on the subjects of the determination of wages and employment through the mechanism of the labour market. The study of the labour market normally progresses from an abstract theory using a series of simplifying assumptions which, as the argument is developed, are progressively relaxed to eventually yield a more realistic explanation.

In neo-classical theory demand for labour is treated as derived demand arising out of its productivity and its contribution to the revenue and profits of the firm (Marshall, 1961: 316-321). The basis of this theory is marginal productivity. The demand for labour depends jointly upon labour productivity and the marketability of the product of labour. A profit maximising employer will hire labour to the point where the last unit of labour adds an identical amount to both the output and the wage bill. In situations of imperfect competition the relationship between marginal inputs of labour and changes in total revenue is called the marginal revenue

product of labour. In the long term employers can vary their inputs of labour and capital to take account of their relative prices. A fall in the relative price of labour results in an increase in the quantity demanded, both because labour is substituted for capital and also because output is expanded as a result of the increase in labour inputs. The measure of the responsiveness of the ratio of factor inputs to changes in their relative prices is known as the elasticity of substitution.

In the discussion of this branch of economics and how it relates to HRA two further points need to be made. Firstly, the cost of labour to an employer is more than simply the wage rate. There are, as Oi (1962) points out, a number fixed costs associated with the employment of labour, such as the costs of its acquisition. Second, labour markets may be far from perfect and indeed many organisations have well developed internal labour markets which, as Doeringer and Piore (1971) point out, means that decisions concerning personnel deployment are a function of administrative rules rather than direct market forces.

A second contribution from economics, and one which has generally attracted more attention in the literature on HRA, is that of the theory of human capital.

Human capital theory is concerned mainly with the long term supply of labour. Becker (1975), in his development of the theory, considered the subject of

the training of workers as well as the question of education and its long term affects upon labour supply. The theory postulates that individuals spend on themselves in order to reap future benefits. This is the conventional concept of investment. Individuals may be expected to make investments in themselves both in the form of monies spent on education or training and in income foregone whilst accumulating their human capital, up to the point where the present value of future incomes is equal to the investment made when the individual's personal rate of discount is applied.

With respect to the investment, very often the individual is not the sole contributor. Other investors include the state and quite often the organisation for which the individual works. Before considering the investment from the perspective of the firm it should be noted that analysis of investment in human capital may differ from that of conventional investment analysis, because people are different in many respects from physical capital. The most important difference is that when a businessperson invests in a machine she or he assumes ownership and with that the right of disposal. When an investment is made in human capital, there is no lump sum of capital that could be sold, instead what is acquired is access to a service which has been facilitated by the investment. The service cannot be separated from the person in whom the investment has been made. This is not to say that the

lack of ownership of workers means that human capital theory has no relevance to decision making in the firm. The way that the theory can accommodate the problem can be shown by considering the question of training. Human capital theory develops an interesting distinction between types of training and their relationships to costs and revenues. Training can be divided into two categories on the basis of who pays for it. The two types of training which are best considered as extreme points on a continuum are "general training" and "specific training".

General training is general in the sense that the benefits that it yields are of value to many employers and not solely to the organisation in which the training takes place. Consequently a worker who has received general training can offer the services of his/her human capital freely in the labour market and his/her employer will offer him a wage that reflects only his/her current value in production. (i.e. the worker's net marginal product.) This means that whilst (s)he is undertaking the training the employee is actually bearing the cost of the process of investment. Specific training is useful only to the employer who provides the training, so one might expect that no worker would undertake this type of training if it involved him/her in any cost. If the employer needs specifically trained labour, (s)he must offer to pay

the potential trainee a wage during his/her training that is equal to his/her best alternative wage, which is likely to be greater than his/her net marginal product, given the normal assumptions about perfect markets.

So as Hunter et al (1981: 192) state;

"The returns to the investment in specific training accrue to the employer and are measured by the difference between the wage paid and the current net marginal product of the worker. For a profit-maximizing employer this simply means that an investment is made in training and yields returns at the current rate of interest over the working life of the employee so that the costs of the training are recouped."

This is in direct contrast to the case of the generally trained worker, who both pays for the cost of his/her training and reaps the return in the form of earnings equal to his/her (augmented) marginal product.

This is a somewhat simplified explanation and one point still needs to be developed further. Once the specifically trained worker has received the training, (s)he would be in a strong bargaining position if (s)he threatened to leave, because there would be relatively little cost to him/her as an individual but the cost to the organisation would be considerable. To avoid this the employer will be inclined to pay the worker a sufficiently high wage to make it attractive to him/her to stay with the firm, but which is still less than his/her marginal product. By doing this the returns from the specific training are shared by the employer and the worker, which would make the employment very

attractive to all workers. The employer would consequently be over-subscribed by workers wishing to be employed by him/her at that wage. As a result of this over supply the employer can require the workers to at least share some of the cost of the training. The extent to which these costs will be shared depends on a number of factors including the employer's estimate of the probabilities of workers leaving at different levels of relative wage.

The issue of ownership is therefore irrelevant provided the employer feels the necessary information concerning costs of training, wage rates and probabilities of workers quitting are available. With this information the decision maker would be in a position to make a reasonable judgement about the investment in training in the light of the expected stream of future benefits. The same would be true of other costs or expenditures such as those incurred in the acquisition process.

The principles of human capital theory can be applied to firms that do not seek to profit maximize and therefore do not conform to the basic neo-classical model. Though the computations may differ the principle of investment compared with estimated streams of future benefits is still applicable. However, whether the objectives are profit maximization or sales maximization or something else, the theory does assume that decision makers behave in an economically rational

way.

1.6.3 THE CONTRIBUTION OF ACCOUNTANCY

As Wood (1985: 1) notes; "Accounting is often said to be the language of business". The representation of business activity in financial terms, through the language of accountancy covers not only what has happened within the organisation but also provides the basis for planning and control. The traditional view of accounting is of a neutral technical process. As Hopper et al. (1987: 438) note; " ... conventional accounting texts represent organisations as instruments designed to advance shared interests, and depict accounting merely as an enabling device." This traditional view of accounting has in recent years been the subject of critical review. In chapter 10 some of these criticisms and how they relate to HRA are considered.

If accountancy is the language of business then the syntax of that language has a profound effect upon the meanings that are expressed through it. One of the most important differences between the approach of economists and accountants relates to the *meaning of value*. For the economist the value of anything is its ability to render future utility, benefits or services. So when the economists speak of the value of plant and machinery they are concerned with the services that such equipment can yield. Indeed it is their services rather than the items themselves which constitute the factors of production. When accountants speak of value

there are elements of similarity, but also differences. The accounting usage is rather narrower in that the value tends to be expressed in terms of the object itself in that the object represents money or could be converted into money. Such objects are referred to as assets. The logic of the accounting position is that the value may derive from the future services that will be rendered by the use of the asset, but that they are embodied in the asset, since if necessary that object could be sold to another party who could then reap the future benefits. Ownership therefore becomes an essential attribute of an asset. From an accounting perspective ownership is a necessary but not sufficient condition to give an asset value. The future stream of benefits must still be realisable. So, if for example, a piece of plant owned by an organisation was dedicated to the production of goods, the market for which suddenly disappeared, then the value of the asset would become the price that could be obtained for it as scrap. If it had no scrap value then it would have no value and would cease to be an asset.

The requirement of ownership in defining assets has enormous consequences in terms of performance measures within organisations and therefore potentially upon management decision making. Economists view a combination of different factors of production coming together to represent economic activity within the

entity of the firm. The mix of the various factors of production may theoretically be infinitely variable. There is no reason why one factor of production should automatically be considered as fixed and the others as variable, rather they are all potentially variable. They may not all come in the same sized units, but in the long run they are at least all variable. Decision makers seek to achieve the most efficient combination of these factors of production. As Hermanson notes; (1964: 2) "From an economists point of view it would seem therefore, that assets, resources, expected future services, and factors of production are identical concepts." Ownership is not a requirement for an economist's asset. Therefore to economists the concept of human assets is reasonable. This is not the case for accountants since (outside of a slave economy) human resources cannot be owned.

There is no suggestion within accountancy that workers do not combine with other assets (both fixed and current) to produce sales and profits, simply that they are not measured in the same way. The effect is that, within the language of accountancy, human resources cannot be presented in a way that expresses future utility. This is reserved for owned assets. The syntax of the language of accountancy does not allow the concept of human capital. Consequently the language encourages the treatment of human resources not just as current but also as variable inputs to the mix of

resources to be determined by decision makers. Equally the language discourages, because it provides no means of expressing the use of human resources as the relatively fixed resource to which increments of other factors of production are added to arrive at the most efficient combination of resources within the organisation.

The language of accountancy encourages the view of labour as the variable resource which is added incrementally to other factors of production up to the point where the desired results are achieved. One effect of this relates to the valuation of other non-human assets.

The logic of an investment in a piece of equipment is that over its anticipated life its use will yield net benefits at present value which exceed the expenditure involved in its acquisition. It is recognized that the piece of equipment does not generate the benefits working alone, but has to be used in conjunction with other resources, including human resources. The costs of these other resources are taken into account when arriving at the projected net benefits stream for the expected useful life of the equipment. The effect is that all the stream of benefits is attributed to the equipment and none to the labour. (Dawson, 1988c: 31-32) The decision to invest in the equipment depends upon the discounted stream of net benefits equaling or

exceeding the purchase price. If this is the case then the asset will be bought and its purchase price will, quite logically, be used as a surrogate measure of its value. This representation of the value is only logical and valid if appropriate account has been taken of the "costs" of the human resources that were computed to arrive at the stream of net benefits. If, as may be the case, the workers will learn new skills in using the equipment (learning which may not involve formal training) and that these skills are potentially usefully transferable to other activities in the firm, then the stream of net benefits should be adjusted to take account of the "value" of these new skills and the probability of them being retained in the organisation. Unless this is done the asset valuation given to the equipment is a misrepresentation. The magnitude of such a misrepresentation may not be great and therefore not very important where the purchase price of the equipment is much greater than any potential value of any enhanced human resources. Conversely, however, it may be very significant where the relationship is reversed.

To summarize, the conventions of accountancy do not allow human resources to be treated as assets the value of which would be represented by the discounted expected stream of benefits deriving from their acquisition or development. The use of the term is confined to objects or entities which are owned by the

organisation. The value given to such objects is derived from their discounted expected stream of benefits, for which their purchase price may be used as a surrogate measure. Such a stream of benefits can however in most cases only be obtained if the asset is used in combination with human resources. The effect of this rule of ownership for the definition of assets is twofold. Firstly, human resources can only be expressed in terms of cost and not value. Secondly, deriving from this, it is almost inevitable that human resources will be treated as the variable input, with traditional assets treated as fixed, when decision makers have to determine the most efficient mix of resources to achieve any given output. Whilst the good sense of this may be open to question, especially in circumstances where there may be little difference in the predictability of future useful life of conventional assets and the expected rates of labour retention, and/or the "costs" of acquiring workers and conventional assets may be similar, it will make little practical difference, since accountancy, even if is not the sole language of business, is certainly the dominant tongue.

1.6.4 THE CONTRIBUTION OF PERSONNEL MANAGEMENT

Defining Personnel Management is not easy. Much of what is written about it is of a normative character. The activities undertaken by employees in organisations,

which are referred to as personnel management, vary considerably. Moreover, neither is it clear whether these activities are performed by individuals who are "personnel specialists" or whether they are undertaken by "line managers". This matter is discussed thoroughly by Legge (1978). For current purposes the function of personnel management is taken to be the optimal utilization of human resources in pursuit of organisational goals. Legge argues (1978: 60);

" ... most would agree that personnel management, by definition, is chiefly concerned with the acquisition, maintenance and development of one of the resources (i.e. the human resource) through which organizational ends are achieved, rather than with the ends themselves. They are concerned with means rather than ends and inputs rather than outputs, and in situations where there is difficulty in determining the relationship between the two. This is for two reasons. As stated previously, personnel managers, by the very nature of their function, are dealing with a resource that cannot be manipulated as easily as inanimate objects. Compared with that related with other factors of production (such as machinery or capital), the theory that explains the behaviour of the human factor is less developed, less systematic, and certainly less easy to apply in an organizational context, where there may be ethical objections to activities that smack of human engineering. Thus, the relationship between the effort and ability expended by the personnel manager and the achievement of his objectives (let alone organizational objectives) is often far less certain than it is for the production or engineering manager, for example dealing with inanimate objects- except, of course, when these managers do in fact take on 'personnel' activities (e.g., when training, motivating, rewarding, and sanctioning the workforce). Moreover, because personnel is chiefly concerned with providing efficient inputs for use within other functional systems (e.g., those of sales, R and D, production, finance, and so on), not for use within its own system, the outputs these resources generate are achieved within, and are seen to be the achievement of these other systems. As

discussed earlier, even if employees' ability to achieve required outputs is an indirect result of good personnel management in the areas of recruitment, training, development, and conditions of employment, the specific contribution of personnel is difficult to measure and isolate from effects of market and other organizational factors. The problem exists that, while a personnel department can measure its performance in terms of the number of activities undertaken - for example, the number of training and development courses run, the number of jobs evaluated, the production of a personnel manual itemizing conditions of employment, and personnel procedures - it can rarely, at present, demonstrate in quantifiable terms that X quantity and quality of these activities will have Y influence on employee behaviour, which in turn will contribute in Z degree to the achievement of a specific organizational end."

If the function of personnel management involves determining and causing the optimal utilization of human resources, the establishment of optimality cannot be achieved by the consideration of inputs alone. Moreover, the determination of optimality implies both measurement and a pro-active approach in terms of the personnel management contribution.

As Legge argues, the desire by personnel specialists to make such a pro-active contribution may be a far cry from what they actually do. In order to be able to make such an impact they must operate from a position of power. Legge suggests two different approaches to the "power" problem of personnel specialists; those of "conformist innovation" and "deviant innovation". Innovation is conformist in that it is based on an acceptance of, rather than a challenge to, the existing organisational ends and conforms to the dominant

financial basis of criteria for evaluation. Not surprisingly therefore Legge proposes HRA as one form of conformist innovation. However, she does note (1978: 81 -82);

"Conceptually, the underlying assumption behind all the methods, that it is an advantage to have well-trained and high-cost people, may be at variance with the usual business objective to be maximally profitable with a minimum of assets and costs, and with the usual (British) business practice, compounded by banking conventions, of putting a higher priority on short term profitability, in response to shareholders demands rather than on long-term investment and growth. Practically there are numerous problems to be ironed out in application."

As a means of conformist innovation HRA would need to conform to existing organisational ends, and since these are usually expressed in terms of accounting measures it would also need to conform to existing accounting conventions with the implications discussed in the previous section. This is likely to result in a convergence of the activities of personnel specialists and accountants. Armstrong (1986; 1989) concludes that the evidence indicates that such a convergence is likely to take the form of a take-over of personnel management by Management Accounting.

Armstrong's conclusions should be seen in the context of the current debate about personnel management. Indeed the term "Personnel Management" has in some quarters been largely displaced by that of "Human Resource Management". As Storey (1989: 4-5), when commenting on the term Human Resource Management (HRM),

notes;

"In the 1980s it has, however, come to denote a radically different philosophy and approach to the management of people at work - applicable alike to manual workers, staff and managerial grades. In its reworked usage it often purports to signal the interweaving of a number of elements which, in sum, demarcate it sharply from personnel management as commonly understood."

As Storey goes on to say (1989: 6); "The attribute of HRM which perhaps excites the most intense interest is that which allegedly locates HRM policy firmly at the strategic level."

There has been considerable discussion on this so called strategic aspect of HRM including recent contributions from Purcell (1989), Brewster and Smith (1990), Armstrong and Cooke (1990) and Georgiades (1990). Indeed as Poole (1990: 1) writes in introducing the first edition of "The International Journal of Human Resource Management"; "A central aspect of human resource management is the link with business policy and strategic management." Writing of the origins of HRM Hendry and Pettigrew (1990: 17) make direct reference to HRA;

"The stress on 'human resources' as an organizational asset goes back at least to Drucker (1954). This was elaborated in the theory of 'human capital' by Schultz (1963) who was concerned to describe the benefits of education as a 'production good' enhancing the economic resources of society, and by others like Becker (1964) who argued for the benefits to economic growth of a well-trained workforce. While labour market segmentation theory developed in reaction (stressing institutional processes in labour market formation), human asset accounting in the 1970s applied the capital theory to quantifying investments in people by the organization

(Flamholtz 1974). This was embraced by some (for example, Likert, 1967) as a way of encouraging humane employment policies, less geared to the short term (although others saw in it the rule of accountants)."

Guest (1987: 507) argues that the literature suggests that a stereotypic view of personnel management uses evaluation criteria of cost minimization whilst HRM uses criteria of maximum utilization (human asset accounting).

The use of terminology associated with HRA would seem to be more common in the HRM literature than that of Personnel Management. As can be seen from Poole (1990:

3) HRM can be defined very broadly;

" ... human resource management is viewed as strategic; it involves all managerial personnel (and especially general managers); it regards people as the most important single asset of the organization; it is proactive in its relationship with people; and it seeks to enhance company performance, employee 'needs' and societal well being."

Many definitions and descriptions of HRM make use of, and indeed emphasize the term "asset". It would seem that, whilst the term is not employed in a technical accounting sense, it is used to evoke the notion of a wealth generating resource. The term is associated with that strand of the concept of HRM which is concerned with developing the potential of human beings in employment. There is however another strand to be found in the definitions of HRM. This second strand is associated with the notion of "bottom line performance", where performance is measured in the

traditional financial way using normal accounting conventions. These two strands are only compatible from a unitarist perspective in which the growth of individuals is presumed to be congruent with the financial performance of the organisation in which they are employed.

As Legge (1989) points out, HRM embodies the fundamental "contradictions of capitalism". These contradictions in HRM expressed in terms of HRA are that human resources should behave like, and should be encouraged to see themselves as assets, but in the final analysis must be treated as costs. As Dawson notes (1989b: 11);

"The dual meaning of the word 'resource' in HRM, that of commodity/factor of production or creative energy behind wealth generation, is particularly poignant when used in HRA. Management rhetoric will no doubt emphasize the 'creative image' whilst management actions reflect the 'commodity status'. HRA has always been put forward as an adjunct to conventional accounting, rather than as an alternative and, as such, like HRM it has contradictions embedded within it. Both HRM and HRA, in the sense that these terms are normally used, are of little relevance within the accounting hegemony."

The difference between the two approaches and the contradictions is presented succinctly by Legge (1989: 26) when discussing Storey's "hard" and "soft" versions of HRM.

"The former emphasizes the quantitative, calculative, and business strategic aspects of managing the headcount resource in as 'rational' a way as for any other economic factor and the latter emphasizes communication, motivation and leadership. Put differently the 'hard' version might be said to emphasize the management aspect,

and the 'soft' version the human resource aspect of HRM"

Whilst abstract theories of economics can accommodate both "hard" and "soft" versions of HRM the principles of conventional accounting practice facilitate only the measurement of the "hard" version.

1.7 THE RESEARCH AND ITS CONTRIBUTION TO HRA.

Much of what has been written on the subject of HRA and most of the models and theories that have been put forward are of a normative kind. The authors have proposed new ways of looking at the subject of the value of workers, and how such values should be applied by managers. The authors advocate ways that managers should represent the value of labour financially and how this representation may or should be used. They start, therefore, with models of how the value of labour should be measured and made explicit. In previous sections it has been argued that such models, constructed as they are in the main using existing accounting conventions, suffer from inbuilt contradictions.

Normative approaches to the subject of HRA are valuable in as far as they prompt debate on the subject of the value of labour. It must, however, be conceded that their impact upon the practices of management have been limited. This is not to say that managers operate with a total disregard to the concept of labour having value. Such value is not, however, made explicit in

conventional accounting terms.

Within this research a positive approach is adopted. Rather than offering another model of how labour ought to be valued, the research attempts to discover how labour is valued by practicing managers. To achieve this the managers who act as the subjects in the research use a simulation model of the process of employee acquisition, to which they input costs and benefits.

The simulation, which is presented in a way which allows managers to explore the relationships among resourcing activities/situations and the relative costs and benefits associated with different resourcing strategies, also provides a means for collecting the data required to operationalize the "Replacement Cost Model" and the "Stochastic Rewards Valuation Model" of HRA. Moreover the way the simulation is designed and used makes it possible for the researcher to obtain not just the figures input by the subject managers but the reasoning that they employ to arrive at those inputs.

So while the subject managers are engaged in an activity of determining the best way of resourcing employees (an activity which itself is likely to be influenced by their perceptions of the value of labour) they are, through their use of the simulation, providing not only the data required to operationalize the two models of HRA under review, but also explanations of the basis on which that data is

computed.

It is the combination of the data itself and the information on the basis of its computation which is used to review the validity, reliability and utility of the the two models of HRA under consideration.

The aim of the research is to be achieved, therefore, by observing practicing managers involved in the employee acquisition activity, using the simulation model. The managers in making their inputs to the simulation and providing their explanations for these inputs, will provide not only the figures required to operationalize the two models of HRA but also the reasoning they use in arriving at these inputs. Through the analysis of these figures and the explanations of them, the utility of the two models will be evaluated. The reason for selecting the two models of HRA to be evaluated is the relationship that Flamholtz claims exists between them. The "Stochastic Rewards Valuation Model" is, as has been noted, put forward as a second generation model for evaluating the value of labour. Flamholtz however, concedes that in many circumstances it may be difficult to operationalize the model and suggests that the "Replacement Cost Model" may, in these circumstances, be used as a reasonable surrogate measure of employees' value. It is, therefore, this claimed relationship between the two models of HRA which the research aims to investigate.

CHAPTER 2

THE RESEARCH DESIGN

2.1 INTRODUCTION

The purpose of this chapter is to describe the research design and to explain why the approaches adopted were chosen.

The chapter starts with a discussion of how the research design relates to the research aim and objectives. This is followed by sections covering the research method, the research instrument, the research methodology and the research paradigm. In the conduct of the research the research instrument was of central importance and for that reason a separate chapter (chapter 3) is devoted to the detailed description of the design and operation of the simulation model. In this chapter the emphasis is directed towards the place of the research instrument in the research design and there is therefore one section devoted to the research instrument in relation to the research method and another to the research instrument in relation to the research methodology. The chapter ends with some general conclusions concerning research design.

2.2 THE RESEARCH DESIGN AND THE RESEARCH AIM AND OBJECTIVES

In order to achieve the aim of this research of reviewing the relationship between, and relative utility of, the two HRA models it was necessary to collect data to operationalize each of the models. However as noted in chapter 1 HRA has made virtually no

impact at an operational level, in the sense that there are no organisations (as far as the researcher is aware) that claim to operate a system of HRA. It was not, therefore, possible to observe HRA in action, such that different systems or models could be compared.

Though there may be no full blown systems of HRA in operation much of the data that would be needed to operationalize the models may be obtainable from managers in organisations who may implicitly use it when addressing a range of human resource management issues. One area in which data associated with the "Replacement Cost Model" of HRA might be used is with respect to the employee resourcing activity of human resource acquisition. It was with respect to this activity that a prototype simulation model, which was subsequently developed into the research instrument, was initially built. This prototype model, and the more sophisticated version used as the research instrument, allow a user to simulate alternative resourcing arrangements as a means of identifying an overall cost optimal strategy. Moreover, the design of this simulation model is such that the data necessary to operationalize the "Stochastic Rewards Valuation Model" may also be obtained.

The use of the simulation model research instrument not only facilitated the collection of the figures needed to operationalize the HRA models in such a way that the

first objective of the research could be met, but also afforded the opportunity to explore in detail the basis on which the figures were computed, which provided the information necessary to achieve the second objective of the research. However these objectives could only be realized if suitable practicing managers could be persuaded to devote the considerable time and effort required for participation in the research. The preparedness of such managers to participate related to the third objective of the research, that of assisting them in dealing with an employee resourcing problem. This assistance was provided by affording them access to and use of the simulation model. It was undoubtedly the prospect of the use of the model which provided the initial attraction for managers who agreed to participate.

In section 1.7 it was noted that the research was to be positive rather than normative, so, rather than either telling managers how they should value labour, or indeed asking them how they felt they should value labour, the simulation model was used to elicit information about how they were implicitly valuing labour when they dealt with a particular employee resourcing issue.

There were at least two alternative approaches that might have been adopted to obtain the data necessary to operationalize the HRA models. First, managers could have been presented with the formulae at the heart of

each of the HRA models and asked to provide data for them. Second, managers could have been observed engaged in their human resource management decision making with regard to either a single type of activity, such as employee acquisition, or a range of activities, and the researcher could have attempted to deduce from the managers' actions the values that should be input to the HRA models.

The first method is considered inferior to the approach adopted for two reasons. In the first instance the answers obtained would be speculative since the questions asked would be hypothetical. ("What figures would you put into the HRA models if you were to use them?") This contrasts with the data obtained from the simulation model in that the figures input to it by the managers were those which were relevant to the resolution of actual problems. Moreover since what was collected were "actual" rather than "hypothetical" figures the explanation of the basis of their computation was likely to be more informative. The second way in which this alternative would be inferior to the approach adopted relates to the level of commitment that might reasonably be expected to be obtained from the subject managers. Managers would have stood to gain no direct benefit from involvement in such an alternative approach, so why should they have been motivated to spend time and effort engaging in

such an activity? By way of contrast, with the approach adopted, whilst they were indirectly addressing many of the same issues as those associated with the HRA models, they were doing so in the context of dealing with a real problem which they had identified and considered worthy of the effort which they put in to it's resolution.

The second alternative approach, that of the researcher observing managers and drawing inferences, is inferior because of the difficulties of data contamination. This issue of potential data contamination in the approach adopted is considered in later sections of this chapter and in chapter 4. Whilst it is impossible for data collected in this type of research to be entirely free from researcher contamination, the approach adopted of, wherever possible, obtaining it in an explicit form is less susceptible to such contamination than a process that is based on wide scale inference and interpretation of the behaviour of subjects.

To summarize, the research method took the form of a series of organisationally based case exercises in which a simulation model, the research instrument, was used to collect two kinds of data; first, the figures used in the simulation which could subsequently be applied to the HRA models and second, the explanations and reasoning behind those figures which formed the basis for assessing the reliability and validity of the HRA models in operation. Finally, the methodology

adopted was a kind of "Action Research" in which the subject managers addressed a problem of their own. This research design proved effective and is considered superior to the alternative approaches suggested for achieving the aim and objectives of the research.

2.3 THE RESEARCH METHOD

The research method adopted is best described as a series of case exercises, because it had many of the features of the case study approach but in some respects it resembled a series of field experiments. Yin (1984: 15-16) has noted that the case study can have three research purposes; exploratory, descriptive and explanatory. The case exercises in this research had all three purposes. Yin goes on to argue that the case study may be favoured over other means of social enquiry as a way of obtaining answers to "how" questions. The main "how" question addressed in this research is: How do managers arrive at and formulate data that is necessary to operationalize HRA models?

It is with respect to the way in which the answer to this question was sought that the research method used was most like a field experiment. Since managers were not actually operating systems/models of HRA their answers to such questions could only have been hypothetical or speculative. However the managers were engaged, on an ongoing basis, with employee resourcing, so the use of a simulation model which could assist

them in this activity and which, through its construction elicited from them (albeit indirectly) the information necessary to answer the question, was rather more like a field experiment than a traditional case study. Moreover, the contexts in which the information was obtained (through managers addressing actual employee resourcing problems) meant that many of the benefits associated with the case study method could still be obtained. So, more precisely, the "how" question addressed was; how do managers make their employee resourcing decisions when the resourcing process is presented in a particular form? In attempting to answer this question the case exercises have been used to explore and describe the behaviours of managers engaged in such decision making. To explain such behaviours (in this case the inputs made to the simulation model) requires recourse to theoretical frameworks. These explanations have been sought from the managers themselves. Though this data and its explanation was provided in the context of dealing with employee resourcing, the form of the data is the same as that required for operationalizing the HRA models.

The great strength of the case exercise approach compared with alternatives is the possible richness of data obtained. The traditional criticisms leveled at this type of method are first the lack of rigour, secondly that such a method provides very little basis

for scientific generalisation and thirdly that they take too long and result in massive, unreadable documents.

The criticism of lack of rigour can potentially be leveled at all forms of enquiry even the supposedly highly controlled laboratory experiment. It is incumbent upon the researcher at all stages to make every effort to ensure that the highest possible standards are maintained. Issues of rigour were a constant challenge within this research. These problems were compounded by the methodology adopted and are discussed in section 2.5.

In terms of the second criticism, Yin (1984: 21) argues that case studies; "... like experiments are generalizable to theoretical propositions and not to populations and universes." So, in this research the findings of the case exercises will be interpreted in the context of the theories considered in chapter 1.

To summarize, the research method adopted was that of a series of case exercises in which managers used the simulation model for their purposes of addressing employee resourcing problems, and in doing so provided the information necessary to meet the objectives of the research.

2.4 THE RESEARCH INSTRUMENT

The research instrument (the simulation model) was of central importance to the design and conduct of the

research. It is therefore essential that a full understanding of it's internal workings is obtained. A detailed description of the structure and operation of the simulation is for that reason provided in chapter 3. The purpose of this section is to describe how the simulation was used and the implications of it's use in meeting the research objectives. The function of the instrument in the achievement of each of the three objectives of the research will therefore be reviewed. First, the research instrument will be reviewed with respect to the objective of assisting managers, who acted as subjects in the research, to improve their employee resourcing. Second, the instrument will be reviewed with respect to the objective of collecting data necessary to operationalize the HRA models. Finally, the instrument will be reviewed with respect to it's function of obtaining information which could be used for assessing the reliability and validity of the HRA models.

However, before turning to these three aspects some general comments about the simulation will be useful. Although being a simulation the instrument is not in the normally accepted mathematical sense a deterministic model it does nonetheless have certain less explicit deterministic characteristics. These underlying characteristics and their implications will now be considered.

The simulation model could be described as a stylized

questionnaire, in that it requires subjects to answer a series of questions, processes their answers and provides them with feedback. Like all questionnaires it is highly influenced by the assumptions of its designer. By far the most significant design characteristic of the model is the fact that it is predicated on assumptions of financial/economic rationality on the part of those who use it. At this stage it should be noted that all participants were informed of this characteristic and all without exception indicated that this was not perceived as a limitation, but rather as a strength. This perceived strength of the simulation will be considered in more detail in section 2.4.1.

Whilst this perceived utility of the simulation encouraged participation its achievement on such a basis may seem manipulative. The manipulation is not in the form of "taking advantage" of the subjects, who saw potential direct personal benefits to be gained from participation, but rather in two other respects. First, the simulation is manipulative in terms of setting an agenda in the sense of dictating the form in which a problem is formulated. The simulation model encourages managers to use a single composite criterion of money in resolving their problems. Many managers saw this as an ideal that the model merely assisted them in realising. Nevertheless the particular way in which

this was done (through the simulation's basic structure) was an important aspect over which the subject managers had no control.

Second, the model cannot be seen as a device for exposing existing decision making behaviour, since its use had the effect of modifying that behaviour. This point will be considered in more detail in sections 2.4.2 and 2.4.3.

Another related implication of the model is that its use encouraged participating managers to see their resourcing activities in the form of a system. Such systems thinking, though not novel to most participants, was formulated in a way new to them and involved a more systemic approach than they had been employing up until the time of their participation. Though to the participants this may have seemed quite innocuous from a research perspective it represents a degree of intervention which may be termed manipulative in as far as it was the use by the participants of a type of thinking to a degree that did not exist before. Because of the general acceptability of a systemic approach managers may have been encouraged to formulate their problems in one particular way rather than alternatives.

2.4.1 THE SIMULATION AND THE THIRD RESEARCH OBJECTIVE

It will be recalled that the third objective of the research was to assist subject managers to improve their employee resourcing through the use of the

simulation model.

This objective raises three issues, viz:-

- (1) Who should decide the criteria to be used to evaluate any "improvements"?
- (2) What are those criteria to be?
- (3) How should performance be judged against those criteria?

In the context of this research these questions and the answers to them are inextricably linked.

Judgements of performance in employee resourcing are almost invariably measured against multiple criteria. This is true even when one single aspect of employee resourcing is isolated for the purposes of evaluation. The simulation model is concerned with the aspect of employee acquisition. With respect to the criteria for evaluating employee acquisition there are what might be termed qualitative and quantitative aspects.

Qualitative aspects can be broken down into first, those related to the quality of individual recruits/employees and second, those related to the quality of performance of groups of employees and third, how this is affected by the individuals who are recruited to the group, or indeed how the performance of the group is affected if for some reason, or for some period of time, the group has to function without the required number of members. This last aspect could be seen as a quantitative/ qualitative feature.

With respect to the first aspect, that of the quality of individuals in terms of their ability to perform the jobs for which they are recruited, the simulation has no contribution to make. The potential contribution of the simulation is with respect to group performance and how this is influenced by shortfalls or surpluses of individuals who are assumed to be of an appropriate quality when they have completed any training necessary to equip them to "fill" the jobs for which they were acquired. Though new employees, by whatever means they were acquired, are all "at the end of the day" assumed to be qualitatively equal, there are a variety of possible strategies for their acquisition and it is in terms of the evaluation of these alternative strategies that the simulation can make a contribution. (A detailed explanation of what this means and how it is done is provided in chapter 3.)

So, in terms of the second issue, that of the criteria to be used to evaluate any "improved" employee resourcing, the simulation provides an opportunity to do so only in the one respect just noted and the managers who agreed to participate were fully aware of this. To conclude from this however, that with respect to the first issue of who should decide the criteria to be used to evaluate any "improvements" in employee resourcing, the answer that it was solely the managers themselves would be misleading. The managers were offered and accepted the use of the simulation but

implicit in the design of the instrument was the use of a single composite criterion of performance expressed in financial terms. Indeed it was intended by the researcher when designing the instrument that it would be this particular characteristic which would make it attractive to potential users, since all simulated resourcing strategies could then be easily compared using this single criterion.

