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AN APPROACH TO THE EVALUATION OF THE EFFECTIVENESS OF MANAGEMENT
INFORMATION SYSTEMS WITH PARTICULAR APPLICATION TO PUBLIC
UTILITIES AND OTHER ORGANISATIONS IN NATIONALISED
INDUSTRIES WITHIN THE UNITED KINGDOM

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DEDICATION

To My Country . . EGYPT

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ABSTRACT

The major objectives of this study are: (1) to develop a practical approach for evaluating, periodically and in quantitative terms, the effectiveness of management information systems; (2) to develop an evaluative device to check the results produced by the suggested approach. A modified semantic differential is developed and used for this purpose; and (3) to test the practicability and validity of the suggested approach by applying it on a sample of organisations for the purpose of evaluating the effectiveness of their management information systems.

The foundation for the suggested approach is synthesised from the relevant literature. Specifically, a survey is undertaken of the literature in management information systems, accounting and psychology. The suggested approach assumes that users' satisfaction with the information provided by an information system indicates that the information is useful and consequently the system is effective. The approach takes also into consideration the views of both the providers of information and the persons affected by the decisions taken which are based, among other things, on the information provided by the system.

A set of information criteria is developed to measure information utility and consequently the effectiveness of a management information system can be determined. To express the effectiveness in quantitative terms, a point scoring model is used so that the results can be compared from one period to the next. Also an operational framework of the suggested approach is developed. To evaluate the results produced by the suggested approach, the

semantic differential is modified, based on the views of a sample of users of information and individuals involved in the preparation of management information, and is used as an evaluative device.

As no similar research conducted on the effectiveness of management information systems in nationalised industries was found, it may be useful to test the suggested approach in this field. This application achieves two purposes: (1) primarily, to test the practicability and validity of the approach; and (2) to fill a gap in knowledge concerning the effectiveness of management information systems in nationalised industries. The results of this empirical study are based on the views of 198 individuals involved in the preparation of management information, who use the information and are affected by the decisions taken, which are based, among other things, on information.

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CHAPTER I

INTRODUCTION

1.1 - STATEMENT OF THE PROBLEM

The concept of management information systems (MIS) is certainly not new, nor does it necessarily imply the use of computers. A management information system may be defined as:

A system which provides each manager in the organisation with the information he needs in order to take decisions, plan and control within his particular area of responsibility.¹

All organisations have a management information system, but such systems vary greatly in their levels of sophistication, efficiency, and effectiveness.

A management information system, as any other function in organisations, should be evaluated in a regular manner to determine its effectiveness and efficiency. Obviously, effectiveness is not efficiency, the two concepts are distinct:

Efficiency deals with how well one is producing output. It is concerned with maximising output of a given resource or for a given input level. This concept contrasts with effectiveness which deals with achieving a desired objective. An EDP [electronic data processing] can be very efficient in processing data through the computer but if the arrangement of the data on the output report is poor, it may be totally ineffective.²

¹ Higgins, J.C., Information Systems For Planning And Control: Concepts And Cases, (London: Edward Arnold, Publishers, Ltd., 1976), p.1

² Sutton, Richard H. and Robert L. Mathis, "Performance Appraisal - Part 2", Journal of Systems Management, (July, 1979), p.9; see also for example:

Brodie, Morris and Roger Bennett, "Effective Management And The Auditing Of Performance", Journal of General Management, Vol.4, No.3, (Spring, 1979), p.54;

(footnote 2 continued on p.2)

From the definition mentioned above, three observations can be drawn. First, the effectiveness of a management information system is concerned with providing useful information, while the efficiency of the system concentrates on processing the data, that is, operating the management information system. Secondly, a management information system may be both effective and efficient, but either condition can occur without the other. In a sense, high efficiency does not indicate the system is effective and vice versa. Lastly, in the measurement of the effectiveness of a management information system, operating costs are not taken into account, but the economic efficiency cannot be measured without considering these costs.

As previously stated, an overall appraisal of a management information system should include evaluations of both efficiency and effectiveness. However, a review of the current literature in management information systems indicates that in evaluating the performance of management information systems, much attention has been paid to efficiency and more specifically, computer efficiency, while relatively less attention has been paid to effectiveness. On the other hand, the current literature indicates also that information system design/redesign and an overall evaluation of the effectiveness of information systems have not been considered

(footnote 2 continued from p.1)

Matlin, Gerald L., "How To Survive A Management Assessment", Management Information Systems Quarterly, Vol.1, No.1, (March, 1977), pp.11-12;

Stephens, H. Virgil, "Efficiency And Effectiveness", Management Accounting (USA), (January, 1976), p.41;

Glautier, M.W.E. and B. Underdown, Accounting In A Changing Environment, (London: Pitman Publishing, 1974), pp.156-157;

McLean, Ephraim R., "Assessing Returns From The Data Processing Investment", in: Fred Gruenberger (Ed.), Effective vs. Efficient Computing, (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1973), p.13

separately. In other words, an overall evaluation of the effectiveness of a management information system is usually accomplished as a sub-objective of systems analysis and by the same techniques.³

Four observations can be drawn from analysis of the current literature on management information systems:

- (1) The effectiveness of the systems is expressed in qualitative terms rather than in quantitative terms.
- (2) By applying qualitative techniques, different evaluators, when confronted with the same facts, may interpret them differently. Consequently, the evaluation is likely to be highly subjective.
- (3) Evaluating the effectiveness of the systems cannot be easily replicated in the same manner from period to period.
- (4) If the evaluation is performed on a periodical basis, it is likely that the results may not be comparable from period to period.

In order to separate the two functions, i.e. evaluating the effectiveness of information systems and information systems design/redesign, and to evaluate the overall effectiveness of management information systems periodically and in quantitative terms, so that the results can be compared from one period to the next, a systematic and an inexpensive approach is needed. In this regard, the American

³ See for example:

Sutton, Richard H. and Robert L. Mathis, op. cit., p.9;

Donald, Archie, Management Information And Systems, (Oxford: Pergamon Press, Second Edition, 1979), pp.180-184;

Clifton, H.D., Business Data Systems, (London: Prentice-Hall International, Inc., 1978), pp.286-287;

Cushing, Barry E., Accounting Information Systems And Business Organisations, (Menlo Park, California: Addison-Wesley Publishing Company, 1974), pp.217-221

Forkner, Irvine and Raymond McLeod, Jr., Computerised Business Systems, (New York: John Wiley & Sons, 1973), pp.160-185; pp.193-194

Accounting Association Committee on management information systems has called for development of MIS evaluation techniques:

The development of evaluation techniques has been limited. More research is required at both the conceptual and pragmatic levels.⁴

In fact, the approach which is to be suggested is designed to determine the location and nature of problems of a management information system, but it is not designed to specify a cure for these problems. To redesign the system and/or to improve some aspects of it, the information system analysts and organisational personnel who are in charge of maintaining the system should perform additional examinations. In other words, the suggested approach aims to simplify the analyst's task by ascertaining the locations of relative system ineffectiveness as well as delineating the unsatisfactory information attributes. If redesign is not necessary, this approach makes it apparent with minimum effort, time and consequently, at a reasonable cost.

In evaluating the effectiveness of a management information system the objectives of the system are compared with its actual accomplishments, to determine how well the system actually achieves the purpose for which it was designed.⁵ In fact, user satisfaction with the information provided has been recognised in the literature as the major objective of management information systems and as an

⁴ American Accounting Association, Committee On Management Information Systems, "Report Of The Committee On Management Information Systems", The Accounting Review, (Supplement to Vol. XLIX, 1974), p.147

⁵ Alexander, M.J., Information Systems Analysis. Theory And Application, (United States of America: Science Research Associates, Inc., 1974), p.150

indicator of the effectiveness of these systems.⁶

An effective management information system is one which satisfies its users. In other words, such a system does not require additional searches for information that it is designed to provide. An additional search is a cause of frustration to a manager, i.e. decision maker or user of information. In a psychological sense, a management information system causes frustration by actually blocking managers from carrying out, entirely or effectively, the act of decision making. The more frequent managers must perform to obtain additional information which a system does not provide, the more they are frustrated with the system. On the contrary, if a management information system provides managers with their informational needs as and when required, frustration is avoided and, accordingly, managers are satisfied. Therefore, satisfaction with the information provided by a management information system indicates that the information is useful and the system is effective. To sum up, managers' satisfaction with the information provided by a system is a feasible substitute for measuring the effectiveness of the system.

⁶ See for example:

Sutton, Richard H. and Robert L. Mathis, op. cit., p.9;

Edstrom, Anders, "User Influence And The Success Of MIS Projects: A Contingency Approach", Human Relations, Vol.30, No.7, (July, 1977), p.590;

Gellman, Harvey, "Successful Use Of The Computer Systems", The Business Quarterly, (Summer, 1973), p.39

Pearsons, D.E., "Cases And Causes of Computer Failures", Management Accounting (U.K.), (February, 1973), p.65

Dearden, John and Warren McFarlan, Management Information Systems, (Homewood, Illinois: Richard D. Irwin, Inc., 1966), p.55

Although managers' satisfaction is the key factor in evaluating the effectiveness of management information systems, the views of both the systems' personnel, as providers of information, and the persons affected by the decisions taken, should be taken into consideration. Do the systems' personnel know the actual informational requirements of managers? Do the persons affected by the decisions taken agree that managers, i.e. users of information, appeared to have all useful information? An analysis and comparison of the three viewpoints reveal the actual effectiveness of the systems.

As the purpose of the suggested approach is to evaluate the overall effectiveness of management information systems, periodically and in quantitative terms, the approach should be relatively simple, does not need a long time to accomplish, and accordingly can be carried out at a reasonable cost. Because of this, it is believed that the most appropriate tool would be a questionnaire. Such a tool significantly reduces the time and cost of evaluating the effectiveness of the systems.

In constructing an approach for evaluating the effectiveness of management information systems several problems are encountered. How is the actual satisfaction of managers to be measured, since it is an internal feeling? Managers may or may not adequately express their true feelings. Similarly, the problem is encountered when the providers of information and the persons affected by the decisions taken are asked for their views on the information required by, and provided to, managers. A principal difficulty in this study is minimising the effects of bias and inaccuracy in respondents' expression of their feelings while ascertaining their satis-

faction and views. However, another question is raised. In a case where a manager expresses satisfaction with the information provided by a management information system, but his decisions are extremely poor, should the system still be considered effective?

Another problem is also encountered, namely, what set of criteria are appropriate to be used in evaluating the effectiveness of a management information system? In fact, the literature in accountancy represents the primary sources of these criteria. The literature abounds with suggested criteria for accounting information such as: usefulness, relevance, reliability, objectivity, accuracy, timeliness, etc.. A review of the literature indicates that some of these criteria appear to express identical or closely related ideas. Furthermore, in research work, the suggested criteria have been arranged in hierarchical order where some criteria are considered to be more important than the others, or where criteria of a lower order are supposed to lead to the attainment of criteria of a higher level. On the other hand, in some research work, substitution or trade-off among the suggested criteria is permitted in the sense that an increase in the adherence to one, can compensate for a decrease in another, while there is no trade-off among these criteria in other research work.⁷ In fact, the problem is, how is a set of

⁷ See for example:

Reynolds, P.D., "Principles And Standards For Better Management Information", The Accountant's Magazine, (June, 1978), pp.253-255;

Staubus, George J., "The Multiple-Criteria Approach To Making Accounting Decisions", Accounting And Business Research, (Autumn, 1976), pp.276-288;

American Accounting Association, Committee On Concepts And Standards - Internal Planning And Control, "Report of the Committee on Concepts And Standards - Internal Planning And Control", The Accounting Review, (Supplement to Vol. XLIX, 1974), pp.79-96;

(footnote 7 continued on p.8)

these qualitative criteria to be used in measuring and expressing in quantitative terms the effectiveness of a management information system?