However, there may be a variety of ways in which this use of a single composite criterion for evaluating and facilitating the improvement of employee resourcing could be achieved. Indeed, there may be a variety of computerized models (which need not be simulations) which could achieve this same objective. The simulation was constructed in such a way that managers making use of it would be required to input data in forms that could be applied to the formulae at the heart of the two models of HRA which the research aims to review. Other possible ways of achieving the same results for managers might not have enabled the researcher to collect the data required to meet the first and second objectives of the research itself.

As a means of achieving the third objective of the research the importance of the simulation cannot be overstated. Not only did it provide a mechanism for performing large and complex calculations concerning the cost of alternative resourcing strategies, but

because of its form as a simulation it afforded managers the opportunity to experiment with different strategies and see their effects in a detailed way. Managers had the opportunity to explore the relationships between different aspects of labour turnover and acquisition strategies and judge the sensitivity of the system as a whole to changes in sub-systems. It was access to these opportunities which was to provide the incentive to managers to participate. By participation in the research they would not only be able to address their employee resourcing acquisition problems in a unique way but in so doing they would provide the researcher with the opportunity of achieving the aim and the other two objectives of the research. Attention will now be turned to consideration of the role of the simulation with respect to these other two objectives.

2.4.2 THE SIMULATION AND THE FIRST RESEARCH OBJECTIVE

The first objective of the research as a whole was to collect the data necessary to operationalize the two models of HRA that were under consideration.

As was noted in section 2.4.1 the simulation model was structured in such a way that managers using it would in the course of inputting data to the model provide the figures needed to operationalize the HRA models.

The issue to be addressed in this section is the extent to which such data derived from inputs (and indeed outputs) from the simulation model can legitimately be

used to operationalize the HRA models? Moreover, given that the stated intention was to adopt a positive approach, how legitimate it is to use data derived from a situation that is not normal managerial behaviour and treat it as if were, is another important point. To put it another way, is the data derived from the simulation model "artificial", and if so is the claim to be adopting a positive approach invalid?

The simplest response to these questions is that the managers concerned were engaged in real as opposed to hypothetical decision making and were doing no more than taking advantage of a particular piece of technology (the simulation model) to do so. Having gained an appreciation of the strengths and limitations of the simulation they chose to use it as a tool to assist them in dealing with their employee resourcing problems.

The objectives of the managers who participated, which are noted in chapters 5, 6 and 7 bear witness to the fact that their primary concerns were in terms of dealing with real problems that confronted them in their organisations. Moreover through the research methodology adopted (described in section 2.5) it was made clear that within a broad programme the activity, and who was involved in it, was manager rather than researcher determined.

The model caused the managers to make explicit the

information they used in reaching their employee resourcing decisions. Since employee acquisition is an ongoing process it is far from being an artificial or engineered activity. The effect the model had was to present the process in such a way that managers would be expected to adopt a perspective of financial/economic rationality to guide them in their decision making. Such an assumption about the primacy of financial/economic criteria is embedded in and central to the structure of the simulation. It was this aspect of the simulation, the ability to describe the outcomes of a particular resourcing strategy in terms of a single financial measure, which was, as it were, it's unique "selling" feature, which was the focus of its attraction to managers. That this was something that they saw as highly desirable does not alter the fact that it was something that they had previously not had available to them and therefore the use of the model was a new rather than an artificial way of assisting them in their decision making. Whether the implicit assumption of the primacy of financial/economic criteria in managers' employee resourcing decision making is a valid one will be discussed in the final chapter when the subject of possible future research projects in the area is considered.

2.4.3 THE SIMULATION AND THE SECOND RESEARCH OBJECTIVE

The second research objective was to review the data collected for each HRA model in terms of it's reliability and validity. This objective can be seen at two related levels, first the reliability and validity of the data and information derived from the use of the simulation model and at the second level the reliability and validity of the HRA models themselves. Since reliability and validity are necessary but not sufficient conditions of utility, this second level relates closely to the aim of the research of reviewing the relationship between and the utility of the two HRA models. This will, of necessity, be considered later, when reference will be made to the actual data and information collected. (Chapter 9)

It is generally held that reliability of data and information is a pre-condition of it's validity. The reliability of data and information obtained is a function of the collection process. The process of collection is considered in section 2.5 and chapter 4. At this stage consideration will be confined to the issues thrown up by the use of the simulation in the collection process.

The form of the simulation is such that the managers were required to provide inputs to the model. (The specific inputs required are described in chapter 3.) In addition to providing these inputs the managers were required to explain the basis of their computation.

This seeking of explanations for all inputs was the means by which internal consistency or reliability was achieved. The question of the validity of inputs is more problematic and once again all that could be sought was internal validity. The issue still remains of whether the questions raised through the structure of the simulation model were valid with respect to employee resourcing decision making and whether such data may be reasonably transferred to operationalize the HRA models. With respect to the issue of employee resourcing decision making the data had face validity at least for the participating managers. With respect to the validity of the data in terms of the HRA models this is difficult to determine without reference to specific data so discussion of this issue will be deferred to chapter 9.

2.5 THE RESEARCH METHODOLOGY

The methodology adopted in this research was described to participants as Action Research. Taking Rappaport's definition quoted in Susman and Evered (1978):

"Action research aims to contribute both to practical concerns of people in a problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework."

The reason for drawing attention to this particular definition of Action Research is that it is the one that was presented to participating managers. As such it represented the basis for a common understanding of

the activity entered upon by both researcher and participants.

The researcher's objectives were stated to the participants as:-

"(1) To study managerial decision making in the area of employee resourcing and, through doing so, to gain insights into managerial valuation of the organisation's human resources.

(2) To provide feedback on any insights obtained so that the clients' understanding and appreciation of the activities and/or systems associated with the process might be enhanced."

These were discussed and the participating managers were asked to make their own objectives explicit. These objectives were also discussed. The purpose of these discussions was to reach a shared understanding of what the exercise was intended to achieve and how it might progress. This initial discursive approach characterized the whole exercise and was essential for establishing a collaborative approach to the activities that were to follow. In all of the cases it was established that all issues in the exercise were open to discussion and that should a situation arise where the desires of the researcher and participants were incompatible or in conflict, and that this could not be resolved through discussion, then the participants' wishes would prevail.

Attention will now be turned to the implications for

issues of rigour and reliability.

The issue of rigour involves the strict observance of rules and procedures within data collection, analysis and interpretation. In this research the rules and procedures have, within broad limits, been evolved through discussion between the researcher and the participants. Throughout the three case exercises the purpose was for the researcher to understand clearly what actions the participants were taking in the use of the simulation and their reasons for taking them. To achieve this the researcher made notes throughout all sessions and then provided minutes to the participants for them to approve or modify such that an agreed record of events was made. The purpose of these minutes was threefold: First to establish a record of proceedings, second to provide feedback to the participants and finally to ensure there was a clear unambiguous understanding by all parties of what had taken place and the reasons for the actions. Given the lengths of the meetings (rarely less than half a day and usually of a whole day's duration) and the fact that most of the interaction took the form of discussion and debate, the minutes were not verbatim but recorded the final decisions arrived at and where appropriate the reasoning that lead to them. Two points are worthy of note; first that on a few occasions the minutes were altered because the participants felt that

they did not have the correct emphasis, and secondly the iterative nature of the exercises meant that decisions made at one meeting would sometimes be modified at subsequent meetings. It is felt that this process of recording and minuting provides a form of control to ensure a degree of rigour at the data collection stage.

With respect to reliability this methodology raises some issues. In terms of a simple test of reliability, the consistent repeatability of the *record of events*, this would be impossible to establish. The unique setting of each case rules out inter-exercise measures. The fact that there was only one researcher means that inter-observer reliability is not obtainable, though the system of minuting means that the participants minimized researcher error. Finally the nature of the research process meant that "test-retest" measures of reliability were not obtainable.

As pieces of action research the case exercises were intended both to contribute to the practical concerns of people in problematic situations (in this case the employee resourcing decisions of the participating managers) and to the aim of the research.

To summarize, the research methodology adopted though described as action research is different from the approach advocated by Heron (1988) and Reason (1988) who see the process of cooperative enquiry extending to the point where the traditional distinction between

researcher and subject is completely broken down. Rather the approach adopted is one where the researcher provided the means (through the simulation model) by which the subjects could address particular problem issues and engaged the subjects in detailed explanations of the basis of their actions and thoughts in resolving those problems.

2.6 THE RESEARCH PARADIGM

Burrell and Morgan (1979: 23) have noted that the term paradigm

"...is intended to emphasise the commonality of perspective which binds the work of a group of theorists together in such a way that they can be usefully regarded as approaching social theory within the bounds of the same problematic."

Although as they argue this definition does not imply a complete unity of thought within any given paradigm such thought is based upon broadly the same assumptions about human nature and has ontological, epistemological and methodological implications. Moreover a paradigm also provides a convenient way of locating one's own personal frame of reference. Such a frame of reference determines what one "sees" with the effect that all "facts" are in practice theory laden. Such an effect is not confined to researchers but also applies to practitioners. The researcher in his attempt to add to the stock of knowledge has a responsibility to take account of this effect of a paradigm perspective. Practitioners on the other hand tend to have more

pragmatic objectives. Practitioners are however, albeit often unknowingly, subject to intra-paradigm constraints. The reason for this is that management practices are not divorced from social theory but are on the contrary influenced by it. That practitioners may not feel obliged to question the more fundamental assumptions that underpin their actions does not mean that paradigm bounded assumptions do not prevail. The assumptions are merely implicit rather than explicit. The area of concern of this research straddles the management disciplines of accountancy and personnel management. Using the Burrell and Morgan classification, research in the areas of both accounting and personnel management has in the main developed within the functionalist paradigm. (Gowler and Legge 1986 and Hopper and Powell 1985). The practices in both areas of activity have been heavily influenced by theories and subsequent developments located within the functionalist paradigm.

2.7 THE RESEARCH INSTRUMENT AND THE RESEARCH METHOD

In as far as the research instrument, the simulation model, can be seen as a stylized questionnaire it would seem to represent a method of research in itself. Viewed as a piece of research based on data obtained through the administration of a questionnaire the sample of participants would be unacceptable on the basis of size and of criteria of selection. It is however, felt that the simulation model is no ordinary

questionnaire. The use of the model involved an iterative process that is not normally associated with questionnaires. The use of the model involved researcher participation which took place over a protracted period. Since no application of the instrument took place over a period of less than six months this inevitably imposed a practical limit on the number of settings in which the process could be undertaken.

Though the data collection took place in only three organisations the data obtained from the small number of participants was in considerable depth. As such the method has many of the characteristics of the case study approach. Though the method undoubtedly suffers from limited contextual input, it is felt that this is compensated by the amount of detail that was obtained about participants' reasoning in coming to their decisions.

2.8 THE RESEARCH INSTRUMENT AND THE RESEARCH METHODOLOGY

As has already been noted the simulation model was of central importance to the conduct of the research. Without the model the research could not have taken place. The model however performed different functions for the researcher and the participants. For the researcher it's function was essentially catalytic. To the participants it provided a unique means of processing information as a way of resolving employee

resourcing problems.

The model is best described as a catalyst because it was not the output of the model that provided the most important data to the researcher, but how, when the model was in use, it acted as a prompt to the participants. It was the participants' inputs and explanations of their inputs to the model that provided the important data to the researcher. These explanations were gained through discussions amongst the researcher and the participants. Similarly the researcher was more interested in the participants' reactions to the outputs than the outputs themselves. Whilst within the research design the discussions were a pre-condition of the participants' inputs it was the inputs themselves and the subsequent outputs that were of most interest to the participants. So while the researcher was interested in both the inputs and the reasoning expressed by the participants in arriving at the inputs which determined the outputs, the participants were more interested in the relationship between inputs and outputs.

From the researcher's point of view it was therefore imperative that he obtained the participants' own views and avoided leading the discussions in which they were expressed. The role of the researcher was to question and seek clarification of the participants' reasoning and to do this in such a way as to avoid, as far as possible, influencing it or imposing his own ideas on

them.

Being in the form of a simulation the research instrument gave the participants the impression that they exercised a high degree of control since they determined the values of all input variables and could and did alter them as they chose. However, since the basic structure of the model was immutable participants could only operate within the confines of that structure.

In designing the simulation the researcher, as has already been noted, had intentionally constructed a model which would cause the participants to address particular issues. The researcher never tried to disguise this fact. On the contrary it was discussed at length in every case exercise. In every case the participants were prepared to use the model as it existed and there was no objection to its fundamental structure. It is therefore inferred that the participants perceived the structure as legitimate or indeed as a more sophisticated approach than those they had previously adopted. It could be said that the model was based on the same sets of basic assumptions that they, the participants, held about the subject of employee resourcing.

2.9. CONCLUSIONS

The aim of the research is to review two models of HRA, the "Replacement Cost Model" and the "Stochastic

Rewards Valuation Model" and to investigate their relative utility in particular settings. In the absence of settings in which these models are in use it is impossible to observe their relative operational effectiveness and evaluate their relative utility. It is therefore necessary to devise a means of collecting data which could be used to operationalize these models so that they might be reviewed. In doing this it is essential that a positive rather than a normative perspective is adopted. To achieve this it is necessary to look at the actual behaviour of managers.

As Flamholtz, the originator of these two HRA models, has stated the purpose of HRA is to "provide users with information needed to acquire, allocate, conserve, utilize, evaluate and reward human resources". It is appropriate therefore, to look at one of these activities and attempt to determine the implicit value managers are affording to labour when they are engaged in the activity. The area chosen, from which to make these inferences, is that of employee acquisition.

To enable such inferences to be made a means has to be developed that exposes the details of the behaviour of managers engaged in such activity.

One means of achieving this might be to observe managers engaged in the employee acquisition activity and through deduction and questioning to determine how their actions relate to the two models. By adopting such an approach it is probable, given its structure,

that the "Replacement Cost Model" could be operationalized. The ability to collect the data necessary to operationalize the "SRVM", in this way, given its complexity, is more problematic. Moreover, even if it were possible, it would involve either a very significant amount of researcher interpretation (with its attendant risks of data contamination) or the posing of hypothetical questions to managers (with the risk that what is obtained is a normative rather than positive response).

An alternative approach is through the use of the simulation model, which embodies in its structure a means of simultaneously collecting the data required to operationalize both the HRA models. By adopting this approach and following a careful process of data collection it is possible to obtain consistent data, (consistent in the sense that the same principles of costing are applied to the different parts of simulation that provide data for the two HRA models). This not only achieves a more uniform system of data collection to provide the foundation for a better comparison of the two models of HRA, but also provides an integrated basis for questioning managers about their reasoning. Moreover, by obtaining both the data, and the explanation of the reasoning employed by managers in generating it, in this way, affords a common basis of data/information collection, both

within and across organisations, upon which judgements about the reliability, validity and utility of the two models of HRA may be evaluated. As well as being consistent, such an approach is also flexible enough to be able to meet the needs of managers in different organisations.

The generalisations that may be drawn from the research must be limited given the relatively small sample of managers and organisations and the limited area of activity considered. However, the research design has the benefit of providing a quality of data that is unlikely to be obtained through alternative approaches.

CHAPTER 3

THE RESEARCH INSTRUMENT

3.1 INTRODUCTION

The main instrument used throughout this research is a computerized simulation model. This model, which is based loosely on the principles of stock control, is an interactive instrument which is used to prompt the behaviour of managers who are the subjects in the research. The model represents the employee resourcing system involved in the replacement of employees who leave a job in an organisation.

A much simpler prototype model, running on a BBC micro computer, was built during 1983/84 as part of the assessment for the qualification of MBA at The City University Business School. This prototype was demonstrated to managers at Rank Xerox UK in March 1985. As a result of this demonstration the Company offered to fund and assist in the development of the existing PC based model. This model, which was specified by the researcher after consultation with managers from Rank Xerox, was programmed by Magnasys Ltd. Systems trials were completed on the model by the researcher in June 1987.

The model and its operation are described in Dawson (1988a, 1989a and 1989c)

3.2 THE EMPLOYEE RESOURCING PROCESS

The model is designed to simulate the flows of employees, of a particular kind, in and out of an

organisation. It can be used to model only one type of employee at a time. The model can only be usefully employed where;

(1) there is a sufficiently large homogeneous group of employees. (i.e. employees of a particular type who share the same leaving characteristics and are all acquired in the same way.)

(2) the rate of labour turnover amongst this group is of a magnitude to cause on average at least 5 leavers per annum.

(3) the new employees acquired to replace leavers are drawn from the external labour market, (although they may have protracted training periods.)

Within the model the movements of employees in (through recruitment) and out (through employees leaving the job) are simulated. The user of the model has the opportunity to vary any parameters which directly or indirectly affect these inward and outward rates of flow and the consequent levels of employment. The model therefore provides the opportunity for the user to gain an understanding of the nature of the relationships amongst the various factors affecting the effectiveness of the employee resourcing process.

3.3 THE PRINCIPLES OF STOCK CONTROL

Stock control is a fairly simple operational research technique which in application attempts to ensure that

goods are produced or procured in economic quantities whilst at the same time adequate buffer stocks are maintained against unpredictably high rates of use and that both of these objectives are achieved in the overall most cost effective way.

There are two basic types of stock control system. In the first system, stock is replenished whenever the amount in stock falls below some pre-determined level. This is known as the re-order level system. The procedure is a simple one. Each time a piece of stock is used a check is made of the remaining stock level and if this is equal to the re-order level then a new order for stock is made.

The second method of stock control is known as the periodic review system. Under this system orders for replenishment of stock are placed at regular intervals. The procedure in this case is that at specified intervals a check is made of the current level of stock and an order is placed of a size that would, if it were delivered, immediately bring the stock holding up to some predetermined level.

Whichever system of stock control is used, two questions need to be answered; firstly, when should stock replenishment orders be placed? Second, how much should be ordered? It is not necessary to get into the detail of how these two questions are answered but it is helpful to understand what information is required if they are to be successfully dealt with.

Basically there are five pieces of information that must be to hand if an effective system of stock control is to be introduced and operated.

1. The rate at which stock is used
2. The time it takes to place an order for stock and for the replacement stock to be delivered.
3. The cost, if any, of placing an order for stock.
4. The cost of holding stock.
5. The cost of being out of stock.

Provided this information is available then the best stock control arrangements can be devised. The choice of which of the two main types of system is used will be determined by factors such as whether stocks are obtained from a single supplier.

Whichever is chosen, what is sought is the overall cost-optimal solution. The determination of this solution is on the face of it only made difficult because of the influence of uncertainty, particularly with respect to points 1 and 2. Detailed information is required upon the rate at which stock is used. This is what might be called the "call off rate." Very often this rate will not be steady, it may be subject to cyclical, seasonal or random fluctuations. There may be similar fluctuations in the time it takes to obtain the replacement stock, this may be called the "lead time on replacement." However, provided these times can be adequately represented by statistical distributions

and the costs noted in points three, four and five can be accurately calculated, then an optimal solution can be found.

3.4 STOCK CONTROL APPLIED TO EMPLOYEE RESOURCING

Before the ideas of stock control can be applied to employee resourcing a clear understanding of what is meant by employee resourcing, in this context, is required. Employee resourcing is all those activities that are involved in planning, acquiring, inducting and bringing a new employee up to the standard of a fully effective worker in a specific job.

Having defined employee resourcing and described the various aspects of stock control it is now necessary to show how the latter is applied to the former in the simulation model. Given that the "stock" in employee resourcing is fully trained employees it would be absurd to consider all employees as a single type of stock. This means that each type of "stock" or employee has to be dealt with separately, as noted in section 2.2. So, for example the stock may be of salespersons, assuming that each fully trained salesperson is interchangeable with every other one. In order to arrive at the optimum resourcing strategy information is required on both "call off rate" and "lead time on replacement" for the particular type of worker being considered.

3.4.1 THE "CALL OFF RATE" OF EMPLOYEES

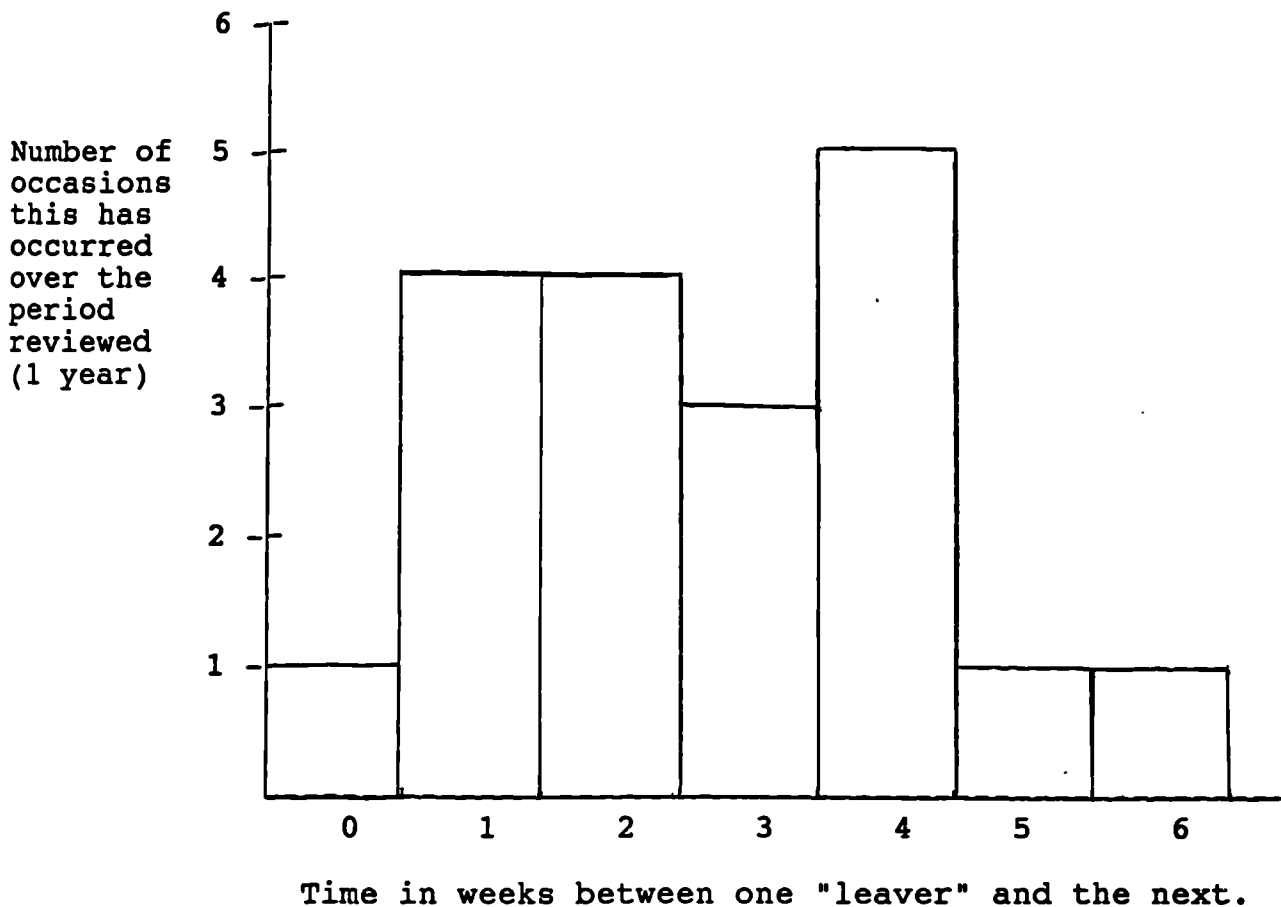
The "call off rate" of employees is the rate at which they leave the "employment system." This does not

necessarily mean that they leave the organisation simply that they are no longer available to perform their role in the part of the system which is under consideration. In the case of salespersons the "call off rate" may be made up of salespersons who leave the organisation, those who are promoted to other more senior jobs and those who are transferred out of selling into some other organisational roles. Irrespective of the reason for their leaving the "employment system" the rate at which they leave must be described. The more detailed this description/representation the better.

The crudest way of expressing the "call off rate" is in terms of the average numbers of "leavers" per period, whether that be a year, a month or even a week. The quality of this data is improved significantly if the variation around this mean can be specified. Such information should be available from most personnel management information systems (PMIS). In more sophisticated systems this could include seasonal and other variations. A convenient way of representing this data is in terms of the inter-leaver time (ie. the time between one leaver and the next). This data can be generated from even the most basic of personnel record systems by simply drawing up a histogram of the time that elapses between one person of the type being considered "leaving" and the next one doing so. (Figure

3.1)

FIGURE 3.1: A HISTOGRAM SHOWING INTER-LEAVER TIMES



In the example shown in figure 2.1 during the course of the year there were nineteen "leavers", sixteen of these may have been employees who left the organisation (labour turnover), two may have been promoted and one may have been transferred to other duties. For whatever reason on average one worker left the "employment system" every 2.7 weeks. The information in the histogram can be transformed into a cumulative probability distribution or ogive. Based on the historical information presented in figure 3.1 it is apparent that the time between one leaver and the next

has never exceeded six weeks and that sometimes there is no time between leavers, i.e. two people leave in the same week.

Careful analysis of records of leavers may uncover more information which could be incorporated in the "leavers distribution" which describes the "call off rate" of employees.

3.4.2 THE "LEAD TIME ON REPLACEMENT" OF EMPLOYEES

Remembering that the "stock" of employees is the number of fully trained workers of the type being considered then the lead time on replacement is the total elapsed time between the initiation of the first activity associated with acquiring a replacement employee to the completion of the last activity that renders that employee a fully effective worker in the job. During this "lead time" many activities will be carried out, some concurrently others sequentially. Sometimes there will be periods of delay whilst no particular activity is taking place but while time passes. An example of this may be the time that elapses between offer letters being sent and the responses of applicants being received.

The first activity is usually a decision to commence the acquisition process. The last activity is normally some form of training which finally renders the new worker fully effective in the role for which he or she has been acquired. What takes place between these two

activities and how long it takes will vary considerably with the type of job that is to be filled and the type of worker who is to fill it.

Just as with the "call off rate" the more detail that can be provided on "lead times" the better. For some of the activities making up the total lead time detailed records may be available so that ogives can be drawn up, for others fixed times may be appropriate.

3.4.3 THE "EMPLOYMENT SYSTEM" AND THE "ESTABLISHMENT LEVEL"

In determining the "lead time on replacement" and the "call off rate" in the ways described, inflows and outflows to and from the "employment system" are being specified.

It is now necessary to define, in rather more detail, what is meant by the term "the employment system." So far all that has been said about it is that it is made up of fully effective workers of the type being considered. The number of these workers is of critical importance.

The senior management have to determine how many workers of each particular type the organisation needs to employ. Over time this number is likely to vary, but at any single moment in time it must be set at some particular level which is judged to be appropriate. The way in which this figure is determined will vary from management to management. Some managers may at some times choose to hoard labour. In doing so it can only be inferred that they judge that in the long run this

is the most effective strategy for the organisation.

The optimum level of staffing is, within the model, called the "establishment level" for the particular type of employee being considered. The determination of the size of the "establishment level" is a matter of senior management judgement in which account is taken of the full range of organisational and environmental factors, including the relative costs of the various factors of production, their inter-substitutability and relationships between factor and product or service markets. Notwithstanding that this determination of the "establishment level" for a particular type of employee may be a complicated process, the fact remains that at any one moment in time such a figure is set and deviation from this figure must therefore be judged to be undesirable.

Flows in and out of the "employment system" imply, albeit temporary, deviations from the "establishment level". Such deviations mean that for the period of their duration the organisation must be operating in a sub-optimal way. This sub-optimality, which takes the form of excesses or shortfalls of employees must be quantifiable. This implies that there must be a cost associated with situations of both employee surpluses and deficits, such costs corresponding respectively to the stock control concepts of the costs of holding stock and the cost of being out of stock. In terms of

employee resourcing these costs of deviation from "establishment level" whilst being different for surpluses and deficits, are likely in both cases to be a function of the extent and the duration of the deviation. As a consequence such costs are best expressed in the form of two matrices. An example of part of a deficit matrix is shown in figure 3.2

FIGURE 3.2: PART OF AN EMPLOYEE DEFICIT MATRIX.

		Duration of deficit in weeks			
		1	2	3	4
Size of deficit in workers	1	320	330	335	340
	2	325	335	340	345
	3	330	335	350	360

The figures in the cells of the matrix represent the cost per employee per week for that extent and duration of deficit.

3.4.4 THE MAIN COMPONENT PARTS OF THE MODEL

In section 3.3 the information requirements for the calculation of cost optimal stock control were identified. As applied in the simulation model these are represented as follows;

- (1) The rate at which stock is used is the rate of leavers from the employment system.

(2) The time it takes to place an order for stock and for the replacement stock to be delivered is the total lead time on acquiring a new employee, from the time that the process is initiated to the new employee reaching full effectiveness in the job.

(3) The cost of placing an order for stock is the cost incurred in all aspects of the acquisition process.

(4) The cost of holding stock is the cost of any fully effective workers who are employed over and above the "establishment level". The cost is a function of the extent of the surplus and its duration and is based upon the data in the labour surplus matrix.

(5) The cost of being out of stock is the cost of operating with below optimal staffing level i.e. with fewer than the "establishment level" of fully effective workers. The cost is a function of the extent of the deficit and its duration and is based upon data in the labour deficit matrix.

3.5 GENERAL CHARACTERISTICS OF THE MODEL

As Robbins (1989: 28) notes; "A model is an abstraction of reality, a simplified representation of some real world phenomenon." This model, which attempts to represent the process of employee resourcing resulting from labour turnover, can be visualised as having four

main parts viz:-

- (1) The part concerned with the attrition from the group of workers.
- (2) The part concerned with the acquisition of workers.
- (3) The part concerned with employee resourcing interventions used by managers.
- (4) The part concerned with the actual size of the workforce compared with the desired size of the workforce.

The model takes the form of a series of questions, on the subject of resourcing employees of the particular type being considered, which are presented to the manager(s). The responses to these questions constitute the input data to the model. The input is then processed and output is produced.

Before considering the detail of the inputs and outputs two general points about the operation of the model should be noted:

- (1) The model simulates events over time. The unit of time used within the model is the week, so events occur within a particular week. Output can also be computed and presented on an annual basis.
- (2) The model can run in two modes; "continuous" and "restart". When the model runs in the "continuous" mode the simulation will continue for the desired period (say 10 years or 520 weeks) from the initially specified start up conditions. When

the model runs in the "restart" mode, at the end of the 52nd week of simulation instead of commencing the 53rd week with all parameters in the status that they are then in (as would be the case with the "continuous" mode) all parameters revert to the originally specified start up condition. The process is then completed until the desired run has been completed.

It is important to note that though the model may be run for 10 years (520 weeks) simulation, it is not the next 10 years that are being simulated but 520 weeks worth of events such that the distributions of probability of occurrences as at the time of decision making may be established.

Finally the model can be run in two forms. One form involves the inclusion of cost data and the other, referred to as the "time only" form does not. In section 3.6 and 3.7 the "time only" form of the model is described. In sections 3.8 and 3.9 the form of the model that includes costs is described.

3.6 DATA INPUT FOR THE "TIME ONLY" FORM

Data is input relating to each of the following areas; "Establishment level" and current "staffing level", leavers, acquisition of workers and the interventions used to relate acquisitions to leavers.

3.6.1 DATA INPUT: "ESTABLISHMENT LEVEL" AND "STAFFING LEVEL"

The "establishment level" is one of the key variables

within the model. The figure input represents the staffing level that is judged to be optimal at the time. It represents the staffing level required in the mix of resources to achieve optimal organisational outcome. It is assumed that the figure is arrived at by the decision maker(s) who have taken account of the other resources and their potential inter-substitutability. It is further assumed that there is only one such optimal staffing level and that therefore any deviation from this level is sub-optimal. The "establishment level" remains constant at its input level whilst the simulation is run.

The "staffing level" input is the level of staffing which actually exists at the time. It can be the same as, greater than or smaller than the "establishment level". Throughout the running of the model the "staffing level" fluctuates as staff leave (when it is reduced) and when the acquisition of new staff is completed (when it is increased).

3.6.2 DATA INPUT: THE LEAVERS PROCESS

The rate at which leavers are generated within the simulation is a function of the "staffing level" and the rate of labour turnover. The latter is an input variable, which except for adjustments to take account of seasonal fluctuations, remains constant whilst the simulation is running. The labour turnover is input as a percentage, based upon the traditional measure of the average number of leavers per year divided by the

average staffing level throughout the year. The figure input may be based upon historic calculations, current experiences, or future predictions, whichever is judged most relevant.

The input labour turnover rate is applied to the input "staffing level" to provide a mean inter leaver time. The user is then required to define the variation around this mean and to select from a menu the chosen distribution. The distributions available are:

- (1) Fixed time. In this case leavers will be generated at fixed intervals equal to the mean inter leaver time (seasonally adjusted).
- (2) A normal distribution. In this case the mean of the distribution is the mean inter leaver time and the user inputs a value for the standard deviation. Leavers are generated at times that result from the application of random numbers to the now defined normal distribution. As with fixed timed leavers these are also subject to seasonal variation if specified.
- (3) A negative exponential distribution. In this case leavers are generated by the application of random numbers to the distribution with a mean equal to the mean inter leaver time (seasonally adjusted).
- (4) A Beta type distribution. In this case the existing mean is used and minimum and maximum inter

leaver times are input. Leavers are generated by the application of random numbers to the triangular distribution to give inter leaver times that may be seasonally adjusted.

(5) A self specified distribution. In this case the user is required to specify the times for eleven equal points on an ogive. The specified ogive is adjusted to ensure that it has the same mean as the mean inter leaver time calculated. Leavers are generated by the application of random numbers to this ogive. The generated time of inter leavers may be adjusted to take account of seasonal variations.

As noted above the inter leaver time can be adjusted to take account of seasonal variations. If this facility is required the user inputs weights for each of four seasons of equal length. Whilst the overall average inter leaver time is maintained for the year variations amongst seasons in proportion to their relative weightings is achieved.

Finally the user specifies by input whether leaving employees are required to work a period of notice and if they are this period is input in weeks.

3.6.3 DATA INPUT: THE ACQUISITION PROCESS

The acquisition process is divided into eight stages;

- Pre-recruitment preparation,
- Recruitment,
- Selection,
- Delay,

Induction,
Initial training,
Intermediate training,
Final training.

Each of these stages is itself broken down into a number of activities.