Finally, in order to evaluate the results produced by the suggested approach, an evaluative or check device is needed. For this purpose a modified semantic differential is used. In general, the semantic differential measures in quantifiable terms what meaning a concept may have for an individual or a group of individuals.⁸ In this study the semantic differential is used to measure the attitudes of users of information and the persons affected by the decisions taken towards the information provided by a management information system. It is used also to measure the attitudes of the system's personnel (the providers of information) towards the users' specification of their informational requirements. In fact, the semantic differential is used to measure the same aspects which are measured by the suggested approach. Using two different techniques to measure the same aspects allows a check on the results produced. However, the problem is how to modify the semantic differential to be appropriate for use in this study.

(footnote 7 continued from p.7)

Fisher, J., "Financial Information And The Accounting Standards Steering Committee", Accounting And Business Research, (Autumn, 1974), pp.275-285;

Snavely, Howard J., "Accounting Information Criteria", The Accounting Review, (April, 1967), pp.223-232;

American Accounting Association, Committee To Prepare A Statement of Basic Accounting Theory, A Statement of Basic Accounting Theory, (Evanston, Illinois: American Accounting Association, 1966).

⁸ Osgood, Charles E., George J. Suci, and Percy H. Tannenbaum, The Measurement Of Meaning, (Urbana, Illinois: University of Illinois Press, 1957).

The approach suggested for evaluating, periodically and in quantitative terms, the effectiveness of management information systems, should be pragmatic otherwise it will be a highly theoretical approach and useless in practice. In a sense, the approach should determine the actual effectiveness of systems being evaluated in a short time, with minimum effort and consequently at a reasonable cost. In other words, the approach value is not inherent in its assumed advantages, but rather in its practicability and validity. Therefore, the approach should be tested empirically.

As no similar research conducted on the effectiveness of management information systems in nationalised industries was found, it was decided to test the suggested approach in this field. This application achieves two purposes: (1) primarily, to test the practicability and validity of the approach; and (2) to fill a gap in knowledge concerning the effectiveness of management information systems in nationalised industries.

The empirical study will be conducted on a sample of organisations. The population includes public utilities, state holding companies and the other organisations in nationalised industries and their subsidiaries which are in fields such as communications, energy, public transport, and iron and steel manufacture. The term "nationalised industries", however, is used in this study to refer to the population described above.

1.2 - OBJECTIVES OF THE STUDY

The three major objectives of this study are:

(1) To develop a practical approach for evaluating, periodically and in quantitative terms, the effectiveness of management information systems. This object is divided into three sub-objectives:

- (a) to determine a set of criteria which are to be used in evaluating the effectiveness of the systems;
- (b) to develop a point scoring model in order to express the effectiveness in quantitative terms;
- (c) to determine procedures to be applied in evaluating the effectiveness.

(2) To develop an evaluation device to check the results produced by the suggested approach. A modified semantic differential is developed and used for this purpose. This objective is divided into two sub-objectives:

- (a) to specify an appropriate set of factors of the modified semantic differential;
- (b) to determine a set of relevant scales (bi-polar adjectives).

(3) To test the practicability and validity of the suggested approach by applying it on a sample of organisations for evaluating the effectiveness of their management information systems. This objective is divided into two sub-objectives:

- (a) to develop an operational framework of the suggested approach;
- (b) to apply the operational framework on a sample of organisations.

1.3 - RESEARCH METHODOLOGY

The methodology of this study consists of two parts; a theoretical study and an empirical study. The first part is concerned with constructing an approach for evaluating, periodically and in quantitative terms, the effectiveness of management information systems. The foundation for the suggested approach is synthesised from the relevant literature. Specifically, a survey is performed of the literature in management information systems, accounting and psychology. The theoretical part concentrates particularly on the influence of some psychological concepts on management information reporting. Concepts such as satisfaction, perception, motivation and the cognitive styles of the human information processor are discussed in this part. The theoretical part also studies information utility and develops a set of information criteria which can be used in evaluating the utility of information. This part concentrates also on methods of measurement in behavioural sciences in general and the semantic differential technique in particular.

The approach suggested for evaluating the effectiveness of management information systems should be examined in practice so that its actual value can be assessed. Therefore the second part of the research methodology, i.e. the empirical study, is concerned with testing the practicability and validity of the suggested approach. The approach is applied on a sample of nationalised organisations. The results obtained are analysed and the approach is evaluated.

1.4 - SCOPE AND LIMITATIONS OF THE STUDY

The scope of the study is restricted by, and the research findings should be assessed in the light of, the following four limitations:

(1) The study is concerned with the behavioural aspects of management information reporting (such as: satisfaction, perception, motivation, and the cognitive styles of users of information) which might have an influence on the effectiveness of management information systems. The procedures and methods being employed in data processing are excluded.

(2) Although performance appraisal of management information systems should include evaluation of both efficiency and effectiveness, the problem with which this study is concerned is the effectiveness evaluation. Therefore the study does not include any analysis of costs of management information systems or matching costs with the related benefits. This area is included in evaluating the efficiency of the systems.

(3) The approach suggested for evaluating the effectiveness of management information systems is applied on a sample of nationalised organisations which may not be described as fully representative of the population, since some nationalised industries are not represented. Furthermore, the industries of "transport and communications", and "gas, electricity and water" are over-represented in the sample.