The pre-recruitment stage of the acquisition process is broken down into the following activities:

Manpower authorisation,
Delay,
Job evaluation,
Remuneration specification,
Consultant,
Advertising,
Delay.

The recruitment stage of the acquisition process is broken down into the following activities:

Consultant,
Pre-selection screening,
Response to applicant,
Interview.

The selection stage of the acquisition process is broken down into the following activities:

Consultant,
Matching candidates to jobs,
Decision making involving line managers,
Acceptance delay,

Rejection delay.

The delay stage of the acquisition process is not broken down into separate activities. This stage represents the time delay between the candidate accepting the job and arriving in the post.

The induction stage of the acquisition process is broken down into two activities, company induction and technical induction.

The initial training stage of the acquisition process is broken down into the following activities:

- Departmental training,
- Technical training,
- Training about the work environment,
- Culture,
- Delay.

The intermediate training stage of the acquisition process is broken down into on the job training and specialist skills training.

The final training stage of the acquisition process is broken down into specialist skills training and product of the job or company training.

The whole acquisition process is thus broken down into 28 separate activities. The user is required to input the time that elapses in weeks whilst each activity is undertaken. With specific kinds of acquisition not all activities will take place in which case zero time is input where appropriate. Some activities may be conducted concurrently in which case zero may be input

for the shorter activity. It is important to note that it is the elapsed time that is input and not the time that the activity takes. For example, decision making involving line management may involve a meeting that takes less than an hour, but it is the time between the start of that activity and the commencement of the next one that is input, which could be a week if it takes that long for the decision to be communicated and acted upon.

As with times with respect to leavers, inputs on acquisition are made in terms of weeks. This means that sometimes activities which have elapsed times of less than one week have to be combined. Inputs for activities can take the form of a fixed time integer or by the use of the same range of distributions that is available for expressing inter leaver times. Similarly each acquisition stage can be seasonally adjusted by the same process used for leavers. The total of the mean times for all the activities in the eight stages equals the mean lead time of acquisition.

3.6.4 DATA INPUT: INTERVENTIONS TO RELATE LEAVERS AND ACQUISITIONS

In practice the actions of managers attempting to maintain an optimal level of staffing may vary. They may take decisions in response to events or situations, or they may make them at specific times. It is the purpose of this part of the model to represent the

essence of such decisions. To do this the user is offered the choice from amongst five types of intervention that link the acquisition process to the process of leavers. An outline of each intervention and the parameters for which values have to be input are noted below.

(1) "Reactive Acquisition". The basis of this intervention procedure is that on the occasion of an employee giving notice, the acquisition process to obtain a replacement is started. There are however special arrangements relating to short inter leaver times.

(2) "Anticipatory Acquisition". With this form of intervention the very first leaver is dealt with by reactive acquisition. Subsequent leavers may however be anticipated in that the acquisition process may be started before an employee gives notice. This intervention combines both reaction and anticipation. The determination of whether acquisition is reactive or anticipatory depends upon the occurrence of events in relation to two parameters, "delay time" and "recruit number" values for which have to be input if this intervention is chosen.

(3) "Batch Acquisition". The basis of this intervention is periodic acquisition of fixed sized batches of new employees. With this intervention the user is required to give values to three

parameters; the "triggering level" the "batch size" and the "minimum time between batches".

(4) "Variable Batch Acquisition". The basis of this intervention is batch acquisition which takes account of and makes adjustments for short inter-leaver times. This system of intervention works in the same way as batch acquisition but in the event of employee(s) giving notice to leave before the batch acquisition process has reached the induction stage then replacements for those new leavers are recruited with the batch the size of which is increased accordingly. Whereas in "Batch Acquisition" the batch size is fixed, in this intervention the specified batch size is the minimum. With this intervention the user specifies values for the parameters of "triggering level" and "batch size".

(5) "Periodic Review System". The basis of this intervention is that the "staffing level" is reviewed at pre-determined intervals and that variable batch sizes are acquired as necessary. With this intervention the user is required to give values to two parameters; "time between reviews" and "full establishment variation figure".

3.7 THE MODEL IN OPERATION AND THE OUTPUT IN THE "TIME ONLY" FORM

The model runs on the basis of a clock with units of

one week. At the commencement of any run of the simulation, after all parameter values have been input, the length of run is set by the user. Events, such as a leaver or the start or completion of an acquisition process, are generated to conform to the input parameter values. These events are generated to conform to the rules of the specified intervention and the use, where appropriate, of a random number generator.

For every week that the model runs a check is made of the "staffing level" which is compared with the "establishment level", to produce at the end of the run a distribution of deviations in the form shown in figure 3.3.

FIGURE 3.3: OUTPUT FROM A "TIME ONLY" FORM RUN OF THE MODEL SHOWING THE DISTRIBUTION OF DEVIATIONS AROUND THE "ESTABLISHMENT LEVEL".

Estab Variance	Percentage (rounded)
-18	0.0
-17	0.0
-15	0.0
-14	0.8
-12	1.3
-11	2.1
-9	6.2
-8	6.2
-7	13.1
-5	5.4
-4	5.4
-2	24.6
-1	14.6
+1	16.3
+2	4.0

Mean Variance -3.52

3.8

DATA INPUT FOR THE COST FORM OF THE MODEL

In this form of the model the "time only" inputs are supplemented by cost data inputs of three kinds; costs of acquisition, costs of surplus and costs of deficits.

3.8.1

DATA INPUT: COSTS OF ACQUISITION

The user is required to make inputs for costs for each of the 28 activities that make up the acquisition process. For each activity the user inputs costs of two kinds viz;

(1) Costs which relate to each employee acquired.

(2) Costs which relate to each batch of employees acquired. (Multiple inputs can be given for these costs in a stepped function if required.)

Inputs are required for all activities irrespective of whether time has been specified for the activity. Inputs can take any positive value and zero. In the case of the two activities that constitute the final training stage of the acquisition process it is possible to enter negative value costs (i.e. benefits). These benefits are conditional in that they are only computed if at the time that the final training is taking place the "staffing level" is less than the "establishment level". If this is not the case then only costs are computed.

3.8.2

DATA INPUT: COSTS OF SURPLUSES

The use of some interventions poses the possibility that at some times during the run of the simulation the "staffing level" may be greater than the "establishment

level". In such circumstances the number of fully trained staff exceeds the optimal number. It is therefore assumed that such a situation involves cost. The amount of the cost is assumed to be a function of the duration of the surplus and its extent. The user is required to specify this potential cost by completing a matrix, the axes of which are time in weeks and extent of surplus in numbers of employees. Employees are only treated as being in surplus when the whole of the acquisition process is completed and if at that time the "staffing level" exceeds the "establishment level". Figure 3.4 shows a portion of the surplus matrix with input values in some cells. The value input into each cell represents the cost per week per surplus employee at that level of surplus for the length of time that any surplus has existed on a continuous basis.

FIGURE 3.4: A PORTION OF A SURPLUS MATRIX.

		Duration of surplus in weeks			
		1	2	3	4
Size of surplus of workers	1	120	130	135	
	2	125	135	140	
	3	130	135	150	

It is not however necessary to complete the full matrix if the unit cost per unit time has a maximum.

With reference to figure 3.4 if it was the first week of a surplus of 2 workers (which would mean that two workers had just finished their final training and that until then the "staffing level" was equal to the "establishment level") then the cost per worker in that week would be £125 making a total cost of £250. If two more workers were to complete their training in the next week and no workers were to leave then the total cost of the surplus for that week would be £540 (4 times £135). Similarly if in the sixth week of a surplus there were 10 workers in excess of the "establishment level" then the cost for that week would be £1500 (10 times £150).

3.8.3 DATA INPUT: COSTS OF DEFICITS

Just as some interventions are likely to lead to surpluses so others are likely to result in periodic deficits. The user is required to input costs into a deficit matrix which is structured and functions in the same way as its surplus counterpart.

3.9 THE MODEL IN OPERATION AND THE OUTPUT IN THE COST FORM

The basic running of the simulation is the same in this form as it is in the "time only" form. In this form the effect of input costs is additionally computed. Each week of a run of the simulation two checks are made. First a check is made whether any acquisition activity

which involves cost has been completed in the week. If it has then the cost is accumulated ready to be output on the completion of the run. (In the case of negative cost or benefits applicable only to final training activities a further check is made of whether the model is at the time in a state of deficit and only then will the benefits be accumulated.) Secondly a check is made of the relative size of the "staffing level" to the "establishment level". If these are not the same then the duration of the surplus or deficit is noted and the appropriate cell in the appropriate matrix is interrogated and the cost computed and accumulated for output at the completion of the simulation run.

On completion of the simulation costs can be output in a variety of levels of detail. Mean costs can be given for each year, for each new employee acquired and for each batch of employees acquired. Mean costs can also be provided for each of the three main types of cost (i.e. acquisition, surplus and deficit.) These costs can be shown on an annual basis or per acquisition. In addition distributions of all these costs for which means are provided can also be obtained.

3.10 SOME IMPORTANT CHARACTERISTICS OF THE MODEL

In this section some of the more important aspects of the model are considered in more detail.

3.10.1 DATA INPUT CHARACTERISTICS

The model requires the user to input data relating to a variety of aspects of employee resourcing. For some

inputs the user may be able to call upon existing data bases. For example the inputs relating to labour turnover depend upon the use of information which is often available within organisations. Similarly some of the information relating to the times of the acquisition process may be available, but here care must be taken to record the elapsed time rather than the execution time associated with each activity.

A very full list of possible activities is provided and indeed though the 28 are given titles it is possible to use each to represent activities deemed relevant to the user, since the labeling of activities within the model is inconsequential.

For some inputs the user may be required to make judgements without the benefit of a data base. For example, it is unlikely that the actions of managers are described in the terms used to convey the rules of the interventions. The use of parameters within each intervention renders them very flexible such that most if not all resourcing decision making can be represented. There is however the possibility that in practice more than one intervention is used at a time. For example reactive acquisition may be used in combination with batch acquisition. This can be accommodated by combining the results of multiple runs of the model using different interventions.

With respect to the costs of acquisition it is possible

that data bases are not already available to users. In these cases the users are required to determine their own basis of cost computation for input. This aspect will be considered in more detail in chapter 4.

The opportunity to input negative costs (benefits) within the final stage of the acquisition process is significant in two respects. Firstly, in terms of the determination of the basis for establishing the magnitude of the benefits and secondly in terms of the relationship to inputs in the deficit matrix. It has already been noted that benefits are only computed within the run of the simulation if at the time of the final training the model is in a state of deficit. This is logical since if the model is not in a state of deficit extra staff in excess of the "establishment level" (albeit incompletely trained) could not possibly make a net contribution. The opportunity to input benefits recognizes the possibility that in situations of deficit staff approaching the stage of becoming fully effective may make a contribution in excess of their costs of employment, though short of the contribution expected from a fully effective worker. Such benefits are used to offset the costs incurred as a result of deficit and computed by reference to the deficit matrix. It would therefore be expected that there would be some relationship between such input benefits and the figures entered in the deficit matrix. Though the deficit matrix is expressed in terms of the

costs of labour shortages, it can be argued that such costs equate to the benefits foregone from not having the desired number of staff. It could be argued that the deficit matrix represents a time series of the perceived net marginal product of labour. This concept will be discussed in more detail in chapter 9.

3.10.2 SIMULATION MODELS AND STOCK CONTROL

Within traditional stock control the costs of stock holding and stock-outs are represented by a single rate. The use of matrices in this model indicates an acknowledgement of the difference between physical stock resources and human resources based upon the marginal principle discussed in chapter 1. A consequence is that unlike many stock control models it is not deterministic in the narrow sense. There are two consequences of this non-deterministic approach. Firstly, it facilitates experimentation since a single correct answer is not prescribed, but the lowest cost arrangement must be sought through successive iterations of the model. Secondly, the use of a simulation rather than a deterministic model gives the user the impression of a greater degree of control than is actually the case. This issue and its implications were considered in chapter 2.

3.10.3 MODEL DESIGN IMPLICATIONS FOR A POSITIVE APPROACH

This model like all models is an attempt to represent rather than replicate reality. As such it is not only a

simplification of reality but inevitably embodies assumptions about what is important and unimportant by dint of what is included and what is excluded. There are three fundamental assumptions associated with the model. First there is the assumption that it is reasonable to isolate, at least partially, decision making about employee resourcing as a sub-system within the whole system of management. In other words there is an assumption that it is conceptually reasonable to treat employee resourcing decision making as a partially closed system for the purposes of analysis. Following from the first the second assumption is that the practice of dealing with one type of labour at a time produces results from which meaningful conclusions can be drawn. Thirdly there is at least an implied assumption that the basis of reasoning of users is economic rationality. It is important that these assumptions and their significance is recognized.

In section 1.7 it was noted that a positive rather than a normative approach was to be adopted in the research. The use of the model is central to the data collection for the research. The assumptions underpinning the model are normative. Although every attempt has been made to record objectively the actions of model users these are still constrained by the operation of the model which is itself a function of its design.

CHAPTER 4

THE DATA COLLECTION PROCEDURE

4.1 INTRODUCTION.

During the period of the research 15 organisations were approached to see whether they would be prepared to participate. In all but one case the initial approach involved contacting a personnel specialist from within the organisation. The exceptional case was Ealing Hospital where the initial contact was with a line manager. In these initial approaches, which generally took the form of a letter, a brief explanation of the purpose of the research and an outline of the model and its uses were furnished.

As a result of these initial approaches demonstrations of the model were given to members of management in 8 organisations. At these meetings a more detailed explanation of the purposes of the research, an outline of the proposed programme and procedure and an indication of the probable required commitment of management time were given.

Following these demonstrations managers from four organisations indicated a preparedness to participate in the research. Of these four organisations three saw the exercise through to its conclusion and in one it was discontinued part way through. In the case of the last organisation the decision to terminate the exercise was by mutual agreement.

The first case study undertaken was at Greene, King and

Sons of Bury St. Edmunds, a regional brewing company. Subsequent to this case five other brewing companies were contacted. None of these approaches came to fruition. It was then decided to broaden the range of organisations to be invited to participate. Approaches were then made to managers of organisations who in one way or another had become aware of the research work and indicated an initial interest. As a result the second case study was undertaken at TVS Maidstone, an independent television company and the third at Ealing Hospital, London.

The data for the research was therefore collected from managers in two private sector and one public sector organisation drawn from three distinct industries, brewing, television and health care. The jobs, the resourcing of which was the subject of the data collection, varied from pub landlords to sales executives and nurses representing quite different occupations. So, though the sample was small it had the merit of being very varied.

4.2

THE INITIAL CONTACT

At the stage of the initial contact four aspects of the research exercise were considered. The purposes of the research were discussed, the outline of a programme of activities was established, a description of the procedures to be followed was discussed and the likely commitment of management time and effort was outlined.

4.2.1. EXPLANATION OF THE PURPOSES OF THE RESEARCH

It was explained that the purpose of the research was to gain insights into managerial decision making in the area of employee resourcing. It was further explained that the research was to take the form of a series of case study exercises, and that the methodology to be adopted was that of "Action Research". Rappaport's definition of action research (see section 2.5) was discussed to ensure that a shared appreciation of the approach was obtained. The researcher's objectives were made explicit. These were the same for all case exercises, viz:

- (1) To study managerial decision making in the area of employee resourcing and, through doing so, to gain insights into managerial valuation of the organisation's human resources.
- (2) To provide feedback on any insights obtained so that clients' understanding and appreciation of the activities and/or systems associated with the process might be enhanced.

The host managers (the clients) who constituted the individuals whose decision making was to be subject of the research were then asked to make their objectives explicit. In all cases there was a compatibility between the objectives of the parties such that a third objective of the researcher, that of assisting the clients in the achievement of their objectives, was included. It was agreed that if within the

collaborative approach to the exercise a situation arose where there was a disagreement about the course of action to be followed then this would be discussed and should it prove impossible to resolve then the wishes of the clients would prevail.

4.2.2. AN OUTLINE OF THE PROGRAMME OF ACTION FOR EACH CASE

The main stages of the exercise were outlined as follows;

- (1) Identification of the group of employees to be modeled.
- (2) Determination of the "establishment level".
- (3) Setting up and running "time only" data to represent the existing resourcing arrangements.
- (4) Experimenting with "time only" data to arrive at a "time only optimal arrangement".
- (5) Inputting and running with cost data for the existing arrangements.
- (6) The application of cost data to the "time only optimal arrangement".
- (7) Experimentation with data sets to obtain a cost optimal arrangement.
- (8) Review and evaluation of the exercise.

4.2.3. PROCEDURES FOR THE CONDUCT OF DATA COLLECTION.

There is considerable potential for confusion about what constitutes data. For the purposes of the research, data is both the figures input to the simulation and the reasoning/explanation of those

inputs. For the purpose of the client manager subjects data is the inputs made to the model and the outputs received from it. The clients' data is therefore an important direct and indirect part of the research data, the control of the basis of collection of which is most important.

It is essential that the data of the research is the decisions of the managers themselves with minimal contamination from the behaviour of the researcher. Yet within the process of the exercise the client managers had a reasonable expectation that with respect to some aspects the researcher/consultant would take the lead. The roles of the parties had therefore to be clearly defined and understood.

The researcher/consultant had the following roles. He ensured that the client managers were familiar with the structure of the model and how it worked. He elicited from the subjects the reasons for their actions and decisions. This had to be done without unduly influencing those actions or behaviours.

The role of the client manager subjects was to take decisions and actions which they judged to be functional and to explain these actions and decisions and the basis of their perceived functionality. The precise nature of these roles for the different stages of data collection are as set out in sections 4.3.1 to 4.3.8.

At particularly critical points the subjects were asked

to provide written explanations in their own words. For all other aspects the researcher recorded decisions in the form of minutes which were subject to the agreement of the client managers. The purpose of these minutes was to ensure that a comprehensive and accurate record of actions and decisions was made.

All these procedures were discussed and agreed with the client manager subjects before the data collection process was commenced.

4.2.4. RESOURCE COMMITMENTS FOR PARTICIPANTS

Participation in the research exercise involved a considerable commitment on the part of participating client managers. It was explained at the stage that the model was demonstrated that it was unlikely that the exercise could be completed in fewer than ten face to face sessions of between a half a day and a whole day's duration. In addition runs of the model would be undertaken on an off-site basis with results sent to the client managers for their consideration. It was also explained that it was essential that the participating client managers had responsibility for strategic decision making for the employees about whom resourcing decisions were to be made. It was therefore likely that more than one such manager would be involved preferably directly, or certainly indirectly in the activity.

In practice all the directly participating managers in

the three case studies were of a senior status. In the two private sector organisations they were operating at the level reporting directly to the board of directors, some of whom themselves became involved in the exercise. In the case of the hospital the managers concerned reported directly to the chief executive.

Since in all cases the participating managers were senior executives with busy schedules it could sometimes be as long as a month between meetings. The result was that in two cases the exercise extended over a period of between nine and ten months and in the third over two years.

4.3 THE DATA COLLECTION PROCEDURE FOR EACH STAGE OF THE EXERCISE

In this section each stage of the exercise is described with respect to the activities involved, the key decisions and the specific roles of the parties.

4.3.1 IDENTIFICATION OF THE GROUP TO BE MODELED

The group to be modeled has to be homogeneous not only in terms of the work they perform but also in respect of the manner of their acquisition. This does not mean that there can only be one form of acquisition, rather that each type of acquisition programme should take place sufficiently frequently to make the results obtained from simulation meaningfully representative. Since the model is "driven by leavers" the group selected must be large enough and or have a

sufficiently high rate of labour turnover to generate leavers in numbers that make the results obtained from modeling credible.

The role of the researcher was to communicate these requirements and to explain how the model works so that the reasons for them were appreciated by the subjects. The subjects had to decide which group of the organisation's employees they wished to model. It was essential that the subjects had prime responsibility for the resourcing of the group to be modeled. This did not mean that they had to be personally involved in the activities that make up the acquisition process, though they may have been, but that they were responsible not only for that activity but also that they played a major part in determining the "establishment level" of the group.

There was little likelihood of researcher contamination at this stage.

4.3.2 DETERMINATION OF THE "ESTABLISHMENT LEVEL"

The "establishment level" is a critical parameter within the model. It was essential that the subjects fully understood the significance of the figure input for this variable. The relationship between the "establishment level" of fully trained staff and the "staffing level" of such personnel had to be explained as had the sub-optimality associated with any deviation from the former.

The fact that the "establishment level" was the optimal

staffing level at the time that the exercise was taking place had to be stressed. The appreciation of this was made more difficult by the tendency of subjects, at least initially, wrongly to assume that the simulation represented future events rather than current events. This misunderstanding arose from the fact that the normal run period of the simulation was 520 weeks, leading many subjects to suppose that the next ten years of events were to be simulated rather than the current situation to be repeatedly iterated to provide data on the probability of complex combinations of events. Once this aspect was fully grasped the proposition that there was but one optimal level at the current time was usually readily accepted.

It was the role of the researcher to ensure that the subjects fully understood the significance of the "establishment level". To impress this upon the subjects they were asked to give a full written explanation of how the level had been determined. Another reason for requesting this written explanation was to ensure that it was expressed in the subjects' own words and thus to minimize the danger of researcher contamination.

At this stage the greatest risk of researcher contamination arose from the explanation of the principles of sub-optimality embodied in the model design. The researcher in providing this explanation

had to avoid suggesting any basis for the computation of sub-optimality associated with surpluses and deficits.

4.3.3. SETTING UP AND RUNNING "TIME ONLY" DATA TO REPRESENT THE EXISTING RESOURCING ARRANGEMENTS

This stage which normally took a number of hours to complete had two main purposes. The first purpose was to ensure that the existing resourcing arrangements could be accurately modeled. The second purpose was to provide the subjects with the opportunity to become familiar with the model and its workings.

The subjects and the researcher together input the data on the times for the various activities in each of the stages of the acquisition process. The role of the researcher was to ensure that account was taken of all acquisition activities and that these were all input "correctly" in terms of the elapsed time rather than the execution time. The researcher had to explain the basis of the various probability distributions (normal, exponential, beta and self specified) that were available and the way in which seasonal weightings were operated. The subjects had to provide the data to be input. Sometimes this involved collecting and analysing data that was not already available, thus adding to the time devoted to this stage.

Similarly when it came to inputting data on labour turnover characteristics there was a tendency for the researcher to take the lead because of the need to

explain the basis of event generation in the model.

The most demanding part of this stage related to the interventions described in section 3.6.4. It was not only necessary to communicate clearly the operation of the various interventions as rule based mechanisms but it also brought to the fore the issue of when a vacancy is treated as filled within the model (i.e. when the final training is completed rather than when the new employee arrives for induction) and how this is dealt with through each of the intervention procedures. Discussions on this subject exposed minor misunderstandings with respect to the function of the "establishment level" within the simulation run. Finally when the model data had all been input the simulation was run and the results, which take the form shown in figure 3.3 in section 3.7, were reviewed to check that they reflected accurately what actually happened in the organisation. If the results did not reflect reality the inputs were reviewed and adjustments made as required.

During this stage the researcher and the subjects worked closely together, and given the subjects' lack of familiarity with the model there was a tendency for them to become partly dependent on the researcher. Whilst there was little danger of direct researcher contamination in terms of influencing subjects' decision making there was the risk of the relationship

developing to a point where discussions became joint problem solving rather than the researcher probing for explanations of actions. At this stage this danger was not great since the data input to the model was historical and factual though still subject to presentation for input in a form compatible with the model requirements.

4.3.4. EXPERIMENTING WITH "TIME ONLY" DATA TO ARRIVE AT A "TIME ONLY" OPTIMAL ARRANGEMENT

At this stage the subjects were given a free hand to vary any inputs they choose on the acquisition process and the intervention used. They were asked to experiment with different arrangements, represented by different data input sets until they arrived at what they considered to be the best possible result.

The role of the subjects was to make changes in the input data, run the model with the new data, review the output data results and repeat the process until such time as they decided that the results obtained could not be improved upon. Subjects may decide that realistically there was little that they could do to change the times on acquisition activities and they may therefore leave these inputs as they were, in which case their manipulations were limited to the interventions employed.

During this process the researcher played no active role. However, given that conducting a large number of runs of the model could be very time consuming much of

this work was carried out off site. In this case the subjects specified the input data sets they wished to have run, the researcher conducted these runs and sent hard copy of the results to the subjects.

When the subjects had decided upon the arrangement that they considered to be optimal, based upon their readings of the output data from the model, they were asked to provide a written statement explaining why they considered that particular result to be optimal.

By the completion of this stage the subjects were thoroughly familiar and comfortable in the use of the simulation model in its "time only" form. This was important because it was essential that from this stage onwards the subjects played the leading role and the researcher simply probed them for explanations of their actions.

4.3.5. COST DATA APPLIED TO THE EXISTING ARRANGEMENTS

The input data set which was developed to represent the current arrangement was now returned to, but in the full cost form of the simulation rather than the time only form in which it was originally developed. The costs of acquisition were input first. The subjects input batch variable and batch fixed costs for all the activities that made up the acquisition process. The subjects then input data to the surplus and deficit matrices.

Initially the role of the researcher was to explain how

the cost form of the simulation worked. The role of the subjects was to decide upon the costs to be entered. As the subjects entered costs as input data the researcher probed them as to the basis of computation of these input costs. The explanations of these cost input decisions were recorded in the minutes. The researcher questioned the subjects on each cost input seeking the basis for its computation and how this related to the basis of computation of other costs that had been input. The researcher also questioned the subjects about the general principles that were being employed in the computation of input costs.

To avoid contamination this probing and questioning process had to be conducted very sensitively so that what was recorded were the subjects' views as far as possible uninfluenced by the researcher. It was essential that the researcher did not suggest ways for computing costs but at the same time obtained a full explanation for the decisions made. This was particularly difficult when the researcher was trying to encourage consistency of approach between acquisition inputs, especially if the negative cost option on final training was used, and the entries made in the deficit matrix.

The researcher's role was to probe without leading and to record accurately the reasoning employed by the subjects. This could be a very lengthy process taking many hours and involving detailed discussion, whilst

explanations were sought.

These explanations are important data of the research. The aim was to expose fully the thinking behind the decision making of the subjects but to do this without influencing that thinking. The approach adopted was to question every input and to continue probing until a clear understanding of the reasoning for it was shared by the researcher and the subjects.

When the cost data input was completed the simulation was run and the cost data output obtained. This output was reviewed by the subjects.

4.3.6. COSTS APPLIED TO THE "TIME ONLY" OPTIMAL ARRANGEMENT

If the only change made between the current arrangement and the "time only" optimal arrangement were with respect to the intervention used then the cost data input set from the existing arrangement were simply replicated on the "time only" optimal arrangement and run in the cost form of the simulation. If changes were made in acquisition times, modifications had to be made to the costs input for these activities. If this was the case the researcher probed the subjects on the basis of the new cost inputs.

The "time only" optimal arrangement was then run with costs and the results were reviewed by the subjects.

4.3.7. EXPERIMENTATION TO FIND THE COST OPTIMAL ARRANGEMENT

At this stage the subjects were given a completely free hand to change any input variable they chose. Logically

they should not wish to change data input to either of the matrices. All changes made attracted the same researcher questioning as that described in section 4.3.5.

The subjects experimented with different cost and time inputs until they arrived at what they judged to be the best obtainable set of results. Logically this should have been the arrangement that yielded the lowest cost result of all those considered. Arriving at this point involved many runs of the simulation, some of which were undertaken on an off site basis with the subjects specifying the inputs, the researcher creating and running the data sets and providing the results to the subjects. Whether the data was input on or off site the researcher probed the subjects on the basis of all their new inputs, though by this stage they may have been expected to conform to and be consistent with costing principles already established.

4.3.8. REVIEW AND EVALUATION

This the final stage of the exercise involved reviewing jointly what had taken place and what had been learned. Initially this took the form of a discussion. The researcher then provided a report which was in the main a description of what had taken place. This report was discussed. The researcher and the subjects in two cases then wrote up what they considered to be the most important findings of the exercise for dissemination to a larger group. The subjects took such other action as

they deemed appropriate in the light of their experiences and findings from the exercise.

4.4 THE ACHIEVEMENT OF CLIENT OBJECTIVES

It was within the stage described in section 4.3.7 that clients realized their objectives of identifying the most cost effective arrangements for employee acquisition for the selected group of staff. It was at this stage that they used the model to its greatest effect in calculating the best solutions. It was undoubtedly the prospect of being able to do this which had provided the initial attraction to participate in the exercise. Interestingly however, having completed the exercise this aspect was often relegated to a position of secondary importance compared with the overall insights obtained.

4.5 THE ACHIEVEMENT OF THE RESEARCHER'S OBJECTIVES

From the perspective of the researcher there are a number of points of special interest throughout the various stages of the exercises.

The first point of interest related to the subjects' explanations of the "establishment level". These explanations have the potential to provide information about the subjects' perceptions of the relationship between human resources and other factors of production. The subjects' basis for defining "time only" optimality may similarly provide insights not only into this relationship but also into their

criteria of optimality when this is not expressed in a single composite form of money.

The most important data collected derives from the explanations given by the subjects for the inputs they make for costs. The reasoning behind the computations of cost inputs to the three parts of the model (acquisition, surplus and deficit) is the raw material from which explanations of the basis of the implied value of labour are derived. Benefit is also derived from the discussion of these issues in the final stage of the exercise.

PART II

This part comprises four chapters. In each of the first three chapters a description of one of the case exercises is presented. These three chapters have a common format. They each begin with the general background to the case exercise, identifying the organisation in which it is located, the group of workers whose acquisition is modeled and the participating managers are the subjects in the research. The next stage in each chapter involves the "establishment level" and the basis of its determination. This is followed by a description of the "time only" operation of the model for the existing arrangements. The "time only" optimal arrangements are considered as are the rationales put forward in their support by the participating managers. Attention is then turned to the cost inputs and their determination. This is followed by a discussion of the "time only" optimal arrangement and the cost optimal solution. Though the three cases have aspects of similarity deriving from the common approach adopted in each setting, there are also features that are peculiar to each study. These are considered at the end of each chapter along with the outcomes of the review stage of the data collection process. The quotations in these chapters are attributable to the managers concerned in each case exercise. In all cases these quotations have been subject to verification by the managers concerned

through the process of minuting described in chapter 4. In chapter 8 the data collected in the three cases is analysed to draw out the similarities and differences that were exposed and to offer explanations for these.

CHAPTER 5

CASE STUDY: GREENE KING AND SONS plc

5.1 THE CASE STUDY SETTING

Greene King and Sons plc. is a regional brewing company which was first established in 1799. At the time that the case study exercise was carried out, (1987/8) the company owned and operated 750 public houses in East Anglia, the northern home counties and London, and employed over 1700 people. The turnover for the year 1987/8 was £100.5m. with before tax profits of £14.2m. The main participating managers in the exercise were the then General Manager Managed Houses and the Employee Relations Adviser. These two managers participated directly throughout the whole exercise. Other managers and directors who were indirectly involved included the Director of Managed Houses, the Director of Production and the Training Manager Licensed Houses. The researcher suggested that the company's financial specialist be included in the directly participating group of managers but this was forcefully resisted by the other managers.

The group of employees decisions about whose resourcing was the subject of the research were landlords employed in 60 "family sized" pubs serviced by the Bury St. Edmunds brewery.

The stated objectives of the participating managers were:

- (1) To improve the company's financial performance

in the area of "managed houses", by the identification and adoption of the best employee resourcing strategies for the acquisition of managers for this type of public house.

(2) To assist the researcher in his studies into managerial decision making.

The researcher's objectives were as noted in section 4.2.1.

5.2 THE "ESTABLISHMENT LEVEL"

The value to be input to the model for the "establishment level" was only determined after lengthy consideration. It was finally decided that this figure should be set at 67. The rationale given for this level was as follows:

"Regarding establishment level of 67"

(a) Our sample is sixty operationally similar pubs.

(b) Managers are entitled to five weeks holiday per annum, which means that there are 300 man weeks to be covered. This does not take into account absence for any other reasons, e.g. sickness.

(c) Six relief managers are therefore needed who in turn are entitled to five weeks holiday per annum. We can however, set against this the fact that not all managers take their full entitlement and the Company at present is

willing to give a cash payment in lieu of one weeks holiday not taken.

(d) In addition, our experience tells us that it is inevitable that we need an additional man in order to cope.

(e) The establishment level therefore of 67 is regarded as an 'optimum' level and does not take into account the normal turnover of managers."

In considering this "establishment level" two points emerge. The first point relates to the figure of 67 and the second to the most basic assumptions behind it.

With respect to the first point, in discussions it became apparent that although the General Manager set the figure at 67 his subordinates, the Area Managers, effectively frustrated its achievement. When challenged they claimed that they never had time to catch up with the wastage of landlords. The fact that they did not aim at the 67 level was borne out by the staffing level of 64.

It seemed that the Area Managers preferred this lower level because it avoided the appearance of "fat" even if this meant the greater use of agency staff. From their perspective their behaviour was rational albeit that rationality was bounded. Moreover by avoiding the direct challenge to their superior they effectively engaged in satisficing behaviour.

Consideration of the explanation given for the

"establishment level" reveals that the basis of the figure is set by the number of pubs with adjustments to take account of absence and holidays. In the mix of all resources the human resources are clearly driven by the physical non-human resources. This may be a result of tradition but nonetheless the number of pubs determines the number of landlords rather than a mix of capital and labour combining to meet customer demand. Alternative mixes do not seem to be entertained.