(4) The findings and the conclusions drawn from the empirical study are based on respondents' views and limited only to the effectiveness of management accounting systems of the participating organisations. No other information systems are evaluated.

1.5 - ORGANISATION OF THE STUDY

This study is divided into nine chapters, Chapter I, "Introduction", presents a statement of the problem, objectives of the study, research methodology, the scope and limitations of the study, and finally, an organisation of the study.

Chapter II is entitled "Information System, Decision Making System And Operations System : Interrelatedness And Interdependency". This chapter concentrates primarily on some of the concepts, definitions and interrelationships essential for measuring and evaluating the effectiveness of management information systems. The chapter begins with a brief summary of the main theme of the systems theory. An analysis of organisation from the point of view of the system is followed. Three sub-systems of organisation are described in this chapter; namely, operations system, decision making system and management information system. The chapter stresses the interrelatedness and interdependency among these systems. Much attention is paid to the management information system. The chapter concentrates particularly on information utility and information criteria. The dimensions of information utility are determined, and a conceptual framework of information criteria is presented in this chapter.

Chapter III, "Management Information Reporting : The Behavioural Aspects", discusses the factors which may influence a manager's perception of information utility. The chapter concentrates basically on some behavioural aspects of management information reporting. Four basic psychological concepts are discussed in this chapter, they are: satisfaction, perception, motivation, and the cognitive styles of the human information processor. The chapter

concentrates particularly on the cognitive styles of users of information and the possibility of designing information systems based on the differences in the cognitive styles.

Chapter IV is entitled "Ineffectiveness of Management Information Systems: Dimensions, Causes And Effect On Managers' Attitudes And Systems Usage". This chapter discusses the possible consequences when the behavioural aspects of management information reporting are not taken into consideration in the design and implementation of management information systems. The chapter also studies other factors which may contribute to the ineffectiveness of the systems. The relationship between the effectiveness of management information systems, managers' attitudes towards the systems and the systems usage is also examined in this chapter.

In Chapter V, "An Approach Suggested For Evaluating The Effectiveness Of Management Information Systems", an approach is suggested for evaluating the effectiveness of the systems periodically, in quantitative terms, in a short time, with minimum effort and consequently at a reasonable cost. Prior to discussing a conceptual framework of the suggested approach a review of the current literature is undertaken to determine the areas covered in evaluating the effectiveness, the approaches applied, and the criteria used. They provide a point of departure for designing the suggested approach. The criteria and the procedures which should be used in evaluating the effectiveness are presented in this chapter. A point scoring model suggested for expressing the effectiveness of the systems in quantitative terms is presented in the chapter. A modified semantic differential is also discussed in this chapter as another device which can be used in evaluating the effectiveness of management information systems.

Chapter VI, "Application Of The Suggested Approach To Nationalised Industries : Research Methodology", presents an operational framework of the suggested approach and its application to nationalised industries. The chapter describes the development of the instrument used in this study, i.e. mailed questionnaire, the pilot test applied, the procedures of checking and processing the data collected, as well as the measurement considerations and analysis techniques. The organisations participating in the empirical study and the selection procedures employed are also described in this chapter.

In Chapter VII, "Description Of Respondents' Profile And Their Management Accounting Systems", the chapter presents the response rate and the results of tests which are performed to investigate the possibility of non-response bias. This chapter describes also the profile of the individuals participating in the empirical study and their management accounting systems.

Chapter VIII, "Research Findings", presents and discusses the results of the empirical study. The effectiveness of management accounting systems in the participating organisations is determined. Some factors which are assumed to influence the effectiveness are also investigated. The practicability and validity of the suggested approach is examined in this chapter.

The last chapter (Chapter IX) includes a summary, conclusions and recommendations for further research.

CHAPTER II

INFORMATION SYSTEM, DECISION-MAKING SYSTEM AND OPERATIONS SYSTEM:
INTERRELATEDNESS AND INTERDEPENDENCY

The word "system" is widely used today in connection with many different phenomena in almost every type of activity. One describes an educational system, a monetary system, a computer system, an information system, and many others. The word can be used also to define an organisation. In fact, although there are several different approaches that may be taken in studying organisations, the systems approach is currently popular.

The systems approach simply means that everything is inter-related and interdependent. A system is composed of elements that are related and dependent upon one another but that, when in interaction, form a unitary whole. Whole, from a management perspective, is the organisation. The systems approach stresses the inter-relatedness and interdependency among the elements of the organisation.

The organisation as a whole, i.e. system, has interrelated-interdependent parts, i.e. subsystems, which are conceived in this study to be an information system, decision-making system and operations system. Each of these systems can be broken down into interrelated-interdependent subsystems. The breaking down of the organisation into three major systems, i.e. information - decisions - operations, in fact, represents only one conceptual framework. Each researcher, however, may give a different emphasis and breakdown of the elements. Yet the systems approach

unifies researchers to view the organisation as a system made up of interrelated and interdependent subsystems.

The most important implication of the systems approach in its application on the organisation is that, since the organisation consists of interacting and interdependent systems, understanding one of these systems, for example the information system, necessitates the analysis of other systems as well. That is, an understanding of the interaction among them; interdependency one upon the other, as well as their relationships with the environment of the organisation.

Thus, the purpose of this chapter is to consider some of the concepts, definitions and interrelationships essential to basic understanding of the concept of the effectiveness of the information systems. The chapter will begin with a brief summary of the main points of the system's theory; no attempt is made in this chapter to review the entire field of such a theory. An analysis of organisations from the system's point of view will follow. The component subsystems; that is, information system, decision-making system and operations system will be studied. Finally, the interrelatedness and interdependency among these systems will be discussed.

To achieve the purpose of this chapter, it is divided into five sections, as follows:

- Section I - An introduction to systems: some basic concepts, definitions, and interrelationships.
- Section II - The organisation from the system's point of view.
- Section III - The decision-making system.

Section IV - The information system.

Section V - Summary.

SECTION 2.1 - AN INTRODUCTION TO SYSTEMS: SOME BASIC CONCEPTS,
DEFINITIONS AND INTERRELATIONSHIPS

2.1.1 Concept of Systems

The "system" concept has been borrowed by the social scientists from the exact sciences, specifically from physics, which deals with matter, energy, motion and force. However, there is no general agreement on the definition of such term. Various researchers have placed emphasis on different aspects, characteristics and dimensions of systems, consequently they have given different definitions. A general idea, however, may be gained from a presentation of some different viewpoints.

Bertalanffy has defined a system as "any arrangement or combination, as of parts or elements, in a whole".¹ Johnson, et al., have also allied themselves with Bertalanffy's point of view; they have stated: "a system is an organised or complex whole; an assemblage or combination of parts forming a complex or unitary whole".² Three terms have been developed in these definitions to describe a system: (i) elements or parts; (ii) assemblage or combination; and (iii) a complex or unitary whole. Ackoff has made an improvement on the definition and attempted to organise the concepts and terms commonly used to talk about systems. He has defined a system as:

¹ Bertalanffy, Ludwig Von, "General System Theory: A New Approach to Unity of Science", Human Biology, Vol.23, No.4, (December, 1951), p.303

² Johnson, Richard A., Fremont E. Kast and James E. Rosenzweig, The Theory and Management of Systems, (New York: McGraw-Hill Book Company, 1967), p.4

a set of interrelated elements. Thus a system is an entity which is composed of at least two elements and a relation that holds between each of its elements and at least one other element in the set. Each of a system's elements is connected to every other element, directly or indirectly. Furthermore, no subset of elements is unrelated to any other subset.³ (Emphasis added)

This concept is further expanded by Miller in his definition:

A system is a set of interacting units with relationships among them. The word "set" implies that the units have some common properties, which is essential if they are to interact or have relationships. The state of each unit is constrained by, conditioned by, or dependent on the state of other units.⁴ (Emphasis added)

The common property among some elements is the Miller contribution.

The conclusion which can be drawn from the definitions mentioned previously is that a system has interacting elements or objects. The interaction must involve at least two elements with some common property. The state of each element is constrained or dependent on the state of other elements. Finally, these elements constitute a complex or unitary whole.

However, some researchers have added another problem in defining the term "system", that is, the goal or purpose of a system. They do not claim that the definitions mentioned above are incorrect, but merely incomplete. In other words, such researchers have taken a somewhat more limited view of the concept of system. They include a statement of the goal or purpose to be a necessary part of the definition of a system. For example, Alexander has explicitly included "the goal" as an essential part

³ Ackoff, Russell L., "Towards A System of Systems Concepts", Management Science, Vol.17, No.11, (July, 1971), p.662

⁴ Miller, James G., "The Nature of Living Systems", Behavioural Science, Vol.21, No.5, (September, 1976), p.299

in his definition of a system: "A system is a group of elements, either physical or non-physical in nature, that exhibit a set of interrelations among themselves and interact together toward one or more goals, objectives, or ends" (Emphasis added).⁵ In fact, every system whether physical biological, or social, has a specific goal or end to which all its elements are created to contribute. Without such a common goal, the interrelationships between these elements would be meaningless. In brief, from the practical standpoint, or even the conceptual, it is difficult to imagine that there is a system which has not a specific goal.

From the preceding discussion, it is possible to mention certain characteristics of a system:

- (1) It is composed of interacting and interdependent elements or subsystems.
- (2) The elements (subsystems) constitute a complex or unitary whole.
- (3) They operate together to achieve some objective or purpose.

2.1.2 Types of Systems

There are a number of ways of viewing systems. For example, systems can be viewed as two basic types: (i) the abstract or conceptual systems; and (ii) the concrete systems.⁶ An

⁵ Alexander, M.J., Information System Analysis, (USA: Science Research Associates, Inc., 1974), p.4;

See also, for example:

Murdick, Robert G. and Joel E. Ross, Introduction to Management Information Systems (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1977), p.2

Churchman, C.W., The Systems Approach, (New York: Delta Books, 1968), p.29

⁶ See, for example: Ackoff, R.L., op. cit., p.662;

Miller, J.G., op. cit., pp.299-300

abstract system is one, all of whose elements are concepts. The elements are symbols and its interrelationships consist of words, logic or computer programmes. In such systems the elements are created by definition and the relationships between them are created by assumptions (e.g. axioms and postulates). In brief, a conceptual system does not exist in material or physical form, it exists only in an individual's mind. In contrast, the concrete system is in tangible form and has material existence.

Systems can also be classified into closed and open. This classification rests upon the relationships between systems and their environment.⁷ A closed system is one that does not interface with its environment, that is, it has no input from or output to its environment. In other words, such a system does not exchange material, information, or energy with its environment. That is, it has no interaction with any element not contained within it. An example is a chemical reaction in a sealed, insulated container. Such closed systems will finally run down or become disorganised. In fact, this concept is more relevant to scientific systems than to social systems.