5.3 THE CURRENT ARRANGEMENTS: "TIME ONLY"

Inputting the data and running the model for this stage of the exercise was fairly straightforward though the representation of the acquisition process within the model required that some activities were combined. The inputs were as follows:-

ACTIVITY	TIME
Recruitment and response to applicants	Exponential distribution with a mean of 1 week
Interviews	Fixed at 1 week
Selection matching	Exponential distribution with a mean of 1 week
Selection decision involving line managers	Fixed at 1 week
Delay	Beta with min. of 1 week, max. of 8 weeks mode of 4 weeks.
Induction	Fixed at 1 week

The data input to generate leavers was an annual labour

turnover rate of 20%. The distribution of time between leavers was specified as:-

Never being less than 0 weeks
 Prob. of .1 that inter leaver time is 2 weeks or less
 Prob. of .2 that inter leaver time is 3 weeks or less
 Prob. of .3 that inter leaver time is 3 weeks or less
 Prob. of .4 that inter leaver time is 4 weeks or less
 Prob. of .5 that inter leaver time is 4 weeks or less
 Prob. of .6 that inter leaver time is 4 weeks or less
 Prob. of .7 that inter leaver time is 6 weeks or less
 Prob. of .8 that inter leaver time is 6 weeks or less
 Prob. of .9 that inter leaver time is 6 weeks or less
 The time between leavers is never more than 8 weeks

The mean time between leavers is 4 weeks. There is no seasonal variation in leaving patterns. Leavers are normally required to work 6 weeks notice.

When this data was input and the model run for 520 weeks with an intervention strategy of "periodic review" with a "full establishment variation figure" of minus three and "time between reviews" of one week the results shown in table 5.1 were judged by the managers to be an accurate reflection of the situation at the time.

TABLE 5.1. THE CURRENT SITUATION IN "TIME ONLY" FORM

ESTABLISHMENT VARIATION	PERCENTAGE OF TOTAL TIME
-7	0.6
-6	3.5
-5	13.5
-4	61.9
-3	20.6
-2	0.0
-1	0.0
0	0.0

The mean deviation from the establishment level was -4.01 which would indicate that on average the group

operated with 63 landlords. This was judged by the managers to be an accurate representation of reality.

5.4

"TIME ONLY" OPTIMAL ARRANGEMENT

A number of different interventions were tried before the arrangement that was judged to be optimal was found. The intervention used for this arrangement was "Variable Batch Acquisition" with a "triggering level" of zero and a "normal batch size" of one. The results obtained from running the simulation with this intervention and the existing data inputs for all other parameters is shown in table 5.2

TABLE 5.2. THE OPTIMAL SET OF RESULTS USING "TIME ONLY" DATA

ESTABLISHMENT VARIATION	PERCENTAGE OF TOTAL TIME
-6	1.7
-5	0.0
-4	0.0
-3	2.1
-2	9.4
-1	44.4
0	37.1
+1	4.2
+2	0.6
+3	0.2
+4	0.2

The mean deviation for this arrangement was +0.73 which means on average the arrangement would involve fully trained staffing levels of between 67 and 68. The reason given by the managers for selecting this arrangement out of those that were tried was that it:-

"Produced the lowest figure for the amount of time we were operating sub-optimally without a significant number of occasions where we exceeded our target establishment level."

Another arrangement using an intervention of "Periodic Review" resulted in a mean deviation of only +0.15 but it was judged to be inferior. It is interesting to look in some detail at the results of this simulation in comparison with the chosen optimal solution since it affords deeper insights into the perceptions of sub-optimality in relation to the "establishment level".

TABLE 5.3. A REJECTED ARRANGEMENT

ESTABLISHMENT VARIATION	PERCENTAGE OF TOTAL TIME
-6	1.7
-5	0.0
-4	0.0
-3	0.2
-2	3.1
-1	14.6
0	64.0
+1	16.3

Comparison of the results in tables 5.2 and 5.3 shows that as well as having a superior (smaller) mean deviation from the "establishment level" the rejected arrangement was also superior in two other respects. First the proportion of time that the staffing level was exactly equal to the "establishment level" was greater at 64.0% compared with 37.1%. Secondly, in terms of landlord deficits the rejected result was better than the selected one in respect of every level

of deficit. It is only with respect to landlord surpluses that the chosen result was superior with 5.2% overall compared with 16.3%.

Possible explanations for this include; that surpluses were seen as being extremely costly, presumably more so than deficits; or on some non-financial basis surpluses were perceived as less desirable than deficits. The perceptions of the relative penalties associated with, or the relative undesirability of deficits and surpluses may be influenced by previous experience. In the past the Company had never intentionally or indeed unintentionally operated with surpluses and as table 4.1 shows was not doing so at the time. In one sense deficits or shortages of landlords had become accepted and maybe even acceptable, but surpluses for which there was no precedent may have been judged to be unacceptable

It is worth noting that the General Manager who felt that his Area Managers were consistently reluctant to aim at a sufficiently high target number of publicans, and that this frustrated his intentions, was himself inclined to accept deficits rather than surpluses when identifying optimal results using non-financial measures. In that respect he would seem to have been acting in a similar way to his Area Managers.

Finally it may be that there were strong pressures associated with the organisation's culture. It may be that surpluses were perceived as wasteful and

indicative of "poor management", whereas deficits may just have been seen as sub-optimal, if not periodically inevitable. Whilst the sub-optimality of deficits was recognized in terms of extra expenditure for substitute personnel, this at least represented expenditure in exchange for which there was some visible benefit (the services of an agency landlord). In contrast in a situation of surplus, payments would be made for which there would be no visible return, the company would be paying someone to do nothing. This may have been seen as a course of action that should not be pursued intentionally.

The issues raised here relating to the determination of the "establishment level" will be considered in more general terms in chapter 9.

5.5 COST INPUTS

During this stage of the case exercise it was necessary to provide costs for the three parts of the model; the acquisition process, the costs of surpluses and the costs of deficits of pub managers. In doing this the conventions used in the computation of those costs were exposed. A considerable amount of time was spent discussing how costs might properly be determined. Conventions and rules developed gradually, with many modifications until such time as they were clear, consistent and when applied yielded defensible results. The managers recognized early on that since

they were breaking new ground, at least within the context of the Company if not in an even wider field, there were clearly no "right" answers.

As the process of computing costs for the three areas developed it was decided that rather than looking at each activity or situation in turn and dealing with it on an ad hoc basis it would be better to have a model for the concept of cost. This was felt to be necessary, because within the company cost was a concept associated primarily with the product. The type of activities and situations being considered here were normally lumped together in the figure for overheads. It became apparent that some of the conventions that would be used would be the same as those employed in product costing; others would be similar, whilst still others would be quite novel and need to be "invented" for the purpose of the exercise. Costs computed using the same conventions as those employed in product costing were termed "hard" costs; those that were similar were slightly "softer" and those which were entirely novel were "softest" of all. This concept of hardness of cost came to be quite significant when the results of different simulation runs were compared. The taxonomy developed is presented below as four classifications of cost in descending order of "hardness".

- (a) Direct expenditure associated with the activity or situation under consideration.

(b) Use of existing Company resources apportioned to the activity or situation under consideration.

(c) Apportionment of under-utilized resources which were owned by the Company and the under-utilization of which came about as a result of the activity or situation under consideration.

(d) Apportionment of profit foregone as a result of the activity or situation under consideration.

5.5.1 TYPE (a): DIRECT EXPENDITURE COSTS

These, the "hardest" kinds of costs were the easiest to compute. The procedure was to identify any direct expenditure resulting from an activity or caused by a situation that came about because of labour turnover amongst landlords, to check that this was the sole cause and to allocate the whole cost.

These were considered as "hard" costs because they were computed using exactly the same conventions and rules that were applied in costing products.

Costs of this kind were computed for three activities/situations. These were 40 pounds per recruitment effort for advertising, 45 pounds per trainee for lunches, room hire and payments for coverage of the trainee whilst he received off the job training and between 167 pounds and 180 pounds per week the nett expenditure for agency managers used in the deficit matrix.

In all these cases the whole of the expenditure was caused by landlord wastage and could therefore be included in full.

5.5.2 TYPE (b): COSTS RELATING TO THE USE OF EXISTING COMPANY RESOURCES

There were many activities/situations where costs of this type were incurred. In every case the Company resource that was used was existing employees, usually managers. These costs were considered to be "softer" costs than type (a) because in product costing they were traditionally included in an overall overhead figure. This meant that there was a need to develop a new convention for their computation. The central question was, since the managers were already there and the Company was paying for them, should any charge be made? It was decided that such resources should be charged for. The next question was, on what basis should they be charged? The managers decided that the charge should be calculated on the basis of salary costs plus one hundred per cent. The enhancement of salary costs by 100% was based on the existing accounting convention operating within the Company whereby the Managed House department was charged by the brewery for offices, phones, heat, light, vehicles etc. on this basis. Using this formula, clerical time was charged at £16 per hour and managerial time at £22 per hour.

Having established the general conventions of how such

costs should be computed there still remained the question of when such costs should be included. This required the invention of some rules. Two rules were devised and applied to all situations where costs of this type were considered; if the situation conformed to either rule then the costs were included.

The first rule stated that all staff who spent more than 5% of their time each year engaged in activities directly concerned with the acquisition of pub landlords of the type being considered, should have the time they spent charged to the activity.

The second rule stated that if the contribution of a member of staff to the acquisition process, though constituting less than 5% of their time, was nonetheless judged to be indispensable to the successful operation of the acquisition process, then the time they spent should be charged to the activity.

With respect to the first rule the 5% was applied to the sum of all times devoted to activities directly concerned with the acquisition process. The word directly was significant in that it limited activities to those of interaction with the employee or dealing with work related to the new employee's acquisition. It therefore excluded time spent providing a service to staff who were themselves directly or indirectly engaged on work caused by the acquisition of new landlords.

The figure of 5% per annum was used because it was felt that a smaller figure would result in sums of money which would be insignificant, whilst to set the figure at a higher level would mean that a significant amount of staff time/effort could be excluded from the cost. Though the second rule seemed to contradict the first it was included because the activities concerned were seen as being of some direct importance to the overall acquisition and that their delay or omission would render the acquisition unworkable. It was acknowledged that the determination of the importance of such activities was judgemental and did therefore need to be justified on an activity by activity basis. The activities costed in this way were:-

(i) Recruitment which involved 11 hours of clerical time costed at £176 and 12 hours of managerial time costed at £264.

(ii) Selection which involved 1 hour of managerial time costed at £22.

(iii) Induction which involved six hours of managerial time costed at £132 and one hour of secretarial time at £16.

(iv) Off the job training costed at £87, based on 32 hours of managerial time and 16 hours of clerical time divided amongst eleven trainees.

5.5.3 TYPE (c): COSTS BASED ON THE APPORTIONMENT OF UNDER UTILIZED COMPANY RESOURCES

These costs were considered to be a little "softer"

than the (b) type. This type of cost was based upon the idea that there were resources ready and available but because of factors related to or caused by labour turnover amongst landlords these resources were in part, at least, wasted or under-utilized.

Costs of this type were computed in two ways. Where direct expenditure on the under-utilized resource could be clearly identified this was used. Where this was not possible costs were computed using the same rules and conventions applied in (b) type costs.

Costs of this type were used in the surplus matrix. Since the direct expenditure on a surplus landlord was a fairly straight-forward one, this was used in this situation. There was also a cost of this type incurred under certain deficit conditions. In a situation where there was a deficit of more than four landlords and as a consequence five or more pubs were being serviced by agency staff, Area Managers would have to spend a disproportionate amount of their time at these pubs. The effect of this would be under-performance of the other pubs. The extent of this based upon the hourly rate of Area Managers was costed at £44 per week for every week at levels of deficit of five or more.

5.5.4 TYPE (d): COSTS BASED ON THE APPORTIONMENT OF FOREGONE PROFITS

These were the "softest" type of costs. The convention

developed to compute this kind of cost was to calculate the annual profit generated by the average family sized pub and to attribute a part of that to the performance of the landlord. A figure of 23 pounds per week was established using this calculation.

This type of cost was only used in one situation, that of the fourth, fifth and sixth weeks that a pub was being managed by an agency landlord. This cost was charged because the General Manager had observed that in these situations pub profits showed a temporary deterioration. The figure of 23 pounds was therefore included in the deficit matrix for all levels of deficit for the relevant weeks.

This approach to costing using the profit foregone was probed to obtain a rationale for its computation. The rationale was explained by reference to the costing of the temporary deterioration of agency landlords in weeks 4, 5 and 6 in the deficit matrix. The cost in this period was judged by the General Manager to be 10% of the profit generating capability of the pub. An average pub of this type generated about £10,000 of profit per year. Therefore the reduction was about £1,000 per year, corresponding to the £23 per week noted in the deficit matrix in the move from £167 to £190 between weeks three and four.

The implication of this rationale was pursued and the following explanation was provided by the managers. The building plus the stock and sales plus the publican

together in combination yielded £10,000 per annum in an average pub. However, it was judged that only 10% of this was attributable to the publican, because 90% of the profit would be obtained irrespective of the publican, since minimally effective agency staff were always available. It was this drop in performance which was reflected in weeks 4, 5 and 6.

It was noted that £10,000 referred to an average pub/publican and that the range around this average was from -£5,000 to +£20,000 of net profit. Net profit was calculated as sales revenue minus variable costs which were defined as all labour costs associated with the pub, all costs of product, beers wines spirits etc. charged to the pub, costs of services such as electricity rates etc. and depreciation on investment in furnishings and fittings. There was no charge for depreciation of the property itself since this was the asset against which profits were set.

If the average publican was seen as causing 10% of the average profit (£1,000) then the exceptional publican was seen as causing (£1,000 + £10,000) £11,000 profit per annum. Similarly the worst performing publican was seen as having variable costs that exceeded revenues by £5,000 per annum. So if the pub was theoretically able to yield £9,000 without any landlord intervention of consequence then the poorly performing landlord was "costing" the company £14,000 per year by his under

performance.

The average pub was valued at £200,000 and yielded an annual profit of £10,000 which represented only a 5% profit expressed as a proportion of fixed assets. This profit would be increased to the extent of any further "profits" generated through transfer pricing.

The issues relating to this approach to costing will be returned to in chapter 10.

5.5.5 A SUMMARY OF COST INPUTS

The inputs for the acquisition process are summarized in table 5.4

TABLE 5.4: THE COSTS OF ACQUIRING PUB LANDLORDS

STAGE	MEAN TIME (weeks)	COST
Pre-Recruitment	0	£40/programme
Recruitment	2	£440/recruit
Selection	2	£22/recruit
Delay	4	zero
Induction	1	£148/inductee
Training	0	£132/trainee
Final training *	0	-£167/trainee *

* The negative entry for final training was introduced to counteract the cost of deficit incurred from the one week of induction training. In practice the landlord would, if there was a vacant pub, receive his induction training on the job. If there was not a pub vacant then the induction would be off the job and the negative cost would not apply.

The costs input for the surplus matrix were £148 per landlord per week for all magnitudes and durations of surplus.

The costs input for deficits were as shown in the matrix in table 5.5

TABLE 5.5: THE DEFICIT MATRIX FOR MANAGERS OF FAMILY SIZED PUBS

	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7
1 Person	£167	£167	£167	£190	£190	£190	£170
2 People	£167	£167	£167	£190	£190	£190	£170
3 People	£167	£167	£167	£190	£190	£190	£170
4 People	£167	£167	£167	£190	£190	£190	£170
5 People	£224	£224	£224	£245	£245	£245	£225
6 People	£224	£224	£224	£245	£245	£245	£225
7 People	£224	£224	£224	£245	£245	£245	£225

5.6 COST OUTPUTS

Once the costs had been input the simulation was run to determine the total cost of the existing arrangement, table 5.6 and the "time only" optimal arrangement, table 5.7.

The managers considered these results before they started experimenting with the simulation to find their overall optimal (cost minimal) result.

**TABLE 5.6 : THE MEAN ANNUAL COST OF THE EXISTING
RESOURCING ARRANGEMENT**

TYPE OF COST	£	% OF TOTAL COST
Acquisition	8,086.00	17.6
Surplus	zero	0.0
Deficit	37,857.20	82.4
Total	45,943.20	100.0

**TABLE 5.7 : THE MEAN ANNUAL COST OF THE "TIME ONLY"
OPTIMAL ARRANGEMENT**

TYPE OF COST	£	% OF TOTAL COST
Acquisition	8,936.90	53.4
Surplus	310.80	1.9
Deficit	7,494.30	44.7
Total	16,742.00	100.0

From the breakdown of the existing arrangement it was apparent that the cost of acquiring replacement landlords was relatively small compared with the cost of operating in situations where there was an inadequate number of them. Since these costs of deficit were a result of the strategy employed for deciding when to initiate the recruitment programme this was the aspect to which attention was turned. It will be recalled that the existing arrangement was that the staffing level was reviewed each week and only if the number of landlords employed had fallen below or could be anticipated to fall below 64 after landlords who had

given in their notice, and had worked it out, had been taken into account would the process of initiating the acquisition of a new landlord be commenced. Within the simulation model this was represented by an intervention strategy of "Periodic Review", the values for the parameters of which were a "Full Establishment Variation Figure" of minus three and a "Time between Reviews" of one week. A number of alternative strategies were input into the model and their effects reviewed. After much experimentation the best (lowest cost) alternative was selected. This involved the same intervention strategy except that the value given to the full establishment variation figure was now plus one. This meant that the acquisition process was initiated if the staffing level fell to sixty-eight. As well as having a significant effect upon costs it also meant that there would be times when there were landlords surplus to requirements. In fact the chosen arrangement which yielded the costs shown in table 4.8 had been considered in its "time only" form and rejected as sub-optimal. The distribution of deviations for this strategy were shown in table 5.3.

**TABLE 5.8: THE MEAN ANNUAL COSTS OF THE OVERALL OPTIMAL
RESOURCING STRATEGY**

TYPE OF COST	£	% OF TOTAL COST
Acquisition	10,153.40	69.9
Surplus	1,332.00	9.2
Deficit	3,037.50	20.9
Total	14,552.90	100.0

Comparisons of tables 5.6 and 5.8 show not only a substantial reduction of total costs (from £45,943.20 to £14,552.90) but also a dramatic change in the make up of the costs. The overall optimal strategy would appear to be considerably cheaper than the existing strategy. Another difference between the optimal strategy and the existing strategy was that because there would be on average slightly more landlords employed in the new strategy then there would be approximately one more leaver each year.

Comparison between tables 5.6 and 5.7 would seem to suggest that the introduction of data of a financial type altered management decisions about optimality. This and other issues will be discussed in the next section.

5.7 GENERAL REVIEW

In this section some issues that relate specifically to this case exercise, but have not so far been considered, will be reviewed.

5.7.1 THE EXERCISE FROM THE PERSPECTIVE OF THE HOST ORGANISATION

On completion of the exercise the participating managers judged that they had achieved their objectives. Soon after the completion of the exercise the Company undertook a major revision of its approach to the acquisition of landlords, with the introduction of a ten week training programme and most significantly with a procedure which involved planning three and a half to four months ahead of the requirements, in other words following the principles identified in the overall optimal solution described in section 5.6. This was introduced despite the fact that one of the direct participants in the exercise had left the Company.

The directors of the company encouraged the promulgation, within the brewing industry, of their experiences in the case exercise. Dawson (1988). The directors also sanctioned the publication of a review of the case exercise in a more general forum, (Dawson, C. Mc.Alpine, R. and Woolley, S. 1989a).

5.7.2 PERFORMANCE MEASURED AGAINST RESEARCHER OBJECTIVES

The main insights gained from this case study related to the basis for determining the "establishment level" which were commented upon in section 5.2, and the basis of the determination of costs inputs reviewed in section 5.5. Another important issue relating to costs was revealed when the exercise as a whole was reviewed and the participants were discussing the "time only"

optimal results and the overall cost optimal results.

The fact that the participating managers selected different strategies as optimal when they were presented with information that included data in a monetary form from when all data was in a non-monetary form, may seem to confirm the results claimed for the experiments reviewed in section 1.4. However discussions with the participating managers introduced a new dimension to the consideration of the hypothesis that the provision of HRA data causes managers to change their decisions. This dimension may be called the "soft cost syndrome".

The experiments reviewed in section 1.4 looked at the effect upon decision makers of the provision of HRA type data on their decision making behaviour. In every case what was contrasted was the decisions reached with and without financial data. In three out of four cases this data was in the form of costs and in the fourth in which SRVM data was used surrogate cost measures would probably have had to have been employed in the computation of the values. So the choice on offer to the subjects of the experiments was with cost or without cost information.

Whilst it is accepted that value is a complex social construct, cost seems to be treated as if it is not. In other words whereas it may be accepted that the value of something may be problematic its cost is treated

less problematically. Indeed the relationships between the concepts of cost and value seem not to be explored much beyond the point that the former may act as a surrogate measure for the latter.

Within this case some of the inputs made to the model, especially those made to the deficit matrix based upon the computation of profit foregone are stretching the concept of cost to a point where the use of the expression value foregone may be more appropriate. However it would seem from discussions that this is not as simple as a substitution of terms.

When comparing the three strategies reflected in the results shown in tables 5.6 to 5.8 it is not only the breakdown of the total costs between the different aspects of resourcing; acquisition, surpluses and deficits but also the difference in the hardness of those costs in terms of the taxonomy noted in section 5.5.

Table 5.9 shows the breakdown of the output results of the three strategies using the categories used in the taxonomy for inputs.

**TABLE 5.9 : THE BREAKDOWN OF HARD/SOFT COSTS IN RESULTS
OBTAINED FROM KEY SIMULATIONS**

STRATEGY	TOTAL COST £	% OF TYPE OF COST HARD <-----> SOFT			
		(a)	(b)	(c)	(d)
Existing/Current	45,943	75.5	20.0	4.4	0.1
"Time only" opt.	16,742	33.2	62.0	3.3	1.5
Overall cost opt.	14,523	19.7	68.9	10.8	0.6

In discussing the results of the various simulation runs with the managers it became apparent that the information summarized in this table was of some importance not only in terms of their constructs of costs and value but also in terms of their confidence in the results. Their feelings of confidence are most easily understood by taking the information in table 5.9 and presenting the percentages of types of cost cumulatively as in table 5.10

**TABLE 5.10 : THE CUMULATIVE PERCENTAGES OF HARD TO SOFT
COST OUTPUTS FOR KEY SIMULATIONS**

STRATEGY/ SIMULATION	CUMULATIVE % OF HARD TO SOFT COST OUTPUTS			
	(a)	(a)to(b)	(a)to(c)	(a)to(d)
Existing/ Current	75.5	95.5	99.9	100
"Time only" opt.	33.2	95.2	98.5	100
Overall cost opt.	19.7	88.6	99.4	100

Whilst the managers stated unequivocally that each input that they had made represented their best judgement for that aspect of the resourcing process the "harder" the cost the greater their confidence in the basis of its computation. When the results were compared they therefore felt most confidence in the accuracy of the existing/current arrangement.

When the differences between the total costs were large as in the case of the comparison of the existing arrangement and either of the other two then the difference in confidence in the results was seen as inconsequential. When, however, the differences were much smaller, as was the case when comparing the "time only" optimal and the overall cost optimal, to ignore the effects of the "soft cost syndrome" may be more problematical.

Not only does the "soft cost syndrome" call into question whether this case exercise lends support to the argument that the provision of monetary based measures changes management decision making, it may also have implications for the concept of Human Resource Management.

One of the claims made for HRM was that it was concerned with the value of human resources rather than their cost. Disregarding for the moment the fact that a detailed consideration of the relationship and the differences between these two concepts particularly with respect to measurement is generally ignored in

such discussions, there still remains the issue of the softness of measures. In this case exercise the inputs that were closest to attempts to give magnitude to value, those of a proportion of profit foregone were perceived to be the softest of all the inputs used. If the tendency is for value type measures to be softer than the most traditional cost type measures then this would seem potentially to have implications for HRM.

CHAPTER 6

CASE STUDY: TVS TELEVISION LTD

6.1 THE CASE STUDY SETTING

TVS Television is a principal subsidiary company of TVS Entertainment plc. Turnover for the group for the year ending December 1989 was £325m. with profits before tax of £16.2m. The company which is part of the ITV network holds the franchise for the south of England and broadcasts from Southampton and Maidstone. The Company employs directly some 900 staff.

The main participating managers in the exercise were the Personnel Manager and after he left the Company the Deputy Group Personnel Controller. Other managers indirectly involved in the exercise were the Financial Controller and the Regional Sales Manager. At the start of the exercise the researcher suggested that the Company's Accountant participate directly. This suggestion was rejected by the Personnel Manager.

The group of employees, the resourcing of whom was the subject of the research were sales executives who sold advertising slots to customers. These executives were based at the Company's London offices.

The objectives set out by the Personnel Manager were:-

- (1) Using the simulation model to cost the current labour turnover/resourcing situation as it applies to sales staff.
- (2) To simulate different acquisition strategies based upon different points of entry; costing these

strategies.

(3) To simulate different acquisition strategies based upon different intervention arrangements; costing these strategies.

The researcher's objectives were as noted in section 4.2.1.

6.2 THE "ESTABLISHMENT LEVEL"

The majority of sales executives were recruited as sales trainees, progressed to the position of sales assistant and from there to the post of sales executive. For the purpose of the modeling exercise the situation was represented as a single career ladder from sales trainee to sales executive. The "establishment level" was set at 43 fully trained sales executives. The Personnel Manager gave the following oral (minuted and agreed) explanation for this figure.

"When TVS first started their operations they inherited a sales force from the previous franchise holders Southern Television. This sales force comprised of 28 agency sales executives. In late 1982 a policy decision was made to create an additional 9 direct sales posts (3 to deal with national accounts and 6 area sales executives.) Between 1982 and 1988 there has been a further growth of 6 agency sales staff which reflects increased sales volume due to increased transmission time,

increased sales volume due to channel four and movement up the rate card.

Sales in 1981 (Southern) were approximately £80m., sales in 1988 are expected to be £160m., the additional £80m. resulting from £10m. from each of the seven agency executives and £1m. from each of the 9 direct sales staff."

The explanation given for the "establishment level" suggested that it was driven primarily by the level of sales achieved or judged to be achievable. There was no evidence of consideration being given to other factors of production in determining the number of sales staff to be employed. The impression was that there was expected to be a strong correlation between the number of sales staff and the value of sales.

6.3 THE CURRENT ARRANGEMENTS: "TIME ONLY"

Inputting "time only" data to represent the existing arrangement proved to be quite a challenging task. This was in the main because of the difficulty in using the model to represent a situation where there were in practice three ports of entry. The three ports of entry were; straight in to the position of sales executive, entry at the level of sales assistant with progression to sales executive and finally entry at the level of sales trainee with progression through the position of sales assistant to the level of sales executive. After careful consideration it was decided that the process

to be modeled would be with respect to the entry at the level of sales trainee, since this was the route that was followed by the great majority of personnel concerned. In situations of exceptional staff shortages the Company would resort to the direct recruitment of already experienced sales executives. Account was taken of this feature in constructing the model.

The data input set that was judged by the Personnel Manager to satisfactorily represent the actual situation as it prevailed was as noted below.

ACTIVITY	TIME
Recruitment and selection	1 week (fixed)
Delay	4 weeks (fixed)
Induction	self specified (below)
Never being less than 12 weeks	
Prob. of .1 of not being more than 12 weeks	
Prob. of .2 of not being more than 12 weeks	
Prob. of .3 of not being more than 15 weeks	
Prob. of .4 of not being more than 17 weeks	
Prob. of .5 of not being more than 19 weeks	
Prob. of .6 of not being more than 21 weeks	
Prob. of .7 of not being more than 23 weeks	
Prob. of .8 of not being more than 25 weeks	
Prob. of .9 of not being more than 26 weeks	
Prob. of 1.0 of not being more than 26 weeks	
Intermediate/Final Training	self specified (below)
Never being less than 8 weeks	
Prob. of .1 of not being more than 8 weeks	
Prob. of .2 of not being more than 8 weeks	
Prob. of .3 of not being more than 8 weeks	
Prob. of .4 of not being more than 8 weeks	
Prob. of .5 of not being more than 10 weeks	
Prob. of .6 of not being more than 15 weeks	
Prob. of .7 of not being more than 20 weeks	
Prob. of .8 of not being more than 20 weeks	
Prob. of .9 of not being more than 30 weeks	
Prob. of 1.0 of not being more than 40 weeks	

With an "establishment level" and staffing level of 43 and an annual rate of labour turnover of 13% with an exponential distribution of leavers and with leavers giving 4 weeks notice the simulation was run with an intervention of "Reactive Acquisition" producing the results shown in table 6.1.

TABLE 6.1. THE CURRENT SITUATION IN "TIME ONLY" FORM

ESTABLISHMENT VARIATION	PERCENTAGE OF TOTAL TIME
-17	1.2
-15	1.1
-14	0.2
-13	0.5
-12	4.3
-10	5.3
-9	7.3
-8	10.4
-6	22.8
-5	14.3
-4	12.0
-3	13.7
-1	5.3
0	1.7
+1	0.0

The mean deviation from the establishment level was -6.16 which would indicate that on average the group operated with 37 fully trained sales executives.

6.4 "TIME ONLY" OPTIMAL ARRANGEMENTS

A large number of alternative intervention strategies were tried before the "time only" optimal solution was selected. The chosen solution had an identical input data set to the current arrangements except that the intervention used was a variable batch acquisition strategy with a triggering level of +4.

The results obtained using this strategy are shown in table 6.2.

TABLE 6.2. THE "TIME ONLY" OPTIMAL SOLUTION

ESTABLISHMENT VARIATION	PERCENTAGE OF TOTAL TIME
-15	1.3
-13	0.1
-12	0.5
-11	1.7
-9	1.7
-8	4.4
-6	9.1
-5	7.2
-4	8.8
-3	13.7
-2	26.3
-1	12.1
0	9.0
+2	13.8
+3	3.8

The rationale given by the Personnel Manager for selecting this solution was that:

"It maximized the time that the Company operated at establishment level without exceeding a staffing level of 46. The upper constraint was applied because it was felt that operating at higher levels would result in upward creep of the establishment level."

This explanation of the reasoning for the selection of the "time only" optimal solution is interesting, particularly when considered alongside the reason given for the "establishment level". The reason given by the Personnel Manager for the "establishment level" implied that it was set on the basis of some sort of economic

rationality, i.e. the number of sales executives was related to the sales volume and value. Though no direction of causality between revenue and staffing was stated a strong relationship was implied. When "time only" optimality was justified a much more behavioural explanation was tendered, which suggested the tendency for the size of departments to grow through "drift" apparently unrelated to economic activity. Within the Company the "establishment level" for sales staff was clearly set within the context of tightly controlled budgets. For this figure which had already been set through the budgeting process, the reasoning given for its magnitude was couched in terms of economic rationality, and yet despite attempts by the researcher to obtain more precise details of the basis of computation, none was ever forthcoming. This, in combination with not only the reasoning given as an explanation for the selection of the "time only" optimal solution but also frequent references to "politically acceptable arrangements" and the rejection of action that would lead to staffing levels exceeding "psychologically important" head count levels inclined the researcher to the view that "economic rationality" was used more as a justification after the event than a means of determining the event.

6.5 COST INPUTS

Before specific costs were determined for input to the

model some general principles of costing were established. Three types of costs were identified; costs based on direct expenditure, costs based on the use of existing company resources and costs based upon revenues foregone.

It was decided that all direct expenditure on the acquisition of sales personnel should be included somewhere in the acquisition process. It was further noted that it might be necessary to apportion some direct expenditure if this was incurred in combination with the acquisition of other types of employees, for example in the case of an advertisement for a variety of staff.

Costing the use of existing Company resources of both a human and non human type where these were used as part of the acquisition process were to be included.

In respect to the costing of human resources the first decision was what human resources should be included if the activity was relevant. The rule to be used to decide this was:-

"Human resource costs should be included if the personnel concerned were engaged in a first line pro-active way with the particular activity within the process of acquisition."

The second decision was on what basis should such costs be computed? The convention to be used was that costs were based upon time; and an hourly or daily rate was used, its magnitude depending upon the personnel

involved. The basis of calculation of these rates was; the annual salary plus bonus, NI, pension etc. divided by 1924 (the hours worked per year) for an hourly rate or 228 (the number of working days per year) for a daily rate.

The costings of non human resources related mainly to office space and were therefore computed on a square footage and time of use basis. A rate per square foot per annum of thirty pounds for Maidstone and forty pounds for London premises was used.

The Personnel Manager noted that in computing costs of this type the basis of calculation was intended to yield results that would be as close as possible to the costs that would be incurred if the activity concerned were undertaken by a contracting organisation which would charge the Company.

The Personnel Manager was inclined initially to compute parts of the acquisition costs and deficit costs on the basis of profits foregone but on reflection he decided that this would not be consistent with the other types of costs. Costs based on revenue foregone would, it was decided, be applied to situations of deficit and to the final training activity as the basis for computing benefits.

6.5.1 ACQUISITION COSTS UP TO AND INCLUDING INDUCTION

Pre-recruitment preparation was costed at £362 per trainee acquired and £200 per batch of trainees. The

cost per trainee was made up of £112 for consultants fees on the basis that 10% of trainees came through consultants who charged a 15% fee based on a starting salary of £7500 per annum, and £250 being one eighth of the cost of an advertisement in "Go and Get". The cost per batch of trainees was the apportioned cost of corporate advertising .

The cost of recruitment was broken down into three component parts, pre-selection screening, response to applicants and interviews. The costs of pre-selection screening was based upon the cost of two managers spending one week each on the "milk round". This cost was based upon the managers' salaries and expenses divided by the number of trainees recruited. In addition there were the costs of the administration staff in the personnel department which meant that this activity was computed at £88 per trainee. Moreover, since recruitment and selection was an important part of the work undertaken in the Maidstone personnel department an allowance was made for the physical facility which could be attributed to the activity related to sales staff. This figure was set at £300 per batch recruited.

The cost of responding to applicants was based upon personnel department staff time and computed at £25 per trainee. Interviews were similarly costed using managers time which yielded a figure of £360 per trainee to which was added £28 per batch of trainees

for the use of interview rooms in the London office. The average total time spent on all forms of training was 34 weeks, of which the first six were treated as induction and during the remainder the trainee was performing on the job. Costing the induction programme was quite straight forward since it was based upon the employment costs of the trainee for six weeks which were computed at £1178 per trainee plus the employment cost for one week of an experienced sales executive for each batch of trainees, computed at £550.

6.5.2 COST/BENEFITS OF TRAINING

After very careful consideration the Personnel Manager decided that the remaining 28 weeks of training, during which time the trainee's effectiveness steadily increased should be costed in a different way to the induction programme. He decided that the value of the contribution made by the trainee in this period should not be computed in a calculation based upon the costs of employment, but rather in a calculation based upon the revenue earning capacity of the trainee. On this basis the whole of the trainee's employment expenses should be included in the cost of training whilst the benefits which were in any case conditional upon a deficit situation should be computed separately.