Opposed to this is an open system. An open system is one that has both input from and output to its environment. In the sense that such a system exchanges information, material, or energy with its environment in a regular and understandable manner. Open

⁷ See for example:

Clifton, H.D., Business Data Systems, (London: Prentice-Hall International Inc., 1978), pp.10-11;

Betz, Frederick and Ian I. Mitroff, "Representational Systems Theory", Management Science, Vol.20, No.9, (May, 1974), p.1245

systems tend to have a quality of adaptation which means they can adapt to changes in their environment in such a way as to continue their existence. In other words, if an open system does not reorganise itself to meet the conditions of its environment, it will run down into a disorganised state. The term "entropy" is used as a measure of such disorganisation. Thus, we can regard open systems as tending to increase their entropy unless they receive negative entropy in the form of material, energy, and information from their environment. In fact, an open system reaches its steady state which might be better described as a dynamic equilibrium when the various subsystems are operating to achieve the objective, also are adapting to environmental forces and performing self-organisation to adjust its internal forces.

Environment, in this connection, refers to the surrounding conditions which affect the results of the system's actions. While the environment is external to the system's control, this does not mean that the environment can not be affected by the behaviour of the system. Since the system has many interfaces with its environment, environment affects the system and the system in turn affects the environment.

2.1.3 The Objects of a System

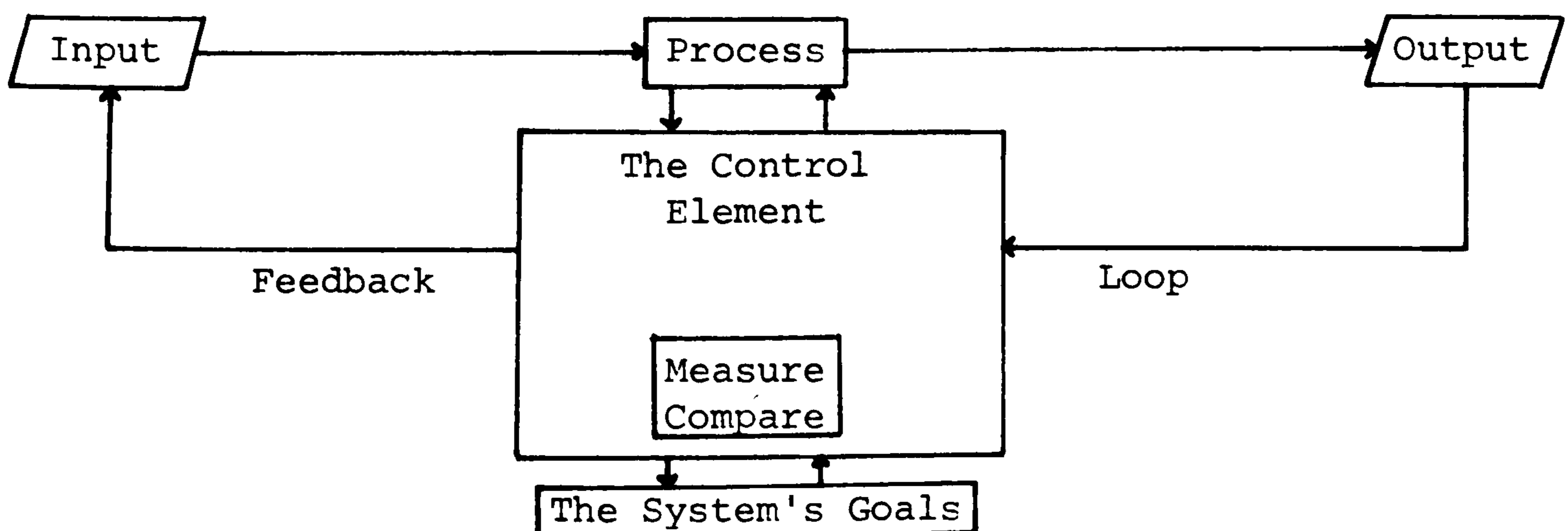
Objects are the components of a system. The four essential parts of a system are: (1) the input; (2) the process; (3) the output; and (4) the feedback-control. Such parts constitute a general model of a system. This is, of course, very simplified because a system may have several inputs and outputs. Further, each system has a boundary. The system is inside the boundary; the environment is outside the boundary.

The system receives the input from its environment; transforms it through the process part, and the system achieves its goal as output to its environment and to the feedback control part. Feedback is the means by which the system controls its own operations and takes corrective action so that the system operates in the proper manner to achieve its goals. The control part measures and compares the output with the output needed for goal achievement, then signals the process and input parts to either continue operations unchanged, to modify and then to continue operations, or to stop.

Although feedback and control are related, they are different. "Control is the result of predetermined knowledge about how the system should operate. Feedback is after-the-fact control based on information concerning the output of the system. Feedback can result in input and control modification".⁸ The relationship of feedback with the control part, on the one hand, and the relationship of the output - the process - the input within such feedback loop, on the other hand, are illustrated in Figure (2.1)

FIGURE (2.1)

The Feedback Loop In A System



⁸ Nichols, Gerald E., "Four Systems Analysis Tools", Journal of Systems Management, (April, 1976), p.7

Feedback also can be both "negative" and "positive". Negative Feedback is informational input which indicates that the system is deviating from what was planned or anticipated and should readjust to a new steady state. Thus, the correction will take place in the opposite direction to the original deviation and for this reason is termed negative feedback. Positive feedback, on the contrary, acts in the same direction as the existing deviation, thereby increasing it.⁹ In brief, negative feedback directs system behaviour in such a fashion that system performance is compatible with an established goal of previous steady state. Positive feedback directs system behaviour moving away from a previous goal, in the sense that positive feedback will increase the deviation of system performance from a previous steady state or goal and in doing so the system grows or changes to a new state.