The cost of the trainee was computed at £5908 (28 weeks at £211 per week).

Benefits accrued from trainee activity between weeks 7

and 34 were conditional upon a deficit and dependent for their magnitude on two parameters, the extent of the trainee's effectiveness and the potential contribution that (s)he could make. The extent of the trainee's effectiveness was derived from the learning curve. The potential contribution that the trainee could make would vary with the size of the deficit. (The larger the deficit the greater the potential for contribution). Thus if whilst the trainee was completing this phase of his/her training there was a deficit of one then the potential contribution was less than if it were two. However the model did not allow for variations in deficit merely its existence or absence as a determinant of whether a single value for benefits (negative costs) was computed. To overcome this limitation it was decided that the benefit to be calculated would be based on the deficit cost, suitably adjusted (the adjustment being based on the learning curve) for the average level of deficit. This average could be derived from the "time only" run of the model. A consequence of this approach was that this particular input variable had to be changed whenever there was a variation in the average size of deficit deviation. The Personnel Manager drew up the learning curve for the average trainee shown in table 6.3.

**TABLE 6.3 : THE LEARNING CURVE FOR AN AVERAGE SALES
TRAINEE**

Week(s)	% effective
0-6	0.0
7	1.0
8	2.0
9	3.5
10	5.5
11	7.5
12	10.0
13	12.0
14	15.5
15	19.5
16	24.0
17	29.0
18	35.0
19	41.0
20	50.0
21	54.0
22	59.0
23	62.5
24	66.0
25	70.0
26	73.5
27	77.0
28	80.5
29	84.0
30	87.0
31	91.5
32	94.0
33	97.5
34	100.0

The basis of computation of the data for the deficit matrix was that a minimum of 33 salespersons were required for the Company to function in any realistic way. It was felt that the "physical" capacity of an average salesperson was 80,000 pounds worth of sales per week. Therefore 33 sales staff could generate an annual revenue of 137,280,000 pounds. Therefore the remaining ten sales staff, between them generated 32,720,000 pounds (£170m minus £137,280,000). Having

established the total contribution of these ten salespersons it was then necessary to determine the relative contribution of each. The Personnel Manager drew up a curve representing the percentage effectiveness for each of the ten staffing levels, as noted in table 6.4.

TABLE 6.4 : THE STAFF EFFECTIVENESS CURVE FOR STAFF LEVELS BETWEEN 34 AND FULL ESTABLISHMENT (43)

Staff Level	Deviation	% effective
43	0	100
42	-1	99.75
41	-2	99.25
40	-3	98.5
39	-4	96.25
38	-5	94.5
37	-6	87.0
36	-7	67.0
35	-8	40.0
34	-9	20.0

Having established the effectiveness curve for staff the next step was to determine the value for each level given that the total value for a year for the sum of all the levels had to be £32,720,000 since the last ten sales staff were judged to earn this amount of sales revenue for the Company.

**TABLE 6.5 : THE INCOME GENERATED BY THE LAST TEN SALES
STAFF OR THE COST OF VARIOUS LEVELS OF DEFICIT**

Staff Level	% effective	Cost/ week	Cost/week/ person
43	100	0	0
42	99.75	795	795
41	99.25	2386	1193
40	98.5	4772	1591
39	96.25	11932	2983
38	94.5	17500	3500
37	87.0	41365	6894
36	67.0	105004	15000
35	40.0	190917	23865
34	20.0	254556	28284

Total cost per week £ 629230

Annual cost (52 x 629230) = 32,719,960 pounds.

The average size of the deficit with the current arrangement was 6.16 staff, but this was based upon the distribution with a long tail (see table 6.1). As the Company never allowed the deficit to exceed 9 this distribution had to be truncated if it was to reflect reality accurately. The truncated distribution had an average deficit of 5.2. All that remained was to calculate the value of a trainee's contribution by computing the cost of a deficit of that size and adjusting it by the learning curve. The cost of a deficit of 5.2 was obtained by reference to table 6.5. The cost per week per person of a deficit of 5 staff was £3500 and the cost of six was £6894 (table 6.5). By taking one fifth of the difference between these two figures and adding it to £3500 a sum of £4179 was arrived at. This figure was then applied to the

learning curve, table 6.3 to establish the total benefit or negative cost to be input to the model for final training. This is done in table 6.6 to yield a sum of £56542.

**TABLE 6.6 THE COST OF THE AVERAGE DEFICIT ADJUSTED BY
THE LEARNING CURVE**

Week(s)	% effective	Benefit (% eff x 4179)
0-6	0.0	0
7	1.0	42
8	2.0	84
9	3.5	146
10	5.5	230
11	7.5	313
12	10.0	418
13	12.0	501
14	15.5	648
15	19.5	815
16	24.0	1003
17	29.0	1212
18	35.0	1463
19	41.0	1713
20	50.0	2090
21	54.0	2257
22	59.0	2466
23	62.5	2612
24	66.0	2758
25	70.0	2925
26	73.5	3072
27	77.0	3218
28	80.5	3364
29	84.0	3510
30	87.0	3636
31	91.5	3824
32	94.0	3928
33	97.5	4075
34	100.0	4179

Total benefit (negative cost)		56542

Though at the end of the exercise this approach to calculating the benefits of final training was abandoned (as will be explained later) it has been included here for two reasons. First it provides an

interesting insight into managerial thinking on the subject and second it is closely related to the basis on which inputs to the deficit matrix were made.

6.5.3 THE DEFICIT MATRIX

As with the inputs for the benefits of final training the inputs to the deficit matrix described here were in the end modified. The modification of these two parts were linked. However the general principles involved in the computation of the figures for entry to the deficit matrix, namely that they should be based on some measure of revenue foregone, remained constant throughout.

The cost per week per person column in table 6.5 represents the basis for part of the first column of the deficit matrix. The main adjustment was that each figure was reduced by £550, the weekly employment cost of a sales executive. The reason for this reduction was that in situations of deficit such costs would not actually be incurred and that this should be taken into account when constructing the matrix. The explanation given for the rest of the entries to the deficit matrix are set out below.

The Personnel Manager stated that the unit costs of deficits at levels 1 to 4 did not alter with the duration of the deficit. The reason for this was that the remaining members of the sales force would continue to fully service the higher spending clients. Whilst

this would be to the detriment of the smaller clients the overall effect would be a change in mix of advertising rather than any additional loss of revenues. For deficits of between 5 and 9 salespersons the unit cost per week would remain constant for the first 8 weeks but thereafter each succeeding week would be 20% more costly than the week before, this continuing until week 13 by which stage extraordinary action would be taken. Deficits of 10 or more staff were costed at £1 to avoid the effect of the "tail" that occurs in simulation runs but in practice would not be tolerated. (If necessary under these circumstances an experienced sales executive would be recruited straight into post.) The deficit matrix is shown in table 6.7. It was specifically noted that the 20% figure given was a subjective estimate. This last comment is of interest since it implies that other input figures were not seen as being arrived at through subjective decision making processes.

TABLE 6.7 : THE ORIGINAL DEFICIT MATRIX

def. level	wk 1	wk 2	wk 3	wk 4	wk 5	wk 6	wk 7
1	245	245	245	245	245	245	245
2	643	643	643	643	643	64	643
3	1041	1041	1041	1041	1041	1041	1041
4	2433	2433	2433	2433	2433	2433	2433
5	2950	2950	2950	2950	2950	2950	2950
6	6344	6344	6344	6344	6344	6344	6344
7	14450	14450	14450	14450	14450	14450	14450
8	23315	23315	23315	23315	23315	23315	23315
9	27734	27734	27734	27734	27734	27734	27734
10	1	1	1	1	1	1	1

def. level	wk 8	wk 9	wk 10	wk 11	wk 12	wk 13	wk 14
1	245	245	245	245	245	----->	
2	643	643	643	643	643	----->	
3	1041	1041	1041	1041	1041	----->	
4	2433	2433	2433	2433	2433	----->	
5	2950	3650	4490	5498	6708	----->	
6	6340	7723	9377	11363	14379	----->	
7	14450	17450	21050	25370	30554	----->	
8	23315	28088	33816	40689	48936	----->	
9	27734	33391	40179	48325	58100	----->	
10	1	1	1	1	1	----->	

6.5.4 THE SURPLUS MATRIX

The costs input for staff surpluses were the sum of the employment costs of a fully trained salesperson (£550 / week) plus the costs of accommodation and equipment, these last two elements of cost being incurred because the London sales office was set up to accommodate only 43 staff. Accommodation costs were based on the office space of 80 sq. ft. at £40 per sq. ft. per year, making a weekly cost of £61. Equipment costs were charged at £10,000 per year, giving a weekly cost of £192. The total unit cost for all levels and durations of surplus was therefore £803.

6.6

COST OUTPUTS

The first full cost data run undertaken was the existing arrangement the results of which are shown in table 6.8

**TABLE 6.8 THE MEAN ANNUAL COST OF THE EXISTING
ARRANGEMENT**

TYPE OF COST	£
Acquisition	(367,396)
Surplus	zero
Deficit	6,063,276
Total	5,695,880

The next data set that was run was for the "time only" optimal solution. The results obtained from a full cost data set for this intervention are shown in table 6.9.

**TABLE 6.9 : THE MEAN ANNUAL COST OF THE "TIME ONLY"
OPTIMAL SOLUTION**

TYPE OF COST	£
Acquisition	(44,159)
Surplus	14,276
Deficit	2,302,796
Total	2,272,913

The Personnel Manager then experimented with a number of alternative arrangements involving pro-active interventions. An interim report was produced by the researcher describing the exercise to that point in time and including a number of different cost runs.

This report was circulated amongst the management team for the purpose of obtaining their reactions. Soon after this report had been circulated the Personnel Manager left the Company to take up a new post. (These two events were unrelated.) After a delay the exercise was continued with the Deputy Group Personnel Controller becoming the principal participant. After discussions it was decided that a different approach should be adopted with respect to the representation of the deficit matrix and the benefits of final training. The first point to emerge from these wider discussions concerned the "establishment level" of 43. It was felt that within the figure of 43 there was greater account taken of both potential quantitative and qualitative shortfalls than was implied by the figures used in the deficit matrix. It was argued that negligible revenues would be foregone except in conditions of severe staff shortages. It was felt that with shortages of fewer than ten sales executives there was sufficient "fat" in the system for the remaining staff to cover without any noticeable loss of revenue to the Company.

The second point concerned the magnitude of the figures within the deficit matrix. It was argued that as it was constructed they took insufficient account of the extent of the demand that existed irrespective of the efforts of the sales staff. Indeed the view prevailed that 80% of sales revenue derived from market demand

uninfluenced by sales effort and that for this proportion of the revenue staff "administered" rather than "sold". For this reason the figures within the matrix should all be reduced to 20% of their original values.

The third point related to the benefits generated by staff during the final stages of their training. It was felt that the effect of the new deficit matrix was such that this aspect was already covered in the "fat" concept noted above. The negative costs were therefore removed from the acquisition inputs.

A new data set was run. In this set all acquisition time data remained unchanged, all acquisition cost data remained unchanged except final training which was now set at zero in place of the "negative costs" previously input. The labour surplus matrix remained unchanged. The new data input to the deficit matrix was as noted below in table 6.10. The modification to the original matrix resulted from reducing by 80% all previous figures and shifting them down the matrix to start at levels of deficit of 11 sales executives. The inputs of £1 for lower levels of deficit were inserted for the sake of model consistency, but made only an insignificant difference to the results. Though the figures had been changed the main principle of the determination of deficit costs, that it was a function of sales revenue foregone, was maintained.

TABLE 6.10 : THE NEW DEFICIT MATRIX

def. level	wk 1	wk 2	wk 3	wk 4	wk 5	wk 6
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	1	1	1	1	1	1
4	1	1	1	1	1	1
5	1	1	1	1	1	1
6	1	1	1	1	1	1
7	1	1	1	1	1	1
8	1	1	1	1	1	1
9	1	1	1	1	1	1
10	1	1	1	1	1	1
11	49	49	49	49	49	49
12	129	129	129	129	129	129
13	208	208	208	208	208	208
14	487	487	487	487	487	487
15	590	590	590	590	590	590
16	1268	1268	1268	1268	1268	1268
17	2890	2890	2890	2890	2890	2890
18	4663	4663	4663	4663	4663	4663
19	5547	5547	5547	5547	5547	5547
and over						

def. level	wk 7	wk 8	wk 9	wk 10	wk 11	wk 12 and over
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	1	1	1	1	1	1
4	1	1	1	1	1	1
5	1	1	1	1	1	1
6	1	1	1	1	1	1
7	1	1	1	1	1	1
8	1	1	1	1	1	1
9	1	1	1	1	1	1
10	1	1	1	1	1	1
11	49	49	49	49	49	49
12	129	129	129	129	129	129
13	208	208	208	208	208	208
14	487	487	487	487	487	487
15	590	590	730	898	1100	1342
16	1268	1268	1544	1875	2273	2876
17	2890	2890	3490	4210	5074	6111
18	4663	4663	5618	6763	8138	9787
19	5547	5547	6678	8036	9665	11620
and over						

This input data was then applied to the existing arrangements with the results as shown in table 6.11.

**TABLE 6.11: THE EXISTING ARRANGEMENTS USING THE NEW
COST DATA INPUTS**

TYPE OF COST	£
Acquisition	76,459
Surplus	zero
Deficit	130,646
Total	207,105

Two alternative strategies given as examples in the interim report were also re-run using the new data input set.

The first of these strategies involved two recruitment drives per year where the aim was to acquire sufficient new staff to bring the total to 52. The results obtained for this strategy are shown in table 6.12.

**TABLE 6.12 : THE RESULTS OF A PRO-ACTIVE STRATEGY WITH
TWO BATCHES PER YEAR, USING THE NEW COSTS**

TYPE OF COST	£
Acquisition	61,906
Surplus	82,044
Deficit	393
Total	144,343

The second strategy involved 4 intakes of staff each year at which time sufficient new sales executives would be recruited to bring the total number up to 49. This strategy would result in an average staff shortage

of just under one person. The results of this strategy are shown in table 6.13

**TABLE 6.13 : THE RESULTS OF A PRO-ACTIVE STRATEGY WITH
FOUR BATCHES PER YEAR, USING THE NEW COSTS**

TYPE OF COST	£
Acquisition	64,872
Surplus	32,481
Deficit	81
Total	97,434

6.7 GENERAL REVIEW

In this section some comments relating to this specific case exercise will be made.

6.7.1 THE EXERCISE FROM THE PERSPECTIVE OF THE HOST ORGANISATION

Towards the end of the exercise a new approach to the acquisition of sales staff was initiated. The decision was made that for the first time a batch of 5 graduate trainees were to be recruited. This batch was to be recruited pro-actively in that they were to be sought in addition to the 43 sales staff, but specifically to fill future vacancies in this area. This was a break from the tradition of recruiting in reaction to sales staff giving notice of their intention to leave. So though the figures were changed from those presented in the interim report the principle was accepted and acted upon.

The experience of working through the exercise was

judged to have been worthwhile, not least because of the detailed level of analysis of resourcing issues, particularly that involved in calculating the benefit of final training, which was prompted by the use of the model.

6.7.2 PERFORMANCE MEASURED AGAINST RESEARCHER OBJECTIVES

This exercise was conducted over a period of twenty-seven months involving 15 on-site meetings in addition to the considerable amount of off-site work that was undertaken. During the course of the exercise the manager who had initially agreed to participate and who had until then been the primary direct contact left the organisation. Whilst at the time this seemed to be a major setback it turned out, thanks to the support of other members of the management, to serve only to broaden the base of involvement in the exercise. This wider involvement prompted questions which might otherwise not have been addressed.

When reviewing the exercise as a whole and particularly the changes made to input cost data after the Personnel Manager left there are a number of important issues raised.

It is interesting to note that there were no changes made to any of the time type data or to the cost data that was not based upon the principle of revenue foregone. However the changes made to the cost data of this type were so significant both in their input form (as evidenced by the complete elimination of

acquisition benefits and the differences between the data in tables 6.7 and 6.10) and their output consequences (as shown by the comparison of the data in tables 6.8 and 6.11) as to demand explanation. Any such explanation must encompass the issue of the "establishment level".

Six possible explanations are suggested:-

- (1) The full significance of the deficit matrix was not appreciated by managers in the Company.
- (2) The initial inputs made to the deficit matrix by the Personnel Manager were highly idiosyncratic and out of step with other managers in the organisation.
- (3) There was no real consensus amongst the managers of the organisation on how deficits should be costed.
- (4) There was a consensus amongst managers on the general principle of how such costs should be computed but that within that the costs were so soft that variations of the kind exhibited were to be expected.
- (5) The whole concept of the "establishment level" is flawed when applied in the context of employee resourcing decision making of this kind. This would mean that the concept of economic rationality as applied in this context is problematic.
- (6) The assumption that the concept of economic

rationality plays a significant part in employee resourcing decision making is itself flawed, which may mean that the model is an inappropriate device for studying this subject.

The first possible explanation is rejected on the grounds that the managers concerned, in deciding upon their inputs and interpreting the outputs of the model, demonstrated a clear understanding of the purpose and workings of the deficit matrix.

The second possible explanation cannot be entirely discounted. The Personnel Manager did discuss his inputs with his colleagues, but since the researcher was not present at these discussions it is not possible to comment upon the depth at which they were conducted or the level of appreciation, at that time, of the concept of the deficit matrix obtained by all the parties to the discussions.

The third possible explanation is rejected because the principle of costing deficits in terms of revenues foregone was accepted by all those with whom it was discussed directly. However the Company Accountant who had seen a copy of the interim report showed a lack of enthusiasm to become involved in the exercise.

Whilst the fourth possible explanation cannot be rejected the implication of its acceptance stretches the concept of "soft costs" beyond reasonable credibility. Comparison of the costs of deficits for the existing arrangement using the two different sets

of inputs can be made by reference to tables 6.8 and 6.11 where figures of £6,063,276 and £130,646 show a 46 fold difference. This wide divergence was caused by two aspects, the magnitude of the figures to be put in the matrix and their location within it. The first aspect relates to the problem of "jointness" (see section 1.3.2.) and in the absence of a means of resolving this problem, subjective judgements were made (the 100% versus the 20% of sales revenue attributed to sales staff) for which little or no substantiation could be provided. If the first aspect were resolved there would still remain the issue of the marginal product of labour, which was again determined subjectively. It may be that in this case the data necessary to make the decisions more "objective" was simply not available so the managers concerned had to rely on subjective judgements which in this case differed dramatically on both aspects.

There are two possible reasons for accepting the fifth explanation offered. First, that the concept of "establishment level" as applied to decision making of this sort is tenable in some economic sense but that the form of a deficit matrix as a means for representing it was inappropriate in this case. Secondly, that the concept of "establishment level" is not tenable in any economic sense when applied to resourcing decisions. This does not mean that the

concept is of no relevance in decision making that is concerned with determining the factor mix within an organisation, simply that once this mix has been determined such economic/financial reasoning does not extend into the area of employee resourcing decision making.

With respect to the sixth possible explanation it is difficult to believe that the concept of economic rationality was completely irrelevant within the Company. It may be that it was of less importance than the impression given. However, in order to behave in an economically rational way requires not just that decision makers have clearly defined economically expressed objectives but also that they have adequate data on which to base their decisions. As noted above such data may not have been available.

As far as the case study goes the revised figures are accepted because they were provided in good faith subsequent to and in the full knowledge of the initial figures. The only alternative to this would be to call into doubt the commitment and/or integrity of the participating managers.

CHAPTER 7

CASE STUDY: EALING HOSPITAL

7.1 THE CASE STUDY SETTING

Ealing Hospital was opened in 1979. It is a 400 bed district general hospital located in West London. Operating as part of the Ealing Health Authority the hospital's acute unit experiences a high proportion of emergency admissions and provides for a wide range of acute specialities. Nursing services represent a key part of this provision. The Health Authority provides training in general nursing, psychiatric nursing and midwifery.

The group of employees, decisions about whose resourcing was the subject of the research, were grade C and D nurses. These grades are the basic entry level for professionally qualified nursing staff.

The main participating managers in the exercise were the hospital's Surgical Services Manager, the Unit Accountant and the Personnel Officer. At the time that the exercise was undertaken managers were concerned with the ongoing developments in the NHS relating to reform and the establishment of an "internal market". This was also a period when the subject of nurse training was high on the agenda of Health Service Managers concerned with this area because of the discussions that were taking place on "Project 2000". The stated objectives of the participating managers were:

1. To obtain a robust methodology to calculate the actual costs associated with trained nurse turnover in a general hospital.
2. To inform the present (national) debate on the appropriate mix between trained nurses (Qualified Practitioners), student nurses in training and "Support Workers" without professional qualifications, to meet the increasing need, as well as demand for care.

The researcher's objectives were as noted in section 4.2.1.

7.2 THE "ESTABLISHMENT LEVEL"

The determination of the numbers of nurses required is a complex process based upon what is known as the "Telford System". Within this system the number of nurses required is a function of the size of the unit and the type of care being provided. The following explanation was provided to accompany a detailed breakdown of nurses by grade and department.

"The skill mix of a hospital ward requires one person 'in charge' per shift and sufficient other staff to care for all the patients with differing levels of dependency. The mix of 'other staff' is determined by the technical skills required together with the level of nursing intervention. Patients who are being assisted towards independence have care (level

of nursing intervention) planned by a qualified nurse but often the care can be delivered by an unqualified person.

A team consisting of one qualified nurse plus one or two others would care for a group of patients the size of which depends on the patient dependency level.

To provide 24 hour care divided into three shifts to thirty patients each ward requires one nurse in charge per shift, one or two qualified nurses to plan and give care and one to five other staff. At night only three staff would be on duty in some low dependency wards. The early shift on a high dependency ward might require eight staff.

The C and D grades are those qualified nurses who plan the care.

The staffing for each ward and department is planned according to these guidelines. An additional 20% is added to allow for leave and 'time out'."

On this basis the number of grade C and D nurses needed to service the existing wards and departments was computed to be 142.

7.3 THE CURRENT ARRANGEMENTS: "TIME ONLY"

There were two main sources of supply of nurses to Ealing Hospital. First there was the output of qualified nurses from the nurse training school which

was based at the hospital. Secondly, there was the external labour market from which nurses who had qualified elsewhere and/or at an earlier date could be recruited. The number of students completing their training and becoming available as qualified (Registered General Nurses) staff was limited by the size of the school. Generally at Ealing this source of supply provided 45 nurses per year in three batches of 15, though potentially this could rise to a maximum of 18. These batches were evenly spread throughout the year. The then current arrangements for nurse training, which were nationally specified, required that it took place over three years. The 3 year training programme created a considerable "lag time" from when the decision was made to increase one intake to the additional new qualifiers appearing on the labour market. During the 3 year training student nurses received both on and off the job instruction. At the end of the training the successful students achieved the qualification of State Registered General Nurse (RGN). On registration nurses were eligible for recruitment to C and D grade positions, that had become vacant as staff had left wards and departments in the hospital.

There were therefore two sources of supply of qualified nurses to fill vacancies on a permanent basis. The resourcing strategy adopted at the time by the

management was to source primarily from the School of Nursing and, only if this source proved inadequate, to resort to the external labour market.

This dual sourcing approach meant that the current arrangements had to be modeled in two stages. First the situation that resulted from the employment of the output of nurses from the training school was modeled and then in the light of the results obtained from this model a second model representing external recruitment was formulated.

The input data set for nurses obtained from the school was as follows.

ACTIVITY	TIME
Pre-recruitment preparation Staff authorisation	1 week (fixed)
Final training * (specialist skills)	Beta dist. Min. 4 weeks Mode 8 weeks Max. 12 weeks
Final training * (job training)	2 weeks (fixed)

* Although these activities were strictly induction they were entered as final training in anticipation of "benefits" at the costing stage of the exercise.

The rate of labour turnover was set at 32% per annum with an exponential distribution. The intervention was batch acquisition with batches of 15 arriving at 17 week intervals.

The results obtained from running this data set are

shown in table 7.1.

TABLE 7.1 THE CURRENT SITUATION RESULTING FROM THE OUTPUT OF THE NURSE TRAINING SCHOOL IN "TIME ONLY" FORM

ESTABLISHMENT VARIATION	PERCENTAGE OF TOTAL TIME
-31	0.0
-29	0.4
-27	0.8
-24	1.3
-22	4.0
-20	7.9
-18	6.5
-15	14.6
-13	14.0
-11	18.8
- 9	10.4
- 7	6.5
- 4	4.8
- 2	6.0
0	3.8

The mean deviation from establishment level was -12.23 which would indicate that on average if only this source of supply were used there would have been between 129 and 130 full time permanent nurses in post. This was judged by the managers to reflect accurately the current situation.

The acquisition times for nurses recruited from the external labour market as noted below were then input.

ACTIVITY	TIME
Pre-recruitment preparation Staff authorisation	1 week (fixed)
Advertising	2 weeks (fixed)
Interviewing	1 week (fixed)
Delay	4 weeks(fixed)
Final training * (specialist skills)	Beta dist. Min. 7 weeks Mode 10 weeks Max. 16 weeks
Final training * (job training)	Beta dist. Min 1 week Mode 2 weeks Max. 3 weeks

* Although these activities were strictly induction they were entered as final training in anticipation of "benefits" at the costing stage of the exercise.

The next task was to create a model input set that gave the same output as that obtained from three intakes of 15 per year so that it could be used as the start up conditions for the model to simulate external recruitment as the secondary method of resourcing. After considerable experimentation a set was found. The inputs which were an establishment level of 142, a start up staffing level of 140 and a labour turnover rate of 15% without any recruitment were used in the restart mode of the model. They produced the results shown in table 7.2 which were judged by the managers to be an adequate representation of the effects of the primary resourcing activity.

TABLE 7.2 THE START UP CONDITION FOR ACQUISITION FROM THE EXTERNAL LABOUR MARKET.

ESTABLISHMENT VARIATION	PERCENTAGE OF TOTAL TIME
-30	0.8
-28	2.7
-26	1.2
-24	1.2
-21	3.1
-19	4.6
-17	8.1
-15	9.6
-13	18.8
-11	16.2
- 9	9.2
- 6	6.2
- 4	5.8
- 2	12.7

The mean deviation from establishment level for this distribution was -11.68.

The next step was to input the data set for external recruitment. The only input that still needed to be specified was the intervention to be used. This was straight forward since the procedure was to conduct a review every six weeks and take whatever action was necessary to bring staff strengths up to 142 when account had been taken of nurses from whatever source who were going through induction training on wards and nurses who had given notice of their intention to leave. The intervention used was therefore one of periodic review with 6 weeks between reviews and "full establishment variation figure" of zero.

The results obtained from running this input data set are shown in table 7.3.

**TABLE 7.3 THE CURRENT COMBINED RESOURCING SITUATION IN
"TIME ONLY" FORM**

ESTABLISHMENT VARIATION	PERCENTAGE OF TOTAL TIME
-21	0.0
-20	0.4
-18	0.4
-16	4.2
-15	7.3
-13	7.3
-12	16.2
-10	11.5
- 8	20.4
- 7	20.2
- 5	3.7
- 3	7.7
- 2	0.8
0	0.0

The mean deviation for this distribution was -9.37, which the managers judged to represent accurately the reality of nurse resourcing as currently practiced.

In the course of experimentation models were run using external recruitment as the sole source of supply. When this was simulated using the reactive acquisition intervention the results obtained were as shown in table 7.4

Having been through this quite lengthy process the managers expressed a high level of confidence in the simulation to accurately reflect nurse resourcing.

TABLE 7.4: EXTERNAL RECRUITMENT USING REACTIVE ACQUISITION

ESTABLISHMENT VARIATION	PERCENTAGE OF TOTAL TIME
-28	0.2
-26	1.3
-24	3.1
-21	6.9
-19	5.0
-17	9.2
-15	21.3
-13	15.6
-11	15.8
- 9	12.7
- 6	6.2
- 4	1.7
- 2	0.0
0	1.0

The mean deviation for this arrangement was -13.54.

7.4 "TIME ONLY" OPTIMAL ARRANGEMENT

The view was taken that in searching for the optimal solution the procedure should be to look at alternative intervention strategies for that part of the acquisition which involved recourse to the external labour market. A number of alternative interventions were tried. The intervention selected as providing the optimal solution expressed in time only terms involved the periodic review system with reviews every four weeks and a "full establishment variation figure" of plus six. This would mean that reviews would be carried out every four weeks at which time an acquisition programme would be initiated to bring the staffing level to 148 nurses when due account had been taken of nurses receiving induction training and those who had given notice to leave. There was some debate amongst

the managers concerned with the Accountant expressing some reservations. However eventually the following rationale was provided.

"The four weeks between reviews is practicable/ reasonable. A target of six ahead of establishment is politically acceptable. The idea of functioning one fifth of the time with one or two staff above establishment is acceptable, knowing that on average it will be 3.5 below."

Table 7.5 shows the "Time Only" optimal solution.

TABLE 7.5 THE "TIME ONLY" OPTIMAL SOLUTION

ESTABLISHMENT VARIATION	PERCENTAGE OF TOTAL TIME
-15	0.0
-14	0.8
-12	1.3
-11	2.1
- 9	6.2
- 8	6.2
- 7	13.1
- 5	5.4
- 4	5.4
- 2	24.6
- 1	14.6
+ 1	16.3
+ 2	4.0

The mean variation from the establishment level was minus 3.52. Other interventions which gave a smaller mean deviation from establishment level were considered and rejected on the basis that they involved too high a proportion of time when the number of fully trained nurses employed would exceed 142. These alternatives were rejected as not being politically acceptable.

7.5

COST INPUTS

With two sources of nurses being considered it was decided that it was important that the approach to costing was applied consistently. It was also decided that the cost of nurse training, in the training school, should be included in the cost of this source in as far as the costs were met by the hospital. Such costs would not however be included in the simulation, since the model for nurse acquisition from this source was constructed on the basis of the final output of the school rather than the time spent (three years) by student nurses in training in the school. The costs of this part of the acquisition process would be computed separately and added to those of induction that was carried out after the formal training was completed. Since work on costing nurse training had already been undertaken by a firm of management consultants it was decided that this work would be reviewed before further action was taken to develop conventions for costing all aspects of nurse resourcing.

7.5.1 COSTS OF ACQUISITION OF NURSES FROM THE NURSES SCHOOL

In 1986 the United Kingdom Central Council for Nursing, Midwifery and Health Visiting commissioned Price Waterhouse to conduct an exercise which computed the cost of nurse training through the traditional training school system at £13,090 per nurse. This figure was an average for all training schools throughout the UK. In arriving at this figure they considered 4 main

headings; Formal teaching, Informal teaching, and Maintenance which were offset by the Service Contribution made by students while they were receiving training. The work of the management consultants was reviewed with respect to the conventions they had used in computing costs and benefits. Some important conventions were exposed.

The first important convention related to the way that the contribution of other employees to the training of nurses was costed. The convention used was to base the costs on the time devoted by the other employees in combination with their employment costs. This was discussed and it was unanimously agreed that this was the most appropriate way to compute such costs and that it should therefore be used throughout the exercise.

The second important convention related to the valuation of the service contribution made by trainees. The management consultants had computed this contribution as a function of the time the trainees spent in clinical placements and their level of experience (or the relative efficiency of students compared with permanent staff) and the "replacement value", which was a composite measure of the employment costs of the grades of staff that the students replaced during the time that they made their contributions. Only the time spent by students as a formal part of the establishment was used to compute

this element of contribution (i.e. not when they are supernumerary). As with the first convention this was discussed in detail and it was unanimously decided to adopt the same approach in this exercise.

Having agreed with the approach adopted by Price Waterhouse the next step was to update the figures they had used.

Formal training costs were made up of; teachers' salaries and salary overheads, school support staff costs, the costs of educational equipment, what were termed hidden costs (which included rates, heating lighting etc. for the school), index and exam fees, and a sum to cover the cost of National Board administrative expenditure. At present prices this totaled £7,540 per student a cost which was borne nationally, rather than by the hospital. Since these costs were borne nationally they were of limited relevance to the exercise as they did not constitute part of the cost to the hospital, and it was with these costs that the managers were primarily concerned.

Informal teaching costs were those which derived from the contribution of existing staff working on wards, who provided clinical supervision of student nurses as part of their job. The time and effort they gave to teaching therefore was not available for direct patient care and represented an opportunity cost. Based upon estimates of the amount of time spent by staff on wards in teaching, and the employment costs of these staff,

the consequent resource diversion at current prices was costed at £4,365 per trainee.

The largest single item of costs was student maintenance which was based upon their salary and employment costs for the period of their 3 year training. This cost was borne by the health authority and was computed at current salary and "on costs" as £26,714 per student.

Against these total costs was offset the value of the contribution made by trainees whilst they were working on the wards as a part of their learning programme. The value of this contribution at current employment costs and with the current nurse training programme was computed at £22,246 per trainee.

The total net cost of providing school based training to a single nurse was therefore £16,373 ($£7,540 + £4,365 + £26,714 - £22,246$) of which £8,833 ($£16,373 - £7,540$) was borne by the hospital/health authority.

Having established the cost of the school based training the next step was to put costs to the parts of the acquisition process that were to be included in the model. These were the induction training given to nurses who on completion of their school training were appointed to a position in a ward or department.

Two general principles were established for these costings.

1. Where a cost was incurred as a result of the use of

staff resources, these resources were based on the employment cost of the type of staff concerned.

2. In determining what costs to include it was decided that if 3% or more of a member or group of staff's time was devoted to an activity directly, then this cost was included. Conversely lesser times were excluded. The effect of this rule was that activities involving less than 1 person/hour per week were not included.

These principles were consistent with the approach adopted for costing school training of nurses.

Training was split into two parts of average duration 2 weeks and 8 weeks.

During the first two weeks the new nurse undertook a formal induction programme, run by the personnel department. There would normally be about 30 staff on this programme. The training cost was therefore $1/30$ th of 2 days of a Personnel Officer (costed at £10 per hour for 15 hours divided by 30 staff) giving a figure of £5 per nurse. Also during the first two weeks the sister would spend 20% of her time with the new nurse. (15 hours at £10 per hour) making £150 per nurse. For two days the new nurse would be escorted by another nurse, effectively taking the latter from her usual duties. (15 hours at £7 per hour) making £105. Finally during the first two weeks (10 days) there is the cost of the nurse him/herself. For four days the nurse would make no contribution but for six days the nurse would be 50% effective. The cost of the learner for this

period was therefore computed at £367.50 (7 days at seven and a half hours per day at £7 per hour)

During the ten weeks the sister would spend half a day per week instructing the new nurse. ($37.5 \times £10 = £375$). During this period the new nurses effectiveness would increase at a steady rate so that at the end of the time she would be fully effective. Since at the end of week 2 she would be 50% effective this meant that on average throughout this period she would be 75% effective. The net cost of her learning was therefore 25% of her employment cost per week for 10 weeks, £656.25

The total cost of the induction training for a nurse acquired direct from the training school was therefore £1658.75.

7.5.2 COSTS OF ACQUISITION OF NURSES FROM THE EXTERNAL LABOUR MARKET

The managers decided that the cost of induction training was the same as for nurses from the training school. The only additional costs therefore related to the recruitment and selection of nurses from the external labour market.

Advertising was costed at £100 per recruitment programme. Selection interviewing was costed at £30 per recruit on the basis of a 30 minute interview conducted by two interviewers charged at £10 per hour, on the assumption that 3 applicants were seen for each vacancy.

7.5.3 THE COST OF NURSE SURPLUSES

The cost per week of a surplus was computed at £262.50, based upon employment costs of £7 per hour for thirty seven and a half hours per week. It was decided that the cost per nurse per week remained constant for all durations and extents of surplus.

7.5.4 THE COSTS OF NURSE DEFICITS

After careful consideration it was decided that the cost of nurse deficits was a function of the net cost of obtaining an agency replacement and the qualitative performance of the replacement(s). It was calculated that an agency nurse cost the hospital the same amount as a full time employee. The *only cost* to be computed was therefore the qualitative shortfall of performance that occurred in situations where agency staff were employed. This shortfall was judged to increase as the deficit became greater. There were two reasons for this. First the agency staff taken on at smaller levels of deficit were judged to be in themselves qualitatively better, in that there were "regular" agency staff known to the hospital management. Secondly the cumulative effect of larger numbers of agency staff, to the extent that there may be more than one per ward, was judged to detract from overall nursing performance.

This was considered to be such an important aspect that a written statement on the employment of agency nurses as a substitute for vacant posts was obtained

from the managers. The statement was as follows.

"The hospital has a long established relationship with 2/3 nursing agencies. Many nurse employees also sign on with these agencies to undertake work in their off-duty time.

Consequently many agency nurses are familiar with the hospital and its systems, and their orientation when they come to work a single shift extends only to learning about the 30 patients in the ward. If the agency nurse continues to fill a vacant post on the same ward for a period the nurse becomes of as much value as a permanent member of staff after full induction and orientation. This situation rarely occurs, but the value of experienced and oriented agency nurses working on different wards or departments each shift is estimated to be 85% of a permanent member of staff.

The contribution of agency nurses declines as the level of available quality and experience/knowledge decreases. When many vacant posts are filled by temporary staff, they contribute little more than a new recruit."

The basis of computing this qualitative shortfall was

to express it in terms of the proportion (shortfall percentage) cost of a trained nurse. It was judged that the duration of deficit at various levels made no material difference to unit costs per week. The costs given for all levels of deficit were as noted in table 7.6

TABLE 7.6: COSTS OF NURSE DEFICITS FOR ALL DURATIONS OF DEFICIT

Extent of Deficit	Qualitative Shortfall	Cost per week per nurse of deficit
1	15%	£40
2	15%	£40
3	20%	£53
4	20%	£53
5	25%	£66
6	25%	£66
7	30%	£79
8	30%	£79
9	35%	£92
10	35%	£92
11	40%	£105
12	40%	£105
13	45%	£118
14	45%	£118
15	50%	£131
16 and larger	50%	£131

In applying this measure of the costs of deficits it was recognized that it was a "rule of thumb" but that there was no data available on which to base a better input. It was felt that there were however limits beyond which this rule might not reasonably be applied. It was felt that in the past when deficits had rarely exceeded 25 nurses this basis for costing deficits was adequate, but that beyond that point costs of deficit would rise steeply.

RUNNING THE MODEL WITH FULL COSTS

It was apparent simply from the input data that the two sources of supply, the training school and recruitment from the external labour market involved significantly different costs. This was borne out by running the two model sets with costs. The first set was the existing arrangement with three batches of 15 newly qualified nurses coming out of the training school, with these being the sole source of supply. When the net cost to the hospital of the school training was included the cost per nurse from this source worked out at £12,254. The second set was to simulate the situation where all vacancies were filled by recruiting nurses from the external labour market adopting an approach of reactive acquisition, that is the acquisition process was only initiated when an existing nurse gave notice of quitting. The cost per nurse of this method was found to be £3,622. The breakdown of these two sets of costs is shown in table 7.7

The next issue considered was whether nurses from these two sources exhibited any other significant differences. Since nurses from the two sources were seen on average as qualitatively the same the only possibility was that nurses from these two sources may have differential rates of labour turnover or stability. A check of the records showed that this was not the case.

TABLE 7.7 COSTS PER NURSE ACQUIRED FROM ALTERNATIVE SOURCES

	Source: Training School	Source: External Labour Market
Acquisition Costs	£1,659	£1,722
Deficit Costs	£1,762	£1,900
Surplus Costs	NIL	NIL
Basic Training Costs	£8,833	NIL
Total Costs	£12,254	£3,622

Table 7.7 shows that if the cost of the school part of the training of school sourced nurses was ignored then there was little difference in the overall cost from the two sources, with external sourcing being marginally more costly. (If a proactive approach was adopted for sourcing from the external labour market the cost per nurse could fall to £2,388 making it less costly). From a local management perspective it was not reasonable to simply ignore this very significant aspect of cost, but that local decision making if it were taken on a short term basis of cost minimization would in the longer term have undesirable consequences. It was decided therefore that rather than attempting to find a short term minimum cost strategy the simulation would be used to explore these broader longer term issues.

THE NATURE OF COSTS AND BENEFITS FROM A BROADER PERSPECTIVE

There were two related issues that came to the fore as a result of the exercise as it had thus far developed. These were the issue of system boundary as far as decision making was concerned and the nature of the external labour market including the relationship between the internal and external labour markets.

The issue of accounting system boundaries is concerned with the locus of decision making and the charging of costs. Decisions concerning resourcing were made at the level of hospital management. The decision concerning the continued operation of the nursing school resided at the level of the Health Authority. The greater part of the net cost of nurse training was borne by the hospital and represented a significant part of the total costs of human resourcing controlled by hospital managers. These managers were charged with making the most efficient use of all the resources under their control. In a climate of stringent budgetary control hospital managers may be inclined to take a rather parochial and short term view of a nurse training school which appeared to be an unnecessarily expensive way of acquiring nurses.

The development of internal market mechanisms within the NHS was likely to make the issue of boundary definitions increasingly important. Unfortunately what

makes good financial sense with one boundary definition does not always do so with another. At the time it was costing Ealing Hospital £12,254 for each nurse they acquired from their own training school and only £3,622 if they could acquire one direct from another hospital's school. But they might as well acquire "their own nurse" since they had already paid the bulk of the cost during the training period. When they trained a nurse they did not do so just for Ealing Hospital. With the average retention being less than three years the chances were that the hospital would be subsidizing another hospital, (either private or NHS), which subsequently employed the nurse. Since it was unlikely that any mechanism could be put in place for Ealing (or any other nurse training hospital) to recoup these training costs the pressure to close training schools could be considerable.

Obviously if all teaching hospitals adopted the view that nurse training was financially unattractive, the supply of nurses as a whole would dry up. Given that each year increasing numbers of nurses leave the profession, with no plans to return to it, the rate of decline in the stock of nurses in the economy as a whole would accelerate. This in turn would be reflected in the state of the labour market from which Ealing Hospital and others sought to recruit.

The external labour market was the second area that required more detailed investigation. A cost of £3,622

per nurse acquired from the external labour market was based in part upon assumptions about the lead time required to recruit nurses. These lead times were derived from actual experience of direct recruitment in the past, which reflected the state of the labour market that prevailed at that time. The state of the labour market at any time is a function of supplies of nurses and demands for them. The figure of £3,622 as the cost of acquiring a nurse through external recruitment would be accurate only if nurses could be recruited in the same lead time as had historically been the case. If this lead time should lengthen, as it would if there was a steep rise in demand, (which would be the case if external recruitment became the primary source for nurses,) then the cost per acquisition would rise. Table 7.8 shows how total costs, based on existing cost data inputs, would increase with extended lead times.

TABLE 7.8: THE EFFECTS ON COSTS OF INCREASES IN LEAD TIME OF RECRUITMENT

Increase in lead time in weeks	Total cost per nurse acquired	Acq cost per nurse acquired	Def cost per nurse acquired	Average size of deficit
0	£3,622	£1,722	£1,900	13.54
+ 5	£3,967	£1,700	£2,267	15.40
+10	£4,334	£1,698	£2,636	17.17
+20	£5,184	£1,696	£3,488	20.66
+30	£6,061	£1,695	£4,366	23.59
+40	£6,569	£1,692	£4,877	26.97
+50	£7,156	£1,691	£5,465	28.82

The increasing costs resulting from lengthened lead

times was primarily a function of rising costs of staff deficits. However with lead times increased by 50 weeks the total cost of £7,156 was still less than the full cost to Ealing Hospital of training and acquiring a nurse. Table 7.8 shows that the average size of deficits increased significantly with lengthened lead times. The average lead time for the last two levels of increase (40 and 50 weeks) exceeded that which it had been argued the original "rule of thumb" for costing deficits could reasonably be applied.

At this point in the exercise the decision was made that rather than attempting to find an optimal resourcing strategy for the hospital it would be more useful to investigate, through the use of the simulation model, the more general issues surrounding alternative sources of nurses.

On the basis of the figures in Table 7.8 it seemed that no amount of tightening of the labour market (as reflected in increased lead times on acquisition) would result in nurses obtained from this source costing as much as trainees from the school. But the levels of deficit resulting from tighter labour market conditions would be so large as to mean that the original basis of costing deficits would no longer be legitimate.

After considerable discussion it was judged that when deficit levels reached more than 25 there would not be a sufficient supply of agency nurses to meet the

demand. Under such circumstances existing nursing resources would be stretched to an extent where normal services could not be maintained. This would require management to take exceptional action. Such action might include, for example, ward closures. There were plenty of examples in recent years of partial or total ward or intensive care unit closures because of insufficient nursing staff with appropriate skills in the local labour market. The effect of such action could only be measured in terms of "social costs".

The managers concerned acknowledged that the quantification of social cost was invariably controversial and difficult, depending as it does upon individual value systems. However it was equally felt that the fact that such computations were difficult was not an adequate reason for ignoring this important aspect of the situation. They felt that rather than quantifying social costs by some process of value laden judgements of their own, it would be more useful to reverse the problem and attempt to determine what social costs would have to be entered in the appropriate parts of the deficit matrices to render nurses from both sources of supply equally costly. Consideration of Table 7.8 makes it clear that there would not be a single social cost, but rather different social costs for each of the labour market conditions noted. By adopting this approach the effect would be to determine what social cost, in different labour market

conditions, would justify the continued provision of nurse training.

A very large number of simulations were run using different figures in the deficit matrix for levels of deficit of more than 24 nurses. The purpose was to find the pairs of runs of the simulation (a pair being resourcing from the school and resourcing from the external labour market) where the cost per nurse acquired were roughly equal for each level of lead time for external recruitment.

Table 7.9 shows what costs had to be input into the matrix at levels of nurse deficit of 25 and greater, to have the effect of approximately equalizing the total costs of sourcing from external recruitment and the nurse training school. It was felt that these represented what would have to be the inferred social costs for different labour market conditions to justify the continued use of the nurse training school as a source of supply of nurses if the criterion for decision making was to be cost minimization and the decisions were to be made by managers at the level of the hospital, charged with making the most efficient use of their resources.

Table 7.9 shows the relationship between a tightening of the labour market (represented by increases in the lead time of acquisition) and the required adjustment in the deficit matrices, to make the overall cost of

direct recruitment from the external labour market approximately equal to the the cost of nurses from the training school. It is apparent from studying the relative movement in these variables that the relationship is not a simple linear one.

TABLE 7.9: THE "SOCIAL COST" INPUTS TO THE DEFICIT MATRICES WHICH HAVE THE EFFECT OF EQUALIZING THE COST PER NURSE FROM THE TWO SOURCES OF SUPPLY IN A RANGE OF LABOUR MARKET CONDITIONS

Increase in lead time for acquisition from the external labour market (weeks)	Value in deficit matrix for deficits of 25 and more	Cost per nurse acquired from the external labour market	Cost per nurse acquired from the nurse training school
10	£2,000	£13,573	£13,531
20	£700	£12,437	£12,642
30	£425	£12,395	£12,454
40	£310	£12,149	£12,376
50	£295	£12,461	£12,366

It was felt that it could be argued that in a tight labour market, the inferred "social cost" did not need to be very high for nurses from the training school to constitute a relatively attractive form of sourcing. This appeared to depend on a close fit between the number of new qualifiers from the school and the number of vacancies caused by natural wastage.

The main variables in determining the social cost/value of nurses were identified as:-

- (1) the cost of 3 year nurse training including temporal mismatch costs on qualifying.
- (2) the cost of external recruitment including mismatch

costs

(3) the level of nurse wastage

(4) the number of nurses qualifying from the training school

(5) the state of the labour market.

This assumed that there was a strong overall demand for nursing and that that demand could be accurately converted into a required number of nurses using the "Telford method".

7.8

GENERAL REVIEW

In this section some comments relating to this specific case will be made.

7.8.1

THE EXERCISE FROM THE PERSPECTIVE OF THE HOST ORGANISATION

The exercise was judged to be a success by the managers participating in it. They felt as a result of participation they had acquired new insights into the resourcing of nursing staff. The two principle participants, the Surgical Services Manager and the Accountant collaborated with the researcher in writing a paper on the exercise. (Dawson, C. Barrett, V. and Ross, J. 1990) This paper was approved by the Unit General Manager before submission for publication. It was hoped that the paper would make a contribution to the debate on the future development of the NHS. The main conclusions that were drawn from the exercise and which were presented in the paper were :

"Our attempts at Human Resource Planning using costs have led us to a number of general conclusions:

1. The level of uncertainty with which we have to deal and the lack of control over important variables renders it impossible to conclude that there is one best way of resourcing to meet our anticipated staff needs.
2. The total cost of employee resourcing is made up of three elements: the costs of acquisition, surpluses and deficits.
3. In order to compare alternative sourcing strategies we need a common basis for measurement, for which costs would seem to be the most practicable. In addition there must be uniformity in applying these costs to the different strategies evaluated.
4. In order to make financial comparisons between strategies we have to be able to assume that the outcomes of alternatives are equally desirable, in the medium and long term, since only in this way is a cost comparison a relevant measure.
5. The costs of staff deficits are of critical importance but the basis of their computation is most problematic.
6. One of the major factors affecting the level/extent of staff deficit, and therefore the costs, is the state of the labour market, which is to a great extent outside the control of local management.
7. Decision making system boundaries are of great significance in determining which strategies appear to be financially attractive.
8. It is inappropriate to try to make financially rational decisions without the expansion of the financial data to include social costs, the basis for computation of which must be clearly established."

7.8.2 PERFORMANCE MEASURED AGAINST RESEARCHER OBJECTIVES

This exercise was conducted over a period of nine months with on site meetings every three to four weeks. In addition, particularly towards the end of the

exercise, a considerable amount of work in the form of setting up and running simulations was conducted off site. Although the exercise did not follow the pattern of the two previous case studies in terms of identifying a single optimal resourcing strategy it was felt that the findings were equally valuable.

CHAPTER 8

ANALYSIS OF RESULTS

8.1 INTRODUCTION

Having described the case studies in chapters 4 to 6 the purpose of this chapter is to identify and investigate the similarities and differences in the behaviours of the subject managers in their employee resourcing decision making. The investigation of these similarities and differences will be considered with respect to five areas, viz:-

- (1) The basis for the determination of "establishment levels".
- (2) The ways of defining optimality in respect of "time only" optimal solutions.
- (3) The basis for computing acquisition costs.
- (4) The basis for computing surplus costs.
- (5) The basis for computing deficit costs.

Finally the data gathered from the case exercises will be reviewed in terms of the evidence it provides about the orientations of the subject managers with respect to "hard" or "soft" versions of the HRM model.

8.2 THE BASIS FOR THE DETERMINATION OF "ESTABLISHMENT LEVELS"

It will be recalled that in all the case settings the significance of the "Establishment Level" to the working of the model was stressed to the managers concerned. In all three cases the importance of this figure seemed to be appreciated by the managers. Even

though a considerable amount of time was devoted to the discussion of this figure in each case the rationale finally provided for it was expressed in fairly simple, generally non-financial terms.

There was no doubt that the managers in each setting saw the demand for all factors of production, including labour, as related to the consumer demand for the product or services that their organisations provided. There were, however, some similarities and some differences in the way that they related the demand for the factor labour to other factors and/or consumer demand.

In two settings, the brewing company and the hospital the explanations for the "establishment level" of staff was expressed in a similar way but differently to the to the way it was provided for the television company. In the cases of the hospital and the brewing company the "establishment level" for nurses and landlords was expressed in terms of the human resources matching the capital assets, this was not the case for the sales staff in the television company.

In the two similar cases the determination of the "establishment level" was derived from the amount of capital that existed. The procedure seems to have been that the demand for goods and/or services was determined in some unspecified way, from which the need for fixed assets, (wards and pubs) was determined.

Henceforth the demand for labour was expressed in terms of ensuring the full utilization of the fixed assets rather than by direct reference to the demand for goods and services. In the case of the sales staff in the television company there were no significant accompanying fixed assets which came together with the human resources to meet the customer needs and the demand for staff was expressed by direct reference to the segmented market for the product/service.

One explanation, then, for the differences in the way "establishment level" was defined could be with respect to the presence or absence of significant quantities of fixed assets in the work setting of the staff under consideration. In two settings consumer demand could not be met except through combining labour with significant quantities of specialized capital, or to put it another way that the jobs concerned were perceived as relatively capital intensive (irrespective of the capital or labour intensive nature of the organisation or industry as a whole). However when this possibility was probed no such explanation was offered. Not only did the managers concerned fail to see the jobs as particularly capital intensive within the context of their own organisation but they did not seem to perceive any scope for substitution of labour for capital in the hospital and the brewing company. In both these settings non-marginal changes in consumer demand was expected to be met first through adjustments

in the amount of capital deployed which would then be followed by adjustments in labour. So, in the case of the brewing company this meant opening new pubs or closing existing houses and in the case of the hospital opening new wards or closing existing ones. In practice in these two settings the demand for labour was effectively derived from the capital investment rather than the consumer demand.

An alternative explanation of the way that the "establishment level" was defined relates to the basis of control systems that were in place in the organisations and the demarcation of units or sub-units of control. This explanation could be applied to all three settings. From this perspective the demand for labour was not identified in terms of its connection to capital but rather with respect to the type of consumer demand that was expected to be met. In the case of the brewing company this was the type of pub and its location, in the case of the hospital it was the type of treatment offered, paediatric, geriatric etc. and in the case of the television company the type of accounts being handled. If this explanation is adopted the fact that in two cases this was closely associated with particular capital investments is incidental. What was significant was the management control mechanisms that were in place in all three settings. Performance was monitored within the bounds of these control systems,

in varying degrees of sophistication and detail, in each setting. Where within the boundary of the control system the factors of production included significant capital assets the system operated in such a way as to cause the managers to express their demand for labour in terms that were biased towards capital utilization, but where there was no such factor mix the demand for labour was expressed by reference to consumers.

In section 1.6.3 it was suggested that the conventions of accountancy might encourage managers to consider human resources as the variable input in the fixed/variable mix. Even though the "establishment levels" for the groups of workers under consideration were never expressed in very sophisticated financial terms, the control systems which provided the contexts within which they were determined did in two cases have the effect of causing them to be specified as the variable inputs in a fixed/variable mix whilst in the third, the television company, they were seen as more direct variable inputs relatively uninfluenced by fixed assets.

The evidence from these case studies would seem to support the contention that in resource allocation decision making managers are inclined to see human resources as a variable input. Moreover where the work performed by the labour is undertaken in the context of or in conjunction with significant amounts of capital in the form of fixed assets then the demand for labour

is likely to be expressed by reference to the utilization of the fixed capital rather than consumer demand.

8.3

THE WAYS OF DEFINING "TIME ONLY" OPTIMALITY

The three explanations given for the "time only" optimal solutions were quoted in sections 5.4, 6.4 and 7.4. Each quote showed a concern for limiting the amount of time that staffing levels exceeded the "establishment level". In each case the selected optimal solution was chosen in preference to an alternative which had a smaller mean deviation from the "establishment level" but also involved a greater proportion of time with staff surpluses. It appears therefore that in all cases there was concern to avoid what was seen as excessive staffing. In the case of the television company the danger of staffing levels creeping or drifting upwards was identified and in the case of the hospital the optimal level was expressed in terms of its political acceptability.

It is noteworthy that in an exercise that was specifically aimed at arriving at optimal solutions, in none of the cases was there any direct reference to costs either in absolute terms or in respect to the relative costs of deficits or surpluses. From discussions of these explanations of optimal solutions it was apparent that the managers were most concerned to achieve politically defensible solutions and that

these solutions were not expressed in financial terms. Whilst it cannot be concluded that financial considerations were of no importance they do not appear to have been of paramount importance. This implies that there are other parameters of political acceptability as well as those of cost.

8.4 THE BASIS FOR COMPUTING ACQUISITION COSTS

In this section the basis on which acquisition costs were computed by the managers in the three case settings will be considered. Attention will be concentrated upon the conventions used rather than the figures themselves. For the purpose of this review costs/benefits will be classified under five headings, viz:-

- (1) Direct expenditures on acquisition.
- (2) The costs of staff involved in the acquisition process.
- (3) The costs of physical facilities used in the acquisition process.
- (4) The costs and benefits involved in the employment of new staff before they became fully effective.

8.4.1 DIRECT EXPENDITURE COSTS OF ACQUISITION

The only conventions identified with respect to direct expenditure relate to the basis of its apportionment. In all three cases expenditure on advertising was included. The procedure adopted in each case was to

calculate the total direct expenditure and divide it by the number of new employees or batches of recruits.

In the case of the hospital advertising costs were the only costs of a direct expenditure kind included in acquisition. In the case of the brewing company the costs of the provision of refreshments during induction training were included as were the costs incurred by the use of recruitment consultants in the case of the television company.

The computation of these costs were in all cases considered uncontentious, requiring only a process of apportionment where the expenditures involved the acquisition of other groups of workers as for instance in the case of press advertising in the television company where general advertisements for a range of jobs were placed in the media. In none of the organisations did the managers consider it worth including the costs of postage, stationery, telephone calls etc. as items of direct expenditure.

8.4.2 THE COSTS INCURRED AS A RESULT OF STAFF INVOLVEMENT IN THE ACQUISITION PROCESS

In all three cases consideration was given to whether these types of cost should be included at all, and if they were to be included the basis on which they should be calculated. Discussions on whether such costs should be included revolved around the issue of whether, since in the main the staff who were engaged in activities involved in acquiring the new workers would have been

employed in any case, any charge should be made in respect of their involvement in the process of acquisition. Whilst it was accepted that these staff indeed had other duties, equally, the activities they undertook in respect of acquisition did constitute a recognised part of their jobs, though not necessarily a major part, and to ignore the cost of this aspect would be to understate the total cost of acquisition. Since the decision in principle had been made two issues remained:-

(1) What staff involvement to charge against the acquisition process, and

(2) the basis on which the cost was to be computed.

In all three cases the managers decided to establish rules for determining what staff involvement should be charged to the acquisition process. In all cases the decision was made to include only the costs of staff directly involved in the process, and that this cost should be computed on the basis of the amount of time that the staff devoted to acquisition activities. In two cases a lower limit of involvement was determined, that is, it was decided that direct involvement below some level would be excluded. In the case of the brewing company the lower limit was set at five per cent. of the time of any groups of staff whilst in the case of the hospital it was set at three per cent. In the case of the television company no lower limit was

explicitly specified. Two points arise from this approach. Firstly, what is meant by direct involvement and secondly what was the rationale for setting the lower limit, where this was specified?

In all three cases there was detailed discussion on how to define direct involvement. In each case it was based upon the time devoted and the nature of the tasks undertaken. This did not mean that to be included the staff had to interact with the new recruits (though this was often the case) simply that they spent more than the minimum amount of their available time in tasks related to the recruitment, selection, induction, placement and training of the new workers. The two minimum involvement figures were established on the basis that inclusion of lesser amounts of time would result in insignificant sums. In practice the use of minimum percentages resulted in individual task related figures as low as five pounds per recruit in the hospital and sixteen pounds in the brewing company. In the case of the television company the smallest identified task was computed at a figure of twenty five pounds per new member of staff.

The second issue, that of the basis of costing the time of staff involved in the acquisition process, is perhaps more interesting. Given that the exercises as a whole were concerned with the value of workers, albeit the identified groups that were being modeled, the basis for charging the time of any staff (who

themselves had some value to the organisations) was a key issue. Whilst in all cases it had been decided that the cost of involvement should be some hourly or daily rate, on what basis should this rate be computed? In other words how much were these staff who were involved in the acquisition process worth themselves? Here there was a potential clash between accounting and economic principles of the cost/valuation of labour. If an economic perspective was adopted then this would involve the use of the concept of opportunity cost. If such an approach were to be adopted it would require the identification of the best alternative activity in which the staff concerned could have been engaged and then putting a figure to the value to the organisation of that activity. To take a specific example, if a manager spent one hour interviewing potential new recruits what was the cost/value foregone of that hour? Supposing the alternative activity would have involved the manager in selling the organisation's products or services to potential customers, would the cost/value of his/her time be the sales revenue that might have been obtained, or the profits that might have derived from those sales? Though this may have been difficult to compute, it is by comparison quite straight forward when set against the situation where the individual concerned was a Personnel Manager, where no such direct linkages to revenues or profits could be discerned.

The possibility of adopting such an approach was discussed, but rejected in all cases. The grounds for rejection were twofold. First, such an approach was not seen as being consistent with other financial computations in the organisation and secondly, it was felt that there was no reliable way of obtaining such figures.

In all three cases the decision on costing the time of staff undertaking activities contributing to the acquisition process was based upon the "employment costs" of the staff concerned. These costs included salaries and employers costs such as pensions and National Insurance, but they excluded the costs that had been incurred in acquiring these staff in the first place. Under the circumstances it may be seen as slightly ironic that such costs should have been excluded. It was, however, felt that to include such costs would involve a continuous backwardly iterative process which would eventually become circular.

A theoretical justification for the use of "employment costs" as the basis for computing the cost of staff involvement in the acquisition of workers under consideration, can however be tendered. If the staff involved in the acquisition process had themselves been recruited up to a number where their marginal revenue product was equal to their marginal cost (which might be expected to be the case in a profit maximising organisation), then this figure would be their

"employment cost". For this to be the case there would have to be exactly the "right number" of such staff employed at the time. In the parlance of the model the "right number" of staff would be the "establishment level" for this group of staff. Whether such "establishment levels" are computed in such a sophisticated way must be open to question in the light of the explanations given in sections 5.2, 6.2 and 7.2 and the discussion in section 8.2.

8.4.3 THE COSTS OF PHYSICAL FACILITIES USED IN THE ACQUISITION PROCESS

In all three cases some account was taken of the cost of physical facilities in which activities involved in the acquisition process were undertaken. In the case of the brewing company the mechanism used to include these aspects of cost was to load the employment costs of staff contributing to the acquisition process by one hundred per cent. (though the proportion of this loading attributable to the physical facilities used was identified as being small). For the television company and the hospital specific costs were computed. In the case of the television company this took the form of calculating the floor space occupied by staff engaged in the acquisition process, multiplying this by a figure which represented the cost of that floor space and apportioning a proportion of the resulting figure to the cost of acquisition. The proportion apportioned

was based upon the percentage of their total time that the staff involved devoted to the acquisition of the sales staff under consideration. In the case of the hospital the costs of physical facilities were included as part of the "Hidden Costs" included in "Formal Teaching Costs" (see Price Waterhouse report, appendix 5.4 paragraph 25). Such costs included rates, heating and lighting for premises used for nurse training. When it came to post school acquisition and external acquisition there was no allocation made for this type of cost.

It is noteworthy that as with the costs incurred as a result of staff involvement in the acquisition process these elements could have been treated as sunk costs and disregarded, but they were not. It is also interesting that the managers wished to go to the trouble of calculating and including these costs even though in the process of doing so it quickly became apparent that they were very small. (Less than one per cent. of the acquisition costs in both the hospital and the television company.) It may be that the inclusion of such relatively small costs is an indication of the importance that managers attached to the utilization of physical resources which generally were taken to be the fixed resource in the (variable/fixed) mix of resources.

THE COSTS AND BENEFITS INVOLVED IN THE EMPLOYMENT OF NEW STAFF BEFORE THEY BECOME FULLY EFFECTIVE

The costs of new employees before they achieved full effectiveness included in all three cases the employment cost of the worker. However in calculating the contribution made by the new worker in the final training period the managers in the three organisations adopted quite different approaches. This may indicate that unlike the costs considered so far there is no widely accepted way of computing such benefits. This inference was borne out by the difficulty the managers had in deciding how such benefits should be computed. In every case the managers made it clear that they judged that, in situations of deficit, benefits did accrue to the organisation as a result of the contribution of trainees at this stage of their training.

The managers in the brewing company chose to represent the conditional benefit of the new landlord by reference to the cost of hiring a substitute agency publican. In the case of the hospital, the managers decided to reduce the employment cost of all the new nurses during the final stage of their training to take account of their contribution. These employment costs were reduced irrespective of there being a deficit at the time. Although in the end in the case of the television company benefits of the final training were eliminated from the model this was because of the

decision to alter the inputs to the deficit matrix, the basis for computing the contribution of new sales staff during the final stage of their training was never called into question. The approach adopted in this organisation was to measure the value of conditional benefits in terms of the revenue that sales staff could achieve for the company.

The principles used to calculate the contribution of workers during the final stage of their training were therefore as follows:-

(1) The computation of the reduction of cost that would have been incurred through resorting to the external labour market to obtain a temporary substitute. In computing this cost no account was taken of the size of the deficit prevailing at the time.

(2) By reducing the employment cost of the trainee. The adoption of this approach implies that the trainee could never make a contribution greater than his or her employment cost. Moreover the extent of this contribution was not seen as dependent in any way on the size of the deficit.

(3) By reference to the revenue that the trainee could bring into the organisation. In determining the magnitude of this revenue account was taken of the size of the deficit.

THE BASIS FOR COMPUTING SURPLUS COSTS

In each of the cases the basis for determining the figure to be entered in the surplus matrix was the weekly employment cost for the type of worker being considered. The similarity in the way the managers from the three organisations dealt with the issue extended to the fact that they all felt these costs remained at a constant rate per week per person for all levels and durations of surplus. This was evidenced by the fact that in each case a single entry was made to the surplus matrix. That the unit cost per unit time of surpluses was seen as unchanging is perhaps surprising given that in identifying their optimal solutions the managers had expressed concern about the danger of "establishment levels" creeping or drifting upwards over time if their organisations were seen to be operating for long periods with staff surplus to the specified establishment level.

1.6 THE BASIS FOR COMPUTING THE FINANCIAL EFFECTS OF STAFF DEFICITS

When it came to computing the financial effects of staff deficits two distinct types of approaches emerged. These will be called the labour market approach and the product/services market approach. In labour market approaches the effects of deficits were calculated by reference to substitute labour obtainable. In product/services market approaches the effects of deficits were calculated by reference to the

reduction in revenues or profits that were judged to result from staff shortages.

8.6.1 THE LABOUR MARKET APPROACHES TO CALCULATING THE FINANCIAL EFFECTS OF STAFF DEFICITS

When a labour market approach was adopted the financial effects of deficits were calculated by reference to the cost of substitute labour obtainable usually from the external labour market. The adoption of such a cost based approach required first that a substitute labour market existed and second that the net cost of using labour from this source could be accurately determined. This approach was clearly adopted either fully or partially in two case settings, those of the brewing company and the hospital. In the case of the television company the approach was adopted in a less obvious way which will be described in section 8.6.3. In the two cases to be considered in this section substitute workers could be obtained from external agencies specialising in the provision of such staff. In section 7.5.4 the basis for determining the entries to the deficit matrix for shortfalls of fewer than twenty five nurses was described. The principles underpinning this approach are consistent with those adopted by the hospital managers for calculating the value of contribution of nurses during the final stages of their training which was discussed in section 8.4.4. To recap, the general principle is that in these

circumstances a nurse could not make a contribution that could be valued higher than her/his employment costs and therefore the cost of a deficit was best expressed as the loss of performance due to the reduced effectiveness of agency staff multiplied by the employment cost of a nurse, or the loss in marginal physical product times the cost. It was not felt however that this principle could be extended to shortfalls of more than twenty four nurses because at such levels of deficit there would be a significant negative impact on the total provision of service. For deficits of these magnitudes the managers felt that some other basis of computation was required. The problem was one of how to put a price to the reduction in hospital services that would result from such shortages. Since such reductions in services were seen as social costs the managers felt unable to quantify them, but resorted instead to investigating at what figures they would have to be costed to render traditional nurse training economically viable.

The approach adopted by hospital managers towards computing the final effects of nurse deficits for the whole range of deficits may be summarized as one which for small levels of deficit where the external labour market could meet the shortfall a labour market cost basis was appropriate, but for higher levels of deficit a product/services market approach was required.