2.1.4 The Relationships Within a System

Relationships are those that tie objects together. They are, in fact, behind the notion "useful system". In complex systems in which each object is a subsystem, relationships are the bonds that link these subsystems together. The relationships most likely to be found in the empirical world belong to one of the three following categories: (1) first order or symbiotic; (2) second order or synergistic; and (3) third order or redundant.¹⁰

Relationships may be characterised as first order, when they are functionally necessary to each other. Symbiosis, as a first-

⁹ Donald, Archie, Management, Information and Systems, (Oxford, U.K.: Pergamon Press, Second Edition, 1979), pp.66-68

¹⁰ Optner, Stanford L., Systems Analysis for Business and Industrial Problem Solving, (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1965), p.27

order relationship, is the necessity of dissimilar organism; for example a plant and a parasite. Relationships may be characterised as second order if they are complementary, adding substantially to system performance, but not functionally essential. Synergy is a second-order relationship. Synergy, in fact, means more than just co-operative action. Synergistic relationships are those where the co-operative action of independent subsystems taken together produce total effects greater than the sum of their effects taken independently. A convenient expression of synergy is to say that $2 + 2 = 5$. Finally, relationships may be characterised as third order when they are redundant. Redundancy describes a state whereby the system contains superfluity. In fact, the essential reason for having redundancy is reliability. However the result is that, the greater the redundancy, the greater the system's reliability and the greater the expense.

2.1.5 Complexity or Wholeness of a System

The most important characteristic of a system is that it is complex or a unitary whole, in the sense that a change in one part will affect change in others. Hall has pointed this out by saying:

If every part of a system is so related to every other part that a change in a particular part causes a change in all other parts in the total system, the system is said to behave coherently or as a whole.¹¹

Each system, in fact, is composed of subsystems which in turn are made up of other subsystems, each subsystem being delineated by its boundaries. The interfaces between the subsystems occur at the boundaries and take the form of inputs and outputs, whether in the

¹¹ Hall, Arthur, D., "Some Fundamental Concepts of Systems Engineering", in: Stanford L. Optner (Ed.), Systems Analysis, (United Kingdom: Penguin Books Inc., 1973), p.109

form of material, energy, or information. The nesting of systems within other systems is what is implied by hierarchy.

Hierarchy means that "a system is composed of interrelated subsystems, each of the latter being, in turn, hierarchic in structure until we reach some lowest level of elementary subsystem".¹² Kast and Rosenzweig have added another explanation of the hierarchy concept; they have stated that: "a system is composed of subsystems of a lower order and is also part of a suprasystem. Thus, there is a hierarchy of the components of the system".¹³ (Emphasis added).

To sum up, to make a hierarchy, at least three levels of systems are required: (1) the subsystem; (2) the system itself; and (3) the suprasystem. Each level in the set must have distinguishably different activities; each of these activities may have different ends or goals. However, the concept of hierarchy implies an assumption that all activities of the subsystems are intended to serve the next higher level system and that each subsystem is evaluated on how it serves the higher level system. In general, the existence of the systems is necessary to exhibit wholeness.

SECTION 2.2 - THE ORGANISATION FROM THE SYSTEM'S POINT OF VIEW

2.2.1 Introduction: The Modern Organisation Theory

Three theories of organisation can be identified in management literature which are having considerable influence on management

¹² Simon, Herbert A., The Science of The Artificial, (Cambridge, Massachusetts: The MIT Press, 1969), p.87

¹³ Kast, Fremont E. and James E. Rosenzweig, "General Systems Theory: Application for Organisation and Management", Academy of Management Journal, Vol.15, (December, 1972), p.450

thought and practice. They are arbitrarily labelled as the classical, the neoclassical and the modern. Each of these theories is fairly distinct; but they are not unrelated. They also are supported by several schools of management thought.¹⁴

Classical organisation theory consisted of an anatomy of the formal organisation. This theory is built around four key bases, they are: (1) the division of labour; (2) the scalar and functional process (that is, vertical and horizontal growth of the organisation); (3) structure (this theory usually works with two basic structures, the line and the staff); and (4) the span of control. In general, the classical theory has relevant insights into the nature of organisation, but the value of it is limited by its narrow concentration on the formal anatomy of organisation. It has overlooked the contributions of the behavioural sciences.

Neoclassical theory of organisation introduced behavioural sciences in an integrated fashion into the theory. Through the use of these sciences, the human relationists demonstrate how the bases of the classical theory are affected by the impact of human actions. Furthermore, the neoclassical approach includes a systematic treatment of the informal organisation, showing its influence on the formal structure. Thus, the neoclassical approach to organisation theory gives evidence of accepting classical theory, but adding to it modifications resulting from individual behaviour, and the influence of the informal group.

¹⁴ See, for example:

Koontz, Harold, "The Management Theory Jungle", in: Patrick E. Connor (Ed.), Dimensions in Modern Management, (Boston: Houghton Mifflin Company, 1974), pp.9-16;

Scott, William G. "Organisation Theory: An Overview and An Appraisal", in: William E. Schlender, William G. Scott and Alan C. Filley (Eds.), Management in Perspective. Selected Readings, (Boston: Houghton Mifflin Company, 1965), pp.255-263

Modern organisation theory considers the organisation as a system composed of subsystems and delineated by identifiable boundaries from its environment. This theory and general system theory are similar in that they look at organisation as an integrated whole. In fact, the former theory is an application of the latter. Thus, modern organisation theory emphasises the interrelationship and interdependency of the organisation's subsystems.