Three separate elements were used by the managers in

the brewing company when they completed the deficit matrix for landlords. The largest element related to the net cost of obtaining a substitute agency landlord. In addition to this element there were two other types of costs which were associated with performance shortfall resulting from the use of agency staff. With respect to one element the basis for computing the financial effect of this was similar to the approach adopted by the hospital managers. Whereas in the hospital a qualitative shortfall was seen as occurring progressively as levels of deficit rose but remaining unchanged for durations of deficit, in the case of the brewing company the shortfall was seen as being related to both size and duration of deficits with these two aspects being treated differently. With respect to the size of the deficit there was some similarity in the approaches adopted by the managers in the two settings. In the brewing company the shortfall in performance attributable to size of deficit was not seen as occurring until the deficit rose above four landlords. When this occurred the cost was computed by reference to the time of the Area Managers, using the apportioned employment costs of these employees. Though this might have been interpreted as the use of an internal substitute the explanation given was rather that the Area Managers by having to devote more time to pubs covered by agency staff had their overall effectiveness

reduced. This reduction in their effectiveness which was charged to the deficit situation was expressed as an hourly rate of the employment cost of Area Managers thus implying that their value to the company could be expressed by reference to employment costs.

There was however, a third element involved in determining the financial effect of landlord deficits in the brewing company. This element related to the profit foregone as a result of the use of agency staff as described in section 5.5.4. This approach to determining the financial effects of labour deficits is considered in section 8.6.2.

8.6.2 THE PRODUCT/SERVICE MARKET APPROACH TO CALCULATING THE FINANCIAL EFFECTS OF STAFF DEFICITS

When product/service market approaches were adopted the financial effects of staff deficits were calculated by reference to the organisations' revenues or profits. For this approach to be adopted certain conditions had to be met viz:-

(1) The overall revenue or profit of the organisation had to be calculable.

(2) It had to be possible to attribute a proportion of this sum to the whole group of staff being considered.

(3) There had to be a mechanism for determining how much of the revenue or profit would be lost at the various levels of staff deficit.

The ways this was done by the managers in the brewing

company and the television company were described in section 5.5.4 and sections 6.5.2 and 6.5.3. In both cases the determination of the revenue or profit for the company as a whole was quite straightforward, since such information was readily available.

With respect to the second point, the attribution of part of the revenue or profit to the group of staff concerned, there were differences between the way the managers in the two companies approached the issue. In the brewing company the problem was eased by the fact that "managed houses" were a profit centre within the organisation as a whole. The split amongst the managed houses themselves to obtain an average profit per pub was facilitated by the financial control systems in operation within the profit centre. It was how that profit should be split between the resources used to achieve it that was potentially more problematic. The determination of this split is an example of the "problem of jointness" identified in section 1.3.2. The managers concerned felt that the attribution varied considerably between pubs and landlords but that it was possible to establish a figure of ten per cent. to an average pub/landlord.

When it came to the attribution of revenues due to the sales staff in the television company there was evidence of less certainty. The estimates of different managers varied significantly, with one estimating the

contribution to be five times greater than his colleagues. Eventually a set of figures were arrived at, but the managers concerned stressed that these were their best personal estimates and acknowledged that they could be subject to a high level of error. In other words these managers were less confident about their ability to resolve the "problem of jointness" than their counterparts in the brewing company. This was undoubtedly in part because in the brewing company the financial control systems identified the activities of the group of workers concerned as a separate profit centre and that within that profit centre (managed houses) the performance of each pub and therefore publican could be readily identified. In the case of the television company the sales staff, though physically separate from production and transmission personnel were nonetheless part of an integrated whole and not identified as a separate profit centre.

Finally with respect to the third point, the mechanisms for determining how much revenue or profit would be lost at various levels of staff deficit there were differences between the two companies. In the case of the brewing company the existence of management control systems made it possible to monitor the performance of each pub in an area, controlled by an Area Manager, such that there were records of the performance of pubs where agency staff were or had been employed. In this way the reduction in profits resulting from the use of

agency staff was readily identifiable. Since in the television company the sales staff all worked in one location and would in situations of staff deficit provide cover for one another, the identification of lost revenue to specific levels of staff deficit was more problematical. Whilst there was no disagreement about the fact that staff shortages did have an impact upon sales revenue the point (i.e. the level of deficit) at which this started to have a material financial effect was less clear-cut, with opinions varying widely. In the end it was decided that the impact was only felt when deficits exceeded ten staff. (This was the reason for inputting costs of one pound for deficits of one to ten staff in the finally agreed deficit matrix, as shown in table 6.10.) As can be seen from table 6.10 the basis for calculating the financial impact of higher levels of deficit was accepted by all managers.

8.6.3 THE RELATIONSHIP BETWEEN LABOUR MARKET AND PRODUCT/SERVICE MARKET APPROACHES TO MEASURING THE FINANCIAL EFFECTS OF STAFF DEFICITS

In all three cases the managers took account of both labour and product/services market approaches to determining the financial effect of staff deficits. Though the form that this took varied there are some general similarities that can be identified. Before looking at these similarities it is necessary to

return to the case of the television company since as it has so far been described it would appear that in this setting no account was taken of labour market approaches. In the early stages of this case exercise no labour market factors were included in the completion of the deficit matrix. As the deficit matrix was finally presented the inclusion of figures of one pound for deficits of between one and ten staff represented the view that for these levels of deficit existing staff could adequately cover for shortfalls. In effect what was being said was that there existed the ability to exploit the internal market for labour. The decision to give this a notional cost of one pound reflected the view that although the organisation was not operating at its optimal level of staffing the remaining staff could make up for the shortfall at no significant cost to the company. In other words the basis for computing deficiencies of between one and ten sales personnel was done by reference to internal rather than external substitution and that the use of these internal substitutes was virtually cost free. The following general conclusions can be drawn about the relationship between labour market and product/service market factors in the managers' decisions in the three cases.

Firstly in all three cases both types of factors were considered to be of relevance to determining the financial effect of staff deficits. In all three cases

a labour market basis was used for computing lower levels of deficit. Generally labour market based costs could be more reliably measured. Product/service market factors become more significant as the size of deficits increases. Though there may be preference for using product/service market factors these cannot normally be as reliably measured as labour market factors, and the ability to measure them is dependent on the three conditions identified in 8.6.3 being met. The degree of confidence that is placed on product/service market based figures is strongly influenced by the form of financial management control systems in operation in the organisation. Finally in none of the three cases did the managers provide or seem to possess a way of relating the labour market and product/service market approaches and the subsequently derived figures to one another.

8.7

THE FINDINGS RELATED TO THE DIFFERENT VERSIONS OF HRM

In section 1.6.4 it was stated that the practices of conventional accounting could only facilitate measurements related to the "hard" version of HRM. In this section the decisions of the managers in the three case settings will be reviewed in an attempt to identify their orientations towards either "hard" or "soft" versions of the HRM model.

With respect to the managers' explanations of the "establishment level" the fact that these were not

couched in terms of direct financial measurement suggests that the managers may not have had a "hard" orientation. However, if it is accepted that the explanations were heavily influenced by the control systems applying in the organisations and that the measurement of performance within these control systems was mainly of a financial kind then these explanations are seen as more consistent with a "hard" rather than a "soft" version approach.

When it came to considering the acquisition part of the model, though in the main inputs were expressed in terms of cost, it would be incorrect to assume that this was evidence of an exclusively "hard" approach. Some of the costs were used as surrogate measures of value as in the case of the determination of the figures input to represent in financial terms the involvement of other staff in the acquisition process. The fact that these values were based on the "employment costs" of these staff was because of the managers' views on the relationship of the marginal revenue product to "employment costs". When it came to the consideration of the costs and benefits involved in the employment of new staff before they became fully effective there was evidence of both "hard" and "soft" version approaches as can be seen from the three points noted in section 8.4.4. In respect to the managers' approach to the financial approach to measurement of the acquisition process overall it can therefore be

said that there is evidence of both "hard" and "soft" version approaches.

It was with respect to the managers' completion of the deficit matrices that the adoption of both "hard" and "soft" version approaches was most readily apparent. In this area, for lower levels of deficit the fact that managers computed financial effects by reference to substitute labour markets is a clear example of a "hard" version approach, but equally in all three cases at higher levels of deficit managers can be seen to have veered towards and adopted a "soft" version approach.

In this section the "hard" and "soft" versions of HRM have been applied as a way of analysing the decision making behaviours of the managers in the case exercises. The managers themselves never used such terms in the sense that they have been applied here. On the contrary they each saw themselves as operating from a single position from which they made decisions about inputs to the model which they formulated in financial terms. The words "cost" and "value" were used simply as expressions of the financial representation of inputs to the model. Whilst the managers were all aware of the "political" aspects of the situations with which they were dealing, they saw the inputs to the model as being formulated within an overall unitary rationality. They recognized that the basis for computing some inputs and

therefore the inputs themselves were more contentious than others (this was expressed most clearly in terms of the "soft cost syndrome" in the case of the brewing company) but any concerns they had related more to the perceived reliability of their figures than their validity.

In this context the concepts of reliability and validity and their relationship is of some interest. If "hard" and "soft" versions of HRM are seen as different and mutually exclusive frames of reference, then managers' inputs to the model would have to be evaluated in terms of both their validity and their reliability in respect of whichever version/frame of reference was adopted. If alternatively, as was the case, a single undefined frame of reference was adopted then from the perspective of the managers then either validity was not an issue or the concepts of reliability and validity became merged and might be better seen as the issue of "political defensibility. (Where "political defensibility" meant the the ability of decision makers to convince others of the efficacy/acceptability of their decisions.)

Whilst the division of "hard" and "soft" versions of HRM provides a helpful means of analysis of the overall approach adopted by managers the evidence from the case studies suggests that in respect of employee resourcing decision making managers did not appear to adopt a single approach.

PART III

This part comprises two chapters. Chapter 9 is devoted to the application of the figures obtained from the simulation to the two models of HRA. Consideration is given to the explanations provided for these figures by the subject managers and how this affects the reliability, validity and utility of the operationalized HRA models. The relationship between the two models is also discussed and conclusions drawn. In the final chapter the research design is evaluated and areas for future possible research are presented.

CHAPTER 9

THE APPLICATION OF DATA GENERATED FROM THE RESEARCH TO MODELS OF HRA

9.1 INTRODUCTION

The purpose of this chapter is to take the data derived from the use of the simulation model, to apply it to the two HRA models and to review the utility of these models.

The chapter starts with a review of the reliability and validity of the data in terms of it's application to the simulation model, (section 9.2) and the utility of the model in achieving the third objective of the research namely to assist managers to resolve employee resourcing problems. In section 9.3 the application of the simulation input data to the "Replacement Cost Model" is considered, followed in sections 9.3.1 to 9.3.3 by the application of this data in each of three case settings. In section 9.4 the operationalization of the "Replacement Cost Model" in which simulation output data is also used is considered and it's application in the three case settings follows in sections 9.4.1 to 9.4.3. Section 9.5 is devoted to an explanation of how the deficit matrix data derived from the simulation can be used in the "SRVM", whilst in section 9.6 the application of simulation data to the "SRVM" is discussed in general terms. The use of the simulation generated data to the operationalization of the "SRVM" in the three case settings is presented in sections

9.6.1 to 9.6.3. In section 9.7 the relationship between the "Replacement Cost Model" and the "SRVM" is discussed in general terms with sections 9.7.1 to 9.7.3 looking at the relationships in the three case locations. Finally in section 9.8 some general conclusions are drawn and the utility of the two models of HRA is reviewed.

9.2 THE RELIABILITY, VALIDITY AND UTILITY OF THE SIMULATION TO THE RESOLUTION OF EMPLOYEE RESOURCING PROBLEMS.

The third objective of the research was, through the use of the simulation model, to assist managers, who act as subjects in the research, to resolve an employee resourcing problem.

Whilst the prospect of the achievement of this objective provided the incentive for managers to participate in the research it could only be realized if the simulation itself was a reliable and valid instrument and the data gathered and used in the simulation were also both reliable and valid.

The concept of reliability, when applied to the simulation model itself, means the extent to which it provides consistent results. This reliability was established at the systems trials stage of the development of the instrument. The concept of validity, when applied to the simulation means the extent to which it does what it purports to do, which in this context means adequately representing the employee

resourcing process. In other words, do the structure and workings of the simulation produce accurate and relevant results when the instrument is put into operation by the application of appropriate data? The validity of the simulation in it's "time only" form was established in each case exercise by inputting historical data of wastage patterns and acquisition practices and checking that the model output conformed to what had actually been experienced. In its "full cost" form, the absence of historical data in an appropriate form meant that this kind of check of validity was not possible. That the simulation had "face validity" (in terms of it's structure and workings) is evidenced by the preparedness of managers to use it. With respect to the simulation as an instrument for measuring the total costs of different resourcing strategies it is, of course, impossible to establish anything other than "face validity" without using data, the reliability and validity of which must itself be assessed.

With respect to the reliability of the data input to the model, the measure is concerned with the consistency of the data. To judge this involves consideration of the process by which the input data was collected. As part of the data collection and input process a detailed record was made of the basis on which the managers computed all inputs. The reliability of the data could, therefore be established by seeing

whether other individuals, following the rules which set out the basis for input data computation, would arrive at the same figures. Though this was never tested the specificity and absence of ambiguity of the rules give reason for confidence in the reliability of the data inputs.

Establishing the validity of the data inputs (did the data represent what it was purported to?) is more complex and there are indications that the level of validity may have varied amongst the cases and within individual cases. A general comment that may be made is that the inputs used to establish the overall costs of the acquisition process were generally found by the managers concerned to be easier to compute and less problematic in terms of the basis of their computation. Conversely the basis of computation of inputs to deficit matrices were seen as more problematic. The essence of this problem was explored most fully in chapter 5, when the "soft cost syndrome" was discussed. Though the issue was expressed most clearly in this case exercise it was a common feature of all three. In all three cases the basis of the entries to the deficit matrices were judged by the managers to be the best that they could arrive at. However, the confidence that they had in these inputs was observed by the researcher to be lower than the confidence they expressed in inputs used in the acquisition part of the model.

How, then, is the validity of any particular input to the simulation to be established? This is a specific example of the broader question of how the validity of any measurement of cost can be determined? There is a whole branch of accounting concerned with cost, with a professional body whose members specialize in the subject. It is accountants who set the standards for how costs "should" be computed, and as Morgan (1990:101) points out;

"Professionals make a claim to a specific body of knowledge regarding a certain object. Thus professionals are expected to undergo a period of training when they learn this body of knowledge. However, being a professional involves more than simply learning abstract knowledge; it also involves the ability to apply it. This notion of application clearly brings out the power dimension of professional knowledge.... Why should the client trust the professional? Because the professional is certified as having undergone a rigorous training in the knowledge and practice of their particular skill and also because the professional belongs to a professional body which monitors the exercise of those skills."

The validity of inputs to the simulation model could therefore be assessed on the degree of endorsement given by the organisations' accounting experts. By this criterion the data provided in the case exercise at Ealing Hospital might be viewed as having high validity in that the hospital's accountant was directly concerned as a participating manager. Conversely, the validity of the data in the case of the Television Company may be lower because, not only did the accountant have an indirect involvement, she explicitly expressed some reservations about the whole approach.

The direct involvement of the accountant in the hospital based case contrasts with the other two cases where the participating managers resisted the researcher's suggestions that the organisations' accounting experts should be involved. It should not be inferred from this that the validity of the data was necessarily less than in the case exercise conducted at the hospital. In the other two case settings the lack of direct involvement of the accountants may stem from examples of what Armstrong (1986) referred to as inter-professional competition or it may be explained in other ways such as for example the nature of the personal relationships amongst managers. What can be said though, is that in all three organisations the findings were approved by managers and directors senior to those participating. In the case of two organisations these more senior executives also approved the promulgation of the research and its findings in the wider domain outside the organisation through the publication of journal articles. (Dawson. 1988b, Dawson, Mc Alpine and Woolley. 1989a, and Dawson, Barrett and Ross. 1990). Finally some evidence of the validity of the exercises and their findings (which implicitly endorses the validity of the data used) may be deduced from the changes in employee resourcing practices adopted subsequent to the participation in the research exercise.

This last point may be taken as evidence of the perceived utility of the simulation as a device for assisting in employee resourcing decision making. This conclusion cannot, however, be drawn unconditionally. In the two case exercises (the Brewing Company and the Television Company) in which the research process led to the identification of new "cost optimal" resourcing strategies and in which changes in the resourcing approach were introduced, these did not conform exactly to the solutions derived from the use of the simulation, though they did involve changes that were in principle the same.

There are at least two possible explanations of why the "cost optimal" solutions were not implemented in precisely the form identified. First, the managers responsible for implementation, who included those who had participated directly and others who had replaced participants who had left the organisations, did not have complete confidence in the validity of the findings. Second, because the design of the simulation model is predicated on the assumption that decisions are taken on purely financial criteria, it takes no account of other intra-organisational factors that in practice influence management action. It may, of course, be a combination of these two explanations. Whilst an investigation of the second explanation was beyond the scope of this research it may be a subject worthy of future investigation. The issue of further

possible research into this subject will be addressed in chapter 10 when the research is reviewed and other possible areas for future research are considered.

Attention will now be turned to how the data derived from the use of the simulation may be applied to the two models of HRA.

9.3 SIMULATION INPUT DATA AND THE REPLACEMENT COST MODEL OF HRA

Grove et al (1979) identified replacement cost models as of the kind that were based on input attributes. In their 1984 study Flamholtz and Geis presented a model for the positional replacement cost of Naval personnel. They saw the positional replacement cost being made up of two main components, namely acquisition costs and total development costs. They broke acquisition costs down into those derived from activities of recruitment and selection. The total development costs they broke down into orientation costs, formal workshop training costs, formal on the job training costs, informal on the job training costs and other development costs such as formal outside training. In the context of the three case exercises of this research these costs equate to the inputs to the acquisition part of the simulation model.

In the following three sections the replacement costs will be extracted from the input data for each of the case studies to compute the replacement cost for each

of the jobs that were the subject of the exercises. In all cases costs of the existing arrangements have been computed.

9.3.1 THE REPLACEMENT COST OF PUB LANDLORDS

The acquisition costs of a new pub landlord were set out in Table 5.4. For the purpose of computing the replacement cost the conditional benefits of final training are disregarded since these were included in anticipation of temporal mismatches of demand for, and supplies of, publicans, a feature of costs that is disregarded in some applications of the Replacement Cost Model.

The replacement cost per landlord is therefore computed at £762 with the breakdown of these costs as shown in Table 9.1.

TABLE 9.1 : THE REPLACEMENT COST OF LANDLORDS

Item	Cost (£)
Pre-recruitment	20
Recruitment	440
Selection	22
Induction	148
Training	132

TOTAL	762

9.3.2 THE REPLACEMENT COST OF TELEVISION SALES EXECUTIVES

The acquisition cost of new sales executives are set out in Table 9.2. The £200 per batch of executives recruited has been computed at £182 per executive since the average batch size was 1.1 sales staff. Similar

adjustments have been made to the £300 per batch recruitment costs to £273, the £28 per batch for selection to £25 and the £550 per batch for induction to £500 per inductee. The remaining costs are as noted in section 6.5. The total replacement cost for a sales executive is computed at £8901.

TABLE 9.2 : THE REPLACEMENT COST OF SALES EXECUTIVES

Item	Cost (£)
Pre-recruitment	362
	182
Recruitment	88
	273
	25
Selection	360
	25
Induction	1178
	500
Training	5908

TOTAL	8901

9.3.3 THE REPLACEMENT COST OF NURSES

The acquisition cost of nurses are set out in Table 9.3. In this case the value of the contribution of nurses whilst undergoing training is included as this was not conditional since hospital staffing budgets when being set allowed for this contribution. The total replacement cost of a nurse is computed at £18031.75

TABLE 9.3 : THE REPLACEMENT COST OF A NURSE

Item	Cost (£)
School Training (Formal)	7540.00
School Training (Informal)	4365.00
Maintenance	26714.00
Contribution	(22246.00)
Induction on ward	1658.75

TOTAL	18031.75

9.4 SIMULATION OUTPUT DATA AND THE REPLACEMENT COST MODEL OF HRA

By using the simulation input data as the basis for calculating the replacement cost the costs of temporal mismatches between supplies of workers and the demand for them are excluded. Such costs could however be included as part of the total cost of obtaining a replacement member of staff. Moreover in two of the cases the costs resulting from temporary deficits are very significant. Such costs can be obtained from the output data of the simulation. The costs including these temporal mismatches, for the existing resourcing arrangements adopted in each case, are shown in the following three sections.

9.4.1 THE REPLACEMENT COST OF PUB LANDLORDS USING SIMULATION OUTPUT DATA

In Table 9.1 the input costs for acquisition, excluding conditional contributions of landlords undertaking

training at a time of deficit was computed at £762 per publican. When these data were input to the simulation and conditional benefits were included the acquisition cost per landlord averaged £612. More significantly the mean cost of temporary deficits, which were shown in Table 5.1 ran at an average of just over four publicans, cost £2868, 82% of the total cost of £3480 per landlord.

9.4.2 THE REPLACEMENT COST OF TELEVISION SALES EXECUTIVES USING SIMULATION OUTPUT DATA

Using the output data from the simulation for the existing resourcing arrangements the total cost per sales executive was £26,383 of which £16,643 or 63% was the result of temporary deficits of executives.

9.4.3 THE REPLACEMENT COST OF NURSES USING SIMULATION OUTPUT DATA

In the case of the current arrangement for resourcing nurses from the training school the cost of temporary deficits was £1761 per nurse which at 8.8% of the total cost of £19,793 constitutes a far smaller proportion than in the other two cases. The reason for this is the combination of the adoption of a batch acquisition strategy and the high costs of nurse training in the school.

9.5 THE INTERPRETATION OF DATA FROM THE DEFICIT MATRIX OF THE SIMULATION MODEL

In completing the deficit matrix the managers in each case study were computing the cost per week per

employee for all levels and durations of staff shortage. Thus the entry in each cell of the matrix represents the perceived cost to the organisation of each member of staff (of the kind being considered) for that level of deficit at that duration of deficit.

The first column of any deficit matrix shows the perceived approximation of the net cost per employee for the first week of staff deficit for all levels of staff shortfall. Subsequent columns represent time series of these costs.

In effect the managers were entering their perceived approximations of the value foregone by the organisation resulting from the various levels of staff deficit, or to put it another way their perceived approximations of the net marginal product of each employee. It must be remembered that no account is taken of qualitative differences between individual employees, the figures represent an average employee of the type concerned. In providing this data the managers are giving their approximate resolution to the "problem of jointness", by attributing a value to the worker in the context of all the resources, both other human resources and non-human resources, employed within the organisation. Tables 9.4 to 9.6 show the data from which part of these perceived approximations of the net marginal product curves could be drawn.

**TABLE 9.4 : THE DATA THAT COULD BE USED TO DRAW THE
PERCEIVED APPROXIMATION OF THE NET MARGINAL PRODUCT OF
LANDLORDS FOR EACH WEEK**

Number of Landlords	Perceived Approximation of Net Marginal Product of Landlords
67	£ 0
66	£ 167
65	£ 334
64	£ 501
63	£ 668
62	£ 892
61	£1116
60	£1340

**TABLE 9.5 : THE DATA THAT COULD BE USED TO DRAW THE
PERCEIVED APPROXIMATION OF THE NET MARGINAL PRODUCT OF
SALES EXECUTIVES FOR EACH WEEK**

Number of Sales Execs.	Perceived Approximation of Net Marginal Product of Sales Execs.
43	£ 0
42	£ 1
41	£ 2
40	£ 3
39	£ 4
38	£ 5
37	£ 6
36	£ 7
35	£ 8
34	£ 9
33	£ 10
32	£ 59
31	£ 188
30	£ 396
29	£ 883
28	£ 1473
27	£ 2741
26	£ 5631
25	£10294
24	£15841

The data presented in these tables are simply the cumulative figures for the first column from the

deficit matrices shown in Tables 5.5, 6.10 and 7.6.

TABLE 9.6 : THE DATA THAT COULD BE USED TO DRAW THE PERCEIVED APPROXIMATION OF THE NET MARGINAL PRODUCT OF NURSES FOR EACH WEEK

Number of Nurses	Perceived Approximation of Net Marginal Product of Nurses
142	£ 0
141	£ 40
140	£ 80
139	£ 133
138	£ 186
137	£ 252
136	£ 318
135	£ 397
134	£ 476
133	£ 568
132	£ 660
131	£ 765
130	£ 870
129	£ 988
128	£1106
127	£1237
126	£1368

9.6 THE SIMULATION INPUT DATA AND THE SRVM MODEL OF HRA

In section 1.3.5 the following five conditions for operationalizing the Stochastic Rewards Valuation Model (SRVM) were identified:-

- (1) the mutually exclusive sets of states that the individual may occupy within the organisational system must be identified;
- (2) the value of each of these states to the organisation must be computed;
- (3) the estimated expected tenure of the person in the organisation must be established;
- (4) The probability that the person will occupy each of

the possible states, noted in (1) above, at specified future times must be determined, and

(5) the discount rate to be applied to future cash flows to determine their present value must be known.

With respect to the first and fourth points the data input to the simulation model in each case study related to only one job or service state. However, if this is the sole service state that an individual is to occupy in the organisation then this operational requirement is met in the case situations. With respect to the second point, data on the perceived value of the service state can be obtained from the deficit matrix in each case. The estimated tenure requirements of the third point can be crudely estimated from the labour turnover data input to the simulations. In respect of the fifth point, the discount rates used within the organisations were not furnished as part of the input data to the simulations but were readily obtained from the managers in the organisations.

It would seem therefore that in using the simulation model the managers were providing the data required to operationalize the Stochastic Rewards Valuation Model for types of employees who are expected to occupy only one service state or job within the organisation.

The average tenure in the job can be crudely calculated as the reciprocal of the probability of the individual leaving in a given year, where this probability can be derived from the average rate of annual labour

turnover. Thus for example with an average rate of turnover of 25% per annum the expected average tenure would be four years.

The value for one week of the service state can be obtained from a single cell in the deficit matrix. The annual value of the service state is therefore the sum of 52 cells in any given row of the matrix. It is apparent that by adopting this approach to the calculation of the annual value of the service state different values will be obtained for different levels of deficit for an average worker of the type being considered. This is to be expected given the perceived approximation of the marginal product of labour discussed in section 9.4.

9.6.1 THE SRVM APPROACH APPLIED TO PUB LANDLORDS

The vast majority of pub landlords were acquired to fulfill only that role within the company. Only a very small proportion would progress to the level of Area Manager. It is therefore reasonable to treat the value to the company of a landlord as being confined to that resulting from this single service state.

The rate of annual labour turnover for publicans was 20% which gives an average tenure of five years. The discount rate used by the company for capital investment decision making was 20% per annum and it was felt by the managers that this was the appropriate rate to be applied. The average value of the service state

was derived from the deficit matrix shown in Table 5.5. The value for the first year of the service state is three weeks at £167 per week (£501) plus three weeks at £190 per week (£570) plus 46 weeks at £170 per week (£7820) giving a total of £8891 for a deficit level of one landlord. For all subsequent years the service state value is 52 weeks at £170 per week making a total for each year of £8840. The discounted values for each year and the total value are shown in Table 9.7.

TABLE 9.7 :THE ANNUAL VALUES OF THE SERVICE STATE OF LANDLORD AT A DEFICIT LEVEL OF ONE

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£8891	1.200000	£7409
2	£8840	1.440000	£6139
3	£8840	1.728000	£5116
4	£8840	2.073600	£4263
5	£8840	2.488320	£3553
Total discounted value of service state is			£26480

As can be seen from Table 5.5 the same pattern of deficit costs applies to deficits of one to four. For deficits of five or more landlords the costs are different as shown in Table 9.8.

**TABLE 9.8 :THE ANNUAL VALUES OF THE SERVICE STATE OF
LANDLORD AT A DEFICIT LEVELS OF FIVE OR MORE**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£11757	1.200000	£9798
2	£11700	1.440000	£8125
3	£11700	1.728000	£6771
4	£11700	2.073600	£5642
5	£11700	2.488320	£4702
Total discounted value of service state is			----- £35038

The total discounted service state values for all levels of deficit are shown in Table 9.9.

**TABLE 9.9 : THE DISCOUNTED SERVICE STATE VALUE FOR
LANDLORDS FOR ALL LEVELS OF DEFICIT**

Level of Deficit	Discounted Service State Value
1	£26480
2	£26480
3	£26480
4	£26480
5 and over	£35038

With an "Establishment Level" of 67 the total discounted service state value for landlords of this kind is £2,313,314 (made up of 4 times £26480 plus 63 times £35038) giving an average discounted service state value for a pub landlord of £34,527.

9.6.2 THE SRVM APPROACH APPLIED TO TELEVISION SALES EXECUTIVES

Seventy five per cent. of Sales Executives enter the Company at the level of Sales Trainee and progress through the stage of Sales Assistant before being appointed as Sales Executives. Since fewer than five per cent. of Sales Executives are promoted further in the Company, for the majority the progression from Sales Trainee to Sales Executive represents the complete career path in the Company. With a rate of labour turnover of 13% per annum the average tenure for this group is calculated at 7 years 36 weeks (400 weeks). The discount rate used by the Company was 15% per annum. The average value of the service states of Sales Executives is derived from the deficit matrix shown in Table 6.10.

The effect of the use of the internal labour market and its representation which was discussed in section 8.6.3 means that in terms of the use of the deficit matrix data for the SRVM approach to calculating the value of this kind of employee the first ten rows (staff levels of 42 to 33) are all of the same nominal value, of £400 (undiscounted). Since this figure is both small and nominal there is no point in applying discount rates to it.

The undiscounted value for each of the first to seventh years of service state at the level of 32 sales

executives is £2548 (52 weeks at £49 per week). The undiscounted value for the 36 weeks in the eighth year is £1764 (36 weeks at £49 per week). The discounted values for this level of deficit service state are shown in Table 9.10. The total discounted value for this level of deficit service state is £11,179.

TABLE 9.10 :THE ANNUAL VALUES OF THE SERVICE STATE OF SALES EXECUTIVES AT A DEFICIT LEVEL OF ELEVEN

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£2548	1.1500000	£2216
2	£2548	1.3225000	£1927
3	£2548	1.5208750	£1675
4	£2548	1.7490060	£1457
5	£2548	2.0113569	£1267
6	£2548	2.3130604	£1102
7	£2548	2.6600194	£ 958
8	£1764	3.0590223	£ 577
Total discounted value of service state is			----- £11179

The computations of discounted values for all other levels of deficit service state are performed in the same way and presented in appendices 1 to 8.

With an "Establishment Level" of 43 the total discounted service state value for sales executives can be computed by adding the values of each service state level of deficit shown in appendices 1 to 8 and those noted above, as shown in Table 9.11

**TABLE 9.11 : THE TOTAL SERVICE STATE VALUE FOR
TELEVISION SALES EXECUTIVES**

Deficit levels 1 to 10 at £400 each equals	£	4000
Deficit level 11	£	11179
Deficit level 12	£	29425
Deficit level 13	£	47446
Deficit level 14	£	111089
Deficit level 15	£	299764
Deficit level 16	£	642306
Deficit level 17	£	1366741
Deficit level 18	£	2189182
Deficit levels 19 to 43 at £2599281 each	£	62382744

Total for all levels of deficit	£	67083876

This yields an average service state value of £1560090.

9.6.3

THE SRVM APPROACH APPLIED TO NURSES

Unlike the other two cases the grades of nurses that were the subject of the case study constitute a part of a well established career path. Grades C and D nurses are the most junior qualified levels of nurse and in Ealing Hospital they represented 29.2% of the total nursing strength. All nurses on a career path would pass through these levels and a significant proportion can therefore be expected to progress further up the career ladder. With a labour turnover rate of 32% per annum the average tenure in these grades is three years and six weeks (162 weeks). The discount rate used in the hospital is based upon the "treasury test rate" of

5% in real terms. Taking the average rate of inflation for the period of 7.7% per annum based upon the Index of Retail Prices the managers felt that a discount rate of 12.7% per annum should be used. The average value of the service states of nurses is derived from the deficit matrix shown in Table 7.6.

The discounted value for the service state for each level of deficit is computed in the same way as in the two previous sections. The computations are shown in appendices 9 to 16.

The total discounted service state values for all levels of deficit are shown in Table 9.12

TABLE 9.12 : THE DISCOUNTED SERVICE STATE VALUE FOR NURSES FOR ALL LEVELS OF DEFICIT

Level of Deficit	Discounted Service State Value
1	£5086
2	£5806
3	£6737
4	£6737
5	£8390
6	£8390
7	£10043
8	£10043
9	£11696
10	£11696
11	£13349
12	£13349
13	£15002
14	£15002
15 and over	£16653

With an "Establishment Level" of 142 nurses the total discounted service state value of nurses is £2,255,537, giving an average service state value of a nurse of £15,884.

9.7 THE RELATIONSHIP BETWEEN THE SRVM AND THE REPLACEMENT COST MODEL

Flamholtz when discussing the application of the SRVM noted (1985: 201)

"To apply this model in an actual organization it is necessary to define a set of service states, derive a measure of the value of each state, and estimate an individual's expected service life and the probabilities that the individual will occupy each service state at each point during his or her expected service life. The basic problem involved in applying this model in real organizations is the difficulty of obtaining valid and reliable data inputs of a value of a service state, a person's expected tenure, and the probabilities of occupying states at specified times."

Flamholtz goes on to suggest two ways of measuring service state values. These he calls the "price-quantity method" and the "income method". He states (1985: 201)

"The price-quantity method involves determining the product of the price per unit of human services and the quantity of expected services. (We must, of course, deduct payments to the individual for salary to derive a measure of his or her net contribution.) The income method involves forecasting the expected earnings of a firm and allocating them between human and other resources and further allocating them among specified people."

The price-quantity method requires that the type of worker being considered produces something the value of which can be measured and attributed exclusively to that member of staff. Like the income method calculation of an employee's value it is dogged by the "problem of jointness".

Recognising this problem Flamholtz suggests that

surrogate measures of value are used. In addressing this subject he notes (1985: 207),

"The need for a surrogate measure of individual value is derived from the need for a surrogate input in human resource investment decisions and in the evaluation of human resource utilization. For these uses, replacement and current costs have greater relevance than historical costs because they are, by definition, more closely related to the market's current assessment of an asset's economic value. Indeed, R.J. Chambers once went beyond the argument that current costs are a surrogate measure of value and suggested that cost is the market's estimate of economic value: 'The price currently ruling for producer's goods is the market's assessment of the present value of expected income flows from their use at the present level of prices, for all potential users of such goods.' He argued that, barring imperfections in the market, current cost and value will be equal.

In principle both current cost and replacement cost reflect an individual's value to a formal organization. Drawing upon Chambers, current cost or market value is, by definition, the market's assessment of an individual's value as a resource. Replacement or reproduction cost is similar to current cost, except that it represents the sacrifice to be incurred by a single firm, rather than the market as a whole, in replacing its resource.

In choosing between replacement cost and current cost as possible surrogates, there is one factor of critical importance: the feasibility of obtaining observations of the surrogate in the real world. In other words, is it possible to obtain empirical measures of the surrogate? Since ours is not an economy typically engaged in the purchase and sale of people, measures of an individual's market value are generally not directly established. Similarly, measures of an individual's replacement cost are not typically available. It is feasible, however, to develop measures of an individual's replacement cost. Thus it seems likely that replacement cost may ultimately be used as one possible surrogate measure of an individual's value."

Throughout his discussions of the SRVM Flamholtz refers to the value of the individual. He argues that in principle the value of a group is the sum of the values

of the individuals who comprise it. He is concerned, however, that such an approach takes no account of the synergy of the group. The SRVM takes no account of the differences in value of group members which is reflected in the marginal product curve for the group. It is not clear, therefore, whether the SRVM formula represents the average employee, though this may be inferred from Flamholtz's suggestion that the principle of aggregation may be employed except for regard to the fact that such an approach takes no account of synergy. In the following sections the relationships between the replacement costs and the value of the service states established in the three case studies will be considered.

9.7.1 REPLACEMENT COSTS AND SRVM APPROACHES APPLIED TO PUB LANDLORDS

The replacement cost of pub landlords derived from input data to the simulation model was computed at £762. The replacement cost computed using output data from the simulation which took account of temporary mismatches of demand and supply of landlords totaled £3480. The average discounted service state value using deficit matrix data in the SRVM was £34,527. The initial impression is, therefore, that there is a major discrepancy between these two measures of the value of a landlord.

The logic underpinning the theoretical basis for the

relationship that Flamholtz claims exists between replacement cost and service state values is that the investment made by a rational decision maker in the acquisition of staff (in this case landlords), being as it were "up front" expenditure, should be equal to or less than the discounted stream of benefits anticipated from the investment. The discount rate applied would need to take account not only of the anticipated change in the real value of money and the normally expected return on investments but also the risk of the anticipated benefits in the future not being realized. On the face of it, assuming that the correct discount rate was set and that the data derived from the inputs and outputs of simulation model are valid then the managers in this case may appear to have been adopting a highly successful employee resourcing strategy. (Demonstrated by the fact that the "up front" expenditure is significantly less than the discounted stream of anticipated benefits.) There is however good reason for doubting this. It was apparent throughout the case study that until their participation in the exercise the managers concerned had never attempted to compute systematically the costs and benefits, the relationship between which demonstrated the success of their adopted resourcing strategy. It is, of course, possible that the managers were behaving intuitively and that the size of the difference between anticipated benefits and costs was "known" to be so great as to

mean that they had not needed to compute the various elements.

If in the early stages of the exercise the managers concerned had demonstrated a clear conviction about how the deficit matrix should be completed, which they did not, then this interpretation would have to be given more credence. Moreover the fact that the cost of deficits was, in the main, computed on the basis of the cost of obtaining substitute landlords would have required that the managers had a clear appreciation of the relationship between product and labour markets, which, as has already been noted, was never demonstrated. Indeed the opposite would seem to have been the case. This too, is an important point since it is one that Flamholtz seems to gloss over. In quoting from Chambers, Flamholtz moves from the traditional classical argument about the relationship between the product price and the purchasers' utility value of the product in a perfect market to one that is extended to factors of production, including labour, without acknowledging the place of labour markets (and their state of perfection or imperfection) and their relationship, if any, to product markets. This classical argument that labour markets are driven by, or are derivatives of, product markets, whilst a convenient abstraction, surely in practice requires a knowledge of both markets and their relationship on the

part of decision makers. The case study provided no evidence of the possession of such knowledge by the decision making managers.

The discrepancy in the figures obtained from the replacement cost model and the SRVM may therefore be attributable to either or both imperfections in labour and/or product markets or inadequate information available to the decision making managers.

There is however, an alternative explanation for the discrepancy in the results derived from the application of data to the two HRA models. The data used and/or the way it has been used to compute these two expressions could itself be flawed. Though the issue of the reliability and validity of data have been discussed in general terms in section 9.2 the issue of data validity will be reviewed in more detail here.

The figures input to the simulation model could simply be "wrong". The question of the validity of these figures has already been raised in the discussion of the "soft cost syndrome". How, then, is the validity of the data to be determined? For conventional accounting data there are by definition conventions that dictate the way that the financial representation of a phenomenon should be computed and against which the validity of any particular data may be judged. These conventions have been established over time in operational and theoretical contexts. They have, as has already been noted, been established by use and the

endorsement of experts and professionals. It is this acceptance and endorsement that gives such conventions external validity. Flamholtz has stated, (1985: 91)

"It is significant to note that many of the concepts and much of the terminology being used in developing human resource accounting are being adopted from conventional accounting. They are merely being applied to a problem that has been relatively ignored."

However the utility of traditional accounting conventions is limited, for the reasons discussed in section 1.6.3 and elsewhere. (Dawson 1989b)

The data generated in this exercise represented the best judgements of the participating managers using explicitly defined conventions of computation. This data had the endorsement of more senior executives in the Company. As such it has internal validity.

If the data input to the simulation are accepted as valid for its original application the way that it has been used to provide figures in Flamholtz' two models may still be inappropriate.

With respect to the Replacement Cost Model the data may be limited. The possible limitation relates to the subject of separation costs. As noted in section 1.3.4 Flamholtz suggests that separation costs are made up of direct costs of separation pay and indirect costs of the loss of efficiency prior to separation and the costs of the vacant position. In the case of landlords leaving the Company voluntarily there would not normally be separation pay. The aspect of cost related

to reduced efficiency in the period prior to separation has not been included. The cost of the vacant position has been taken into account when simulation model output data was included. It will be recalled that this was the single largest component of the replacement cost at 82% of the total.

The computed replacement cost may therefore be understated to the extent of the cost of reduced efficiency prior to separation. If this reduced efficiency was great and/or the period of time over which it extended was protracted then this understatement could be significant. The possibility of such costs being incurred was discussed and the managers decided not to make any provision for it.

With respect to the use of simulation data in the SRVM there are two areas where the appropriateness may be questioned; the matrix data as a representation of the value of the service state and the use of the rate of labour turnover as the means of calculating tenure.

When the managers were determining the figures to be entered in the cells of the deficit matrix they were considering the cost of temporary mismatches between demands for staff and their supply. Such costs were therefore seen as being incurred for relatively short periods. Is it reasonable to assume that figures input to represent short term costs should be used to represent longer term costs/values? In this case the

entries to the deficit matrix were based, in the main, on the cost of employing substitute agency staff. The only alternative courses of action available were temporary closure of the pub, which the management would not countenance, or the use of a substitute landlord provided from the Company's existing staff. The only staff members who could fulfill this role would be the Area Managers, whose time was costed at £22 per hour. To employ these staff in this role would therefore be more costly than the use of agency staff. It would seem, therefore, that since in practice the Company did use agency landlords to cover staff shortages that the cost of such coverage can be taken to represent both long and short term situations, there being no cheaper acceptable alternative. It would seem, therefore, that it is legitimate to use deficit matrix data as the basis for computing the value of the service state of publican.

With respect to the calculation of tenure, the crude method adopted provides the mean tenure. It may be argued that the modal, median or some other measure of tenure is more appropriate. In discussing this with the participating managers, they were interested in considering a period of tenure of two years as opposed to the mean of five years obtained from the crude calculation. With an average deficit of four landlords this yielded a figure of £13548 (£7409 plus £6139 taken from Table 9.7.) Even using a two year period of tenure

the difference between the value of a landlord calculated using the SRVM (£13548) and the Replacement Cost Model (£3480) is significant. Indeed, in order to make the replacement cost and the value computed using SRVM equal the tenure of the landlord would have to be set at about 24 weeks since this would yield a discounted service state value of £3442.

To conclude, it would seem that it is reasonable to use the data obtained from the inputs to and the outputs from the simulation model to compute the Replacement Cost and SRVM methods for determining the value to the Company of a publican. On the basis of the evidence presented in this case the two approaches rather than yielding similar results yield significantly different ones. As noted above this could be the result of either or both market imperfections and the use of inadequate information by the decision making managers.

9.7.2 REPLACEMENT COSTS AND SRVM APPROACHES APPLIED TO TELEVISION SALES STAFF

The replacement cost of Television Sales Executives derived from the simulation input data was computed at £8901. The replacement cost including the cost of staff shortages, derived from both input and output data from the simulation, gave a figure of £26383. The average discounted service state value for sales staff using deficit matrix data was £1560090. Once again the initial impression is that there is a major discrepancy

between the results obtained from these two methods put forward to determine the value to the organisation of a member of staff of this kind. However, in the case of the pub landlords the value computed using the Replacement Cost Model was less than that derived from the SRVM for all levels of deficit; this is not the case for sales staff in the Television Company. Although the average value computed using SRVM is considerably greater than the value computed using Replacement Costs, for deficit levels of one to eleven the value derived from the SRVM is less than that derived from the Replacement Cost Model. Table 9.11 shows that for deficit levels of between 11 and 12 sales staff the discounted value of a single member of staff computed using the SRVM moves from £11179 to £29425.

It will be recalled that the deficit matrix for this group of workers was computed on the basis that the managers believed that for deficit levels of one to ten the shortfall would be made up by the existing sales staff; only at higher levels of deficit was it felt that there was a direct impact on Company revenues, the estimated magnitude of which was used to determine the inputs to the matrix for higher levels of deficit.

This difference in the relationship between the computed values for staff using the two methods in the two cases is not surprising when the difference in the shape of their curves of their perceived approximations

of the net marginal products of the two types of worker are considered (Tables 9.4 and 9.5). The difference in these two curves is explained by the fact that in the case of the landlords the basis of the deficit matrix entries was in the main derived from labour market sources throughout the whole range, whilst in the case of the television sales executives notional internal labour market figures are confined to deficit levels of one to ten and thereafter the data used was derived exclusively from data that was based on beliefs about performance in the product market.

As can be seen from sections 6.5.2 and 6.5.3 the managers in the television company were, when completing the deficit matrix, adopting an approach which is much closer to that advocated by Flamholtz for use with the SRVM. Their approach was based on a combination of what Flamholtz calls the price quantity method and the income method.

Two points emerge from these findings. Firstly, the managers acknowledged the considerable difficulty they had in specifying inputs to the deficit matrix (it will be recalled that inputs to the matrix underwent major modification during the exercise) and that whilst describing the inputs as their best estimates the managers had concerns about the confidence they could place on the reliability and the validity of the figures. As a consequence any conclusions must be drawn

with caution. Second, the findings seem to expose a weakness in the Flamholtz SRVM. Within the SRVM no account appears to be taken of the deficit level prevailing in a service state when the value of the service state is determined. The evidence from this exercise would indicate that deficit level is a most important variable.

To conclude, it would seem, that on the basis of the evidence presented in this case, that in certain situations the Replacement Cost Model can act as a reasonable surrogate measure for the SRVM method of determining an employee's value, but that this will apply to only one level of deficit and that in all other situations it is not a useful surrogate measure.

9.7.3 REPLACEMENT COSTS AND SRVM APPROACHES APPLIED TO NURSES

The replacement cost of nurses who were trained in the hospital's training school was £18031.75, using only simulation input data and £19795 when output data was included. The average value of grades C and D nurses computed using the SRVM was £15884.

Given that many nurses are expected to progress beyond grades C and D positions the relationship between the values computed by these two methods seems reasonable. So, although the "up front" expenditure exceeds the figure for the services obtained by the hospital whilst nurses are employed at grades C and D this difference would seem to be justified as some of them progress to more senior positions. Such progression would however

involve further training the cost of which would then have to be added to the replacement cost. The biggest investment however, is undoubtedly the initial training. In this case, then, the Replacement cost appears to act as a reasonable surrogate measure of the value of the nurse assuming this has been correctly measured using the SRVM approach. It should be noted that this is the cost to the hospital rather than the total cost.

The entries to the deficit matrix upon which the SRVM calculation is based derive exclusively from adjusted labour market data. As such the validity of the calculation is subject to the same limitations raised in section 9.7.1. Indeed, the managers acknowledged when making their entries to the deficit matrix that they had to rely upon a "rule of thumb". The problems identified for pub landlords were compounded in the case of nurses since the cost of nurse deficits, especially at higher levels of deficit, cannot be computed in product/service market terms.

The most interesting aspect of this case in terms of the relationship between the value of nurses computed using the Replacement Cost Model and the SRVM become apparent as a result of the hospital's practice of dual sourcing supplies of nurses. In section 7.6 it was noted that nurses recruited direct from the external labour market, as opposed to the Nurse Training School,

could be obtained for £3662. The comparison of the Replacement Cost Model value applied to nurses obtained from this source to the SRVM value suggests that this is a highly successful resourcing strategy, even at the lowest levels of deficit where the discounted service state value is £5086. (Table 9.12.) However, as discussed in section 7.7, this is only the case for particular conditions of the external labour market.

9.8

CONCLUSIONS

As noted in section 9.1 the purpose of this chapter has been to explore the relationships between two proposed methods of valuing employees, using data generated from the three case exercises, and to assess the utility of the two HRA models.

It will be recalled that Flamholtz put forward the SRVM as a "Second Generation Accounting System for Human Resource Value". In advancing this model he accepted that in some settings it may be difficult to obtain the data necessary to operationalize the model and he therefore advocated the use of the Replacement Cost Model as a means of obtaining a surrogate measure of the value of the employee to the organisation.

The utility of the HRA models must be assessed mainly in terms of their value to practitioners. It will be recalled that in the process of conducting the case exercises it was not only the figures input to the simulation model that constituted the data collected. Equally important was the information obtained from

managers in the long and detailed discussions about the exercise in general and how the figures to be input should be computed. This includes information which related to the bases of computation of the figures and the problems involved in determining what these should be, the level of confidence that the managers had in the figures they used and their reactions to the results produced by the simulation. It is this information as well as the figures produced in operationalizing the HRA models from which the following general conclusions are drawn and which forms the basis for assessing their utility.

The first conclusion is that the SRVM takes insufficient account of prevailing internal labour market conditions. The value of an employee of a specified type varies according to the extent of the deviation from the required establishment level in the organisation for that type of employee. As a consequence the use of the Replacement Cost Model, even in perfect market conditions, can only provide a satisfactory surrogate measure for specific levels of deviation from full establishment. Theoretically this would have to be zero deviation, though practically it has been shown to be other deviations.

The second conclusion is that the Replacement Cost Model, in it's formulation, takes insufficient account of prevailing external labour market conditions,

particularly when these conditions are imperfect.

The third conclusion is that in situations of imperfect markets (product and/or factor markets), which will often prevail, decision makers require a full appreciation of the consequences of the relationships amongst the various markets which, on the basis of the evidence of these three case exercises, they are unlikely to possess.

The fourth conclusion is that managers through their actions can alter the replacement cost without affecting any of the variables used in the SRVM calculation of value. In two of the cases, the brewing company and the television company, the managers reduced the overall cost of resourcing by changing their approach to acquisition from that of commencing the replacement process in response to an employee giving notice to quit, to initiating recruitment in advance of leavers giving notice to quit. The simulated effects of such changes were in both cases to reduce the overall cost, in the main by dint of reduced deficit costs. In the case of the brewing company this represented a reduction of 68% (Tables 5.6 and 5.8) in the overall replacement cost and in the case of the television company the reduction was 30% (Tables 6.11 and 6.12). This evidence suggests that Replacement Cost is not a valid surrogate measure of value using SRVM. Overall, it is concluded therefore, that except under conditions that are very unlikely to occur in practice,

the probability that the operationalization of the two models would result in the same figure being generated for the value of a worker is small.

On the basis of these conclusions the HRA models per se seem to have limited utility. However, that is not to say that the process of operationalizing them has no utility. Even though the use of the simulation, the application of which involved the collection of the data needed to operationalize the two models, did in the words of one of the participating managers, "throw up almost as many questions as it provided answers," the general consensus of managers was that participation in the use of the model was even more valuable than the results (in terms of identifying ways of making employee resourcing more cost effective) obtained from it, as the following quotation bears witness. (Dawson, Mc Alpine and Woolley. 1989a: 8)

"The financial benefits accruing to the company from the research are clear. They are, however, in the opinions of the participants, not the most significant benefits that have been gained. Though the savings made are significant as a proportion of the costs of the current arrangements, in context of the company's overall operation they are fairly 'small beer'. The main benefit of the research is difficult to quantify, for it relates to an approach to decision making in the area of human resource management."

The experience of the use of the simulation in the three case exercises suggests that much of the information required to operationalize the two models of HRA can be obtained, but that it is often not

readily available in suitable forms. The very process of collecting this data causes fundamental questions about the contribution of labour to the successful operation of an organisation, and how this relates to the contribution of other factors of production, to be addressed. The particular means used to quantify this contribution may evolve differently in different organisations, but without attempts to collect the data no such evolutionary process will be started. The utility of the HRA models is, therefore, in terms of the role they can play in this evolutionary process and on the evidence of this research potentially considerable.

CHAPTER 10

RESEARCH REVIEW

10.1 INTRODUCTION

When a research exercise has been concluded it is useful to review the process, since through doing so it may be evaluated and lessons may be learned for the conduct of future research. In such a review findings may not be limited to issues related to the process of the research. The experience gained through the research may also throw up areas for future enquiry. Whereas in chapter 9 the main research findings were set out, in this chapter the process that lead to these findings will be critically reviewed and some conclusions drawn.

In this, as in all research, the decisions on the approach adopted, (the research design), were determined on the basis of how it was judged the aims and objectives of the research might best be achieved within resource constraints. In chapter 2 the research design was described in terms of the research instrument, method, methodology and the paradigm in which the research was located. In this chapter each of these aspects is reviewed and a final section on areas of possible future research is presented.

10.2 THE RESEARCH INSTRUMENT: A REVIEW.

The simulation model proved to be an effective research instrument in that it's use generated the data that, at the stage of research design, it was hoped it would.

However, it's design was such that the time spent on the processes of physically inputting the figures and running the model was protracted. An effect of this was that more runs of the simulation had to be undertaken on an off-site basis than had been anticipated. Whilst this did not detract from the achievement of the research aims and objectives, should further research using this type of instrument be contemplated then the development of a more "user friendly" simulation should be considered.

The simulation, as an indirect means of collecting data with respect to HRA, was limited, in that whilst HRA is concerned with the full range of HRM activities the model was concerned only with employee acquisition. Moreover it could only be used as a means of collecting data about groups of employees and could not do so for "one off" type jobs. There are consequently limitations on the extent to which any findings can be generalized. The most important limitation of the simulation, as a research instrument, related to the basic assumptions upon which it's design was predicated; namely that employee resourcing decision making is based on financially rational criteria. Throughout the research it was apparent that though financial factors were important when employee resourcing decisions were taken, they were certainly not the sole basis on which such decisions were made. So, whilst the use of the

simulation exposed the fact that non-financial criteria were important, it did not provide a means for systematically obtaining an appreciation of the operation of other influences which impact upon HRM activities which are of interest in HRA.

10.3

THE RESEARCH METHOD: A REVIEW

In chapter 2 the research method was described as a series of case exercises, where a case exercise was defined as a combination of a case study and a field experiment. This was considered an appropriate method for collecting positive rather than normative data about employee resourcing from which HRA data could be inferred. In attempting to adopt a positive stance it was important that the subjects' existing approaches to employee acquisition were identified. This inevitably raises the issue of whether the application of a novel approach, which involved the use of the simulation model, could be seen as positivist? In an attempt to ensure that the research conformed to this positivist intention the data used to operationalize the HRA models was that which the managers provided to describe their current practices. However, the question still remains whether a research method that was so heavily dependent on the use of the simulation model could be said to be collecting data about the existing behaviour of managers.

At the stage of planning the research design it had been anticipated that the approach would have provided

a means of exploring the reasoning the managers employed when determining inputs to the simulation. The research tool was seen as a novel device for exposing, in a structured way, the basis of formulation of data which managers were already using in their employee resourcing. Whilst it was appreciated that the particular form in which the data had to be input was likely to be new to the subjects, it was anticipated that this would involve simply a process of adaptation on their part. As it transpired the process was more one of creation than adaptation, in that it became apparent that the subject managers prior, to participation, had not been approaching the task of employee acquisition decision making from a financial perspective.

So, whereas originally the expectation had been that the research instrument would expose, in a structured way, the implicit financial basis of employee acquisition decision making, in practice it provided a means of, if not introducing, then certainly increasing, the significance of the financial dimension to the approach to the activity. The research was therefore interventionist to a degree that was not anticipated, and the original intention of adopting a positivist approach was not fully realized. It cannot, therefore, be claimed that the findings of the research are based upon observations of and the analysis of

existing managerial behaviour.

10.4 RESEARCH PROCESS: A REVIEW.

In adopting an action research methodology the researcher gave over some control to the participants, one consequence of which was that there was less uniformity in the way the three case exercises developed than had originally been expected. The adoption of a methodology that involved senior managers as participants in an exercise which was very demanding of their time also meant that each case exercise took longer to complete than the researcher had originally envisaged. An unanticipated effect of this was that during the course of one case exercise and immediately on the completion of the other two, managers who had been principal participants left the organisations concerned to take up new posts. Whilst in all these cases it was possible to see the research through to a satisfactory conclusion, this kind of eventuality must be recognized as a potential difficulty in conducting research in this way.

In section 2.5 it was noted that in establishing the ground rules for the collaborative approach it was, in each case, agreed that in the event of the researcher and the subjects wishing to progress the exercise in different ways, and having discussed the matter, and failed to reach an accord, then the subjects' view would prevail. It will be recalled that in each of the three cases the researcher suggested that the

organisation's accounting expert should be a direct participant. In two cases this suggestion was resisted. In that the exercises were attempts to represent the existing process of decision making, the participating managers' view was persuasive since they argued that the accountants would, under normal circumstances, play no active part in the employee resourcing process. With the benefit of hindsight it might have been better had the researcher made his suggestions more forcefully since the exclusion of the accountants as direct participants meant that some of the figures input to the simulation and subsequently used to operationalize the HRA models did not enjoy the same level of internal validity that they might have obtained had they been explicitly endorsed through the active and direct involvement of the accountants.

10.5 THE RESEARCH PARADIGM: A REVIEW

If as Legge suggested HRA represents an example of "conformist innovation" then it might be supposed to be firmly located, along with conventional accounting, within what Burrell and Morgan define as the functionalist paradigm. This would be consistent with the view expressed by Flamholtz that HRA represents the extension of accounting principles to new areas of application. He has, however, on other occasions claimed that HRA represents a new paradigm.

In chapter 1 it was noted that the first objective

stated by Flamholtz (1974: 45-46) for HRA was; "to develop a theory that explains the nature and determinants of the value of people to formal organisations". So, does traditional accounting address this issue, and if not does the espousal of such an objective represent a new paradigm? To answer these questions requires at least a brief review of accounting as a management discipline.

In considering the development of accounting Morgan (1990 :95) notes that:

"Over the last 200 years organisations have increasingly presented 'accounts' of themselves in various forms of financial statements. It is tempting to consider these as social facts - that is, objective statements about the 'health' of the organisation. What can be more factual than a profit and loss account? It is surely a technical presentation of facts about the organisation." Accounting's growing complexity is seen as a technical response to the growing complexity of organisational life. However what looks to be a solid edifice needs to be considered as something that has been constructed with a purpose by particular groups in ongoing social transactions."

The idea that accountancy is somehow an objective technical process has in recent years been subjected to challenge from both accountants and non-accountants. Some authors such as Armstrong (1987), Hopwood (1987), Miller and O'Leary (1987), Boland (1982) and (1987) and Hoskins and Macve (1986) have looked at the historical development of accounting. These authors have shown, in different ways, that accounting as a practice must be understood within a social context, in which the demands made upon accounting and accountants change

over time, leading to changes in accountancy. But equally importantly they argue that accounting is not simply the consequence of the operation of social forces, but also acts as a force itself which is influential within organisations and society as a whole. As such they argue that accounting cannot be properly understood if it is viewed as a technical process, but must be seen as part of an ever developing complex web of social transactions.

An important point that comes out of the writings of these authors is that accountancy provides a means by which actions and behaviours are understood. It not only gives the actions visibility, but in so doing utilizes and develops a language which pre-empts and influences agenda and meanings. These agenda are not confined to the level of the organisation, but extend into the wider society. The whole notion of standard costing and the associated activities of budgetary control which are the centre pieces of management accountancy involve the concept of "normalising judgements", whereby the norms that individuals can be expected to achieve are numerically assessed in monetary terms. It is argued that accounting should not be seen as a process of reflection, nor simply as a process of crude control by some "hidden hand", but rather as a complex interactive process conducted in a language which, whilst perpetually evolving, is based upon the construction of what Miller and O'Leary (1987)

call "The Governable Person".

It is concluded that even if HRA, in attempting to establish the value as opposed to the cost of human resources, does not represent a new paradigm it does constitute a new perspective on the subject of the management of people at work, a perspective which in many ways is consistent with Storey's "soft version" of HRM. However, as noted in chapter 1 the principles of conventional accounting are more consistent with Storey's "hard version" of HRM. This research is therefore best seen as making a small contribution to the improvement in the understanding of those aspects of the relationship between the two versions of HRM which involve the the use of forms of financial representation.

10.6

AREAS FOR POSSIBLE FUTURE RESEARCH

From the review of this research three areas are identified that appear to be worthy of further investigation.

First, this research has focused upon HRA in the context of the employee resourcing activity of employee acquisition from which some conclusions about the relationship between the two models of HRA and their general utility have been drawn. An investigation into HRA with respect to other human resource management activities such as employee training and development, employee relations or job design, to discover whether

similar conclusions may be drawn would seem to be a worthwhile area of enquiry.

A second area for research could relate to the fourth objective put forward by Flamholtz, that of determining the cognitive and behavioural impact of HRA measurements and frameworks. In this research it has been noted that HRM decision making does not seem to be conducted on the basis of purely financial criteria. A fruitful area of enquiry might therefore be with respect to managers' decision making behaviour when they are using HRA type data. Such research would need to be grounded in the existing body of knowledge on the subject of decision making.

A final suggestion is what might be termed a "full blooded" action research approach in an organisation in which the managers are committed to the principles of HRA. Such an approach may be particularly appropriate in a public service sector organisation where conventional accounting is still in its infancy.

APPENDIX 1**THE ANNUAL VALUES OF THE SERVICE STATE OF SALES****EXECUTIVES AT A DEFICIT LEVEL OF TWELVE**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£6708	1.1500000	£5833
2	£6708	1.3225000	£5072
3	£6708	1.5208750	£4411
4	£6708	1.7490060	£3835
5	£6708	2.0113569	£3335
6	£6708	2.3130604	£2900
7	£6708	2.6600194	£2521
8	£4644	3.0590223	£1518
Total discounted value of service state is			----- £29425

APPENDIX 2**THE ANNUAL VALUES OF THE SERVICE STATE OF SALES****EXECUTIVES AT A DEFICIT LEVEL OF THIRTEEN**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£10816	1.1500000	£9405
2	£10816	1.3225000	£8178
3	£10816	1.5208750	£7112
4	£10816	1.7490060	£6184
5	£10816	2.0113569	£5377
6	£10816	2.3130604	£4676
7	£10816	2.6600194	£4066
8	£ 7488	3.0590223	£2448
Total discounted value of service state is			----- £47446

APPENDIX 3**THE ANNUAL VALUES OF THE SERVICE STATE OF SALES****EXECUTIVES AT A DEFICIT LEVEL OF FOURTEEN**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£25324	1.1500000	£22020
2	£25324	1.3225000	£19149
3	£25324	1.5208750	£16651
4	£25324	1.7490060	£14479
5	£25324	2.0113569	£12591
6	£25324	2.3130604	£10948
7	£25324	2.6600194	£ 9520
8	£17532	3.0590223	£ 5731
Total discounted value of service state is			----- £111089

APPENDIX 4**THE ANNUAL VALUES OF THE SERVICE STATE OF SALES****EXECUTIVES AT A DEFICIT LEVEL OF FIFTEEN**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£62470	1.1500000	£54322
2	£69784	1.3225000	£52767
3	£69784	1.5208750	£45884
4	£69784	1.7490060	£39899
5	£69784	2.0113569	£34695
6	£69784	2.3130604	£30170
7	£69784	2.6600194	£26234
8	£48312	3.0590223	£15793
Total discounted value of service state is			----- £299764

APPENDIX 5**THE ANNUAL VALUES OF THE SERVICE STATE OF SALES****EXECUTIVES AT A DEFICIT LEVEL OF SIXTEEN**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£133752	1.1500000	£116306
2	£149552	1.3225000	£113083
3	£149552	1.5208750	£ 98333
4	£149552	1.7490060	£ 85507
5	£149552	2.0113569	£ 74354
6	£149552	2.3130604	£ 64655
7	£149552	2.6600194	£ 56222
8	£103536	3.0590223	£ 33846
Total discounted value of service state is			----- £642306

APPENDIX 6**THE ANNUAL VALUES OF THE SERVICE STATE OF SALES****EXECUTIVES AT A DEFICIT LEVEL OF SEVENTEEN**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£286445	1.1500000	£249083
2	£317772	1.3225000	£240281
3	£317772	1.5208750	£208940
4	£317772	1.7490060	£181687
5	£317772	2.0113569	£157989
6	£317772	2.3130604	£137382
7	£317772	2.6600194	£119462
8	£219996	3.0590223	£ 71917
Total discounted value of service state is			----- £1366741

APPENDIX 7**THE ANNUAL VALUES OF THE SERVICE STATE OF SALES****EXECUTIVES AT A DEFICIT LEVEL OF EIGHTEEN**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£459090	1.1500000	£399209
2	£508924	1.3225000	£384820
3	£508924	1.5208750	£334626
4	£508924	1.7490060	£290979
5	£508924	2.0113569	£253025
6	£508924	2.3130604	£220022
7	£508924	2.6600194	£191323
8	£352332	3.0590223	£115178
Total discounted value of service state is			£2189182

APPENDIX 8**THE ANNUAL VALUES OF THE SERVICE STATE OF SALES****EXECUTIVES AT A DEFICIT LEVEL OF NINETEEN AND OVER**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£545175	1.1500000	£474065
2	£604240	1.3225000	£456892
3	£604240	1.5208750	£397298
4	£604240	1.7490060	£345476
5	£604240	2.0113569	£300414
6	£604240	2.3130604	£261230
7	£604240	2.6600194	£227156
8	£418320	3.0590223	£136750
Total discounted value of service state is			£2599281

APPENDIX 9**THE ANNUAL VALUES OF THE SERVICE STATE OF NURSES****AT A DEFICIT LEVEL OF ONE AND TWO**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£2080	1.1270000	£1846
2	£2080	1.2701290	£1638
3	£2080	1.4314353	£1453
4	£ 240	1.6132275	£ 149
Total discounted value of service state is			----- £5086

APPENDIX 10**THE ANNUAL VALUES OF THE SERVICE STATE OF NURSES****AT A DEFICIT LEVEL OF THREE AND FOUR**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£2756	1.1270000	£2445
2	£2756	1.2701290	£2170
3	£2756	1.4314353	£1925
4	£ 318	1.6132275	£ 197
Total discounted value of service state is			----- £6737

APPENDIX 11**THE ANNUAL VALUES OF THE SERVICE STATE OF NURSES****AT A DEFICIT LEVEL OF FIVE AND SIX**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£3432	1.1270000	£3045
2	£3432	1.2701290	£2702
3	£3432	1.4314353	£2398
4	£ 396	1.6132275	£ 245
Total discounted value of service state is			----- £8390

APPENDIX 12**THE ANNUAL VALUES OF THE SERVICE STATE OF NURSES****AT A DEFICIT LEVEL OF SEVEN AND EIGHT**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£4108	1.1270000	£3645
2	£4108	1.2701290	£3234
3	£4108	1.4314353	£2870
4	£ 474	1.6132275	£ 294
Total discounted value of service state is			----- £10043

APPENDIX 13**THE ANNUAL VALUES OF THE SERVICE STATE OF NURSES****AT A DEFICIT LEVEL OF NINE AND TEN**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£4784	1.1270000	£4245
2	£4784	1.2701290	£3767
3	£4784	1.4314353	£3342
4	£ 552	1.6132275	£ 342
Total discounted value of service state is			----- £11696

APPENDIX 14**THE ANNUAL VALUES OF THE SERVICE STATE OF NURSES****AT A DEFICIT LEVEL OF ELEVEN AND TWELVE**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£5460	1.1270000	£4845
2	£5460	1.2701290	£4299
3	£5460	1.4314353	£3814
4	£ 630	1.6132275	£ 391
Total discounted value of service state is			----- £13349

APPENDIX 15**THE ANNUAL VALUES OF THE SERVICE STATE OF NURSES****AT A DEFICIT LEVEL OF THIRTEEN AND FOURTEEN**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£6136	1.1270000	£5445
2	£6136	1.2701290	£4831
3	£6136	1.4314353	£4287
4	£ 708	1.6132275	£ 439
Total discounted value of service state is			----- £15002

APPENDIX 16**THE ANNUAL VALUES OF THE SERVICE STATE OF NURSES****AT A DEFICIT LEVEL OF FIFTEEN AND OVER**

Year	Undiscounted Value	Discount Rate	Discounted Value
1	£6812	1.1270000	£6044
2	£6812	1.2701290	£5363
3	£6812	1.4314353	£4759
4	£ 786	1.6132275	£ 487
Total discounted value of service state is			----- £16653

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