2.2.2 The Organisation as a System

The organisation as a system may be regarded from different viewpoints; each places its emphasis on different aspects of the organisation. For example, Schoderbek, et al., have pointed out that one can identify three main viewpoints: (1) an organisation is a communication network resembling, to a remarkable degree, the telecommunication system of Shannon and Weaver; (2) an organisation is a collection of activities aimed at transformation of certain material and energy inputs into certain material and energy outputs; and (3) an organisation is a social system consisting of networks of roles and relationships.¹⁵ Tilles, on the other hand, has presented a similar viewpoint; he sees that the organisation may be viewed as a system from the point of view of the following specialists: (1) social scientists - the organisation is really a social system; (2) information systems specialists - the organisation may be considered as an information system and decisions network; and (3) financial people - the organisation is really a system of fund flows.¹⁶

¹⁵ Schoderbek, Peter P., Asterios G. Kefalas and Charles G. Schoderbek, Management Systems, Conceptual Considerations, (Dallas, Texas: Business Publications Inc., 1975), pp.114-115

¹⁶ Tilles, Seymour, "The Manager's Job: A Systems Approach", Harvard Business Review, (January-February, 1963), p.74

Each of the viewpoints mentioned above seems, by itself, to be inadequate to fully describe the organisation as a system. Rather, they are integrant. The point is that each viewpoint places its emphasis on an aspect of the organisation, but the organisation has different aspects. Accordingly, the organisation is a social system, a system of collection of activities aiming to transform inputs of material and energy into products or service outputs, and a system of information and decisions network.

2.2.2.1 The Organisation as an Open System

The organisation can be viewed as an open system. The open system view places emphasis on the point that the organisation is in a dynamic relationship with its environment and receives various inputs, transforms them in some way, and exports outputs. The receipt of inputs in the form of material, energy, and information allows the open system to offset the process of entropy. Such systems are open not only in relation to their environment but also in relation to themselves, that is, "internally" in that there are interactions between components which affect the system as a whole. The open system adapts to its environment by changing the structure and process of its internal components.

In fact, a substantial contribution made by systems theorists within the area of management has been an open systems perspective. The emphasis on the holistic perspective in system design, control and evaluation has led to an increased awareness of the total organisational system and of its suprasystem and environment.¹⁷

¹⁷ Peery, Newman S., "General Systems Theory Approaches to Organisations: Some Problems in Applications", The Journal of Management Studies, (October, 1975), p.273

To sum up, the organisation can be viewed as a system. Such a system consists of a group of interrelated parts, i.e. subsystems, designed to achieve a particular goal, both those of the organisation and those of individual participants. The organisation can also be viewed as an open system which has a dynamic interplay with its environment.

2.2.2.2 Characteristics of The Organisation as a System

Further insight into the organisation as a system may be gained by attempting to apply some of the general characteristics of a system to that organisation:¹⁸

- (1) The organisation obviously has many components which interact, such as production, marketing, accounting, all of which are dependent upon each other. Accordingly, in attempting to understand the organisation, one must view it in its entire complexity rather than simply through one functional area or component.
- (2) It is a purposeful system. The goals of it may take the form of profit, share of market, social goals. However, there is considerable diversity of opinion amongst researchers concerning which goals an organisation seeks to achieve.
- (3) Obviously the organisation is dependent upon inputs which are then transformed into outputs. This transformation function may be production oriented, service oriented, or task oriented. In all cases, however, inputs generate the activities to be performed.
- (4) Regarding entropy, the organisation as an open system has a continuous flow of inputs which move against the tendency towards

¹⁸ Schoderbek, Peter P., Asterios G. Kefalas and Charles G. Schoderbek, op. cit., pp.14-15

entropy. Indeed, organisations attempt to have a reserve of inputs to improve their chances of survival and to provide for growth.

(5) In connection with feedback control, it is quite obvious that the organisation employs a spectrum of feedback channels and control methods each designed to compare actual performance against a desired goal.

(6) The organisation is a hierarchy of subsystems and the typical organisation chart often depicts this hierarchy.

2.2.3 Component Subsystems of the Organisation

As stated previously, the organisation is conceived of as a complex input - throughput - output system. It is separated from its environment by a permeable boundary. Through this boundary, transactions occur which enable the organisation to secure human, financial and material inputs. Within such boundaries, a number of interacting subsystems transform these inputs into a final product suitable to the environment. Output passes through the organisation's boundaries, reactivating the input-throughout-output cycle.¹⁹

Components subsystems of an organisation may be identified in many different ways. In fact, there is no agreement among researchers in the field of organisation theory about an identical viewpoint regarding such subsystems. However, some researchers have adopted, more or less, similar classifications in dividing the organisation into its constituting subsystems. For example, Schoderbek, et al., have pointed out that: "the organisation is depicted as an input - transformation - output device, a communi-

¹⁹ Coleman, Charles J. and David D. Palmer, "Organisational Application of System Theory", Business Horizons, (December, 1973), p.78

cation network, a decision-making mechanism, a control system, an operation/activity system, or finally, a combination of the above".²⁰

Fertakis, on the other hand, has specified three sectors in the organisation, they are as follows:

- (1) Management sector. It represents the management function which is the formulation or approval of plans, the allocation of resources for their implementation, and the follow-up and evaluation of results.
- (2) Operations sector. Operations are intended to lead towards the fulfilment of management's plans.
- (3) Controllership sector. Its function is to provide a catalyst between the two sectors mentioned above, thus promoting a favourable interaction between them.²¹

Kast and Rosenzweig have adopted another classification, they stated that there are certain key subsystems in every organisation, these are:²²

- (1) A sensor subsystem designed to measure changes within the system and to provide an interface with the environment.
- (2) An information processing subsystem such as an accounting, or data processing system.
- (3) A decision-making subsystem which receives information and emits planning messages.
- (4) A processing subsystem which utilises information, energy, and material to accomplish certain tasks.

²⁰ Schoderbek, P.P., A.G. Kefolas and C.G. Schoderbek, op. cit., p.114

²¹ Fertakis, John P., "Towards a Systems-Oriented Concept of Controll-ership", Management Accounting (USA), (December, 1968), pp.6-8

²² Kast, Fremont E. and James E. Rosenzweig, "System Concepts: Pervasiveness and Potential", Management International Review, Vol.7, 4-5, (1967), pp.90-91

- (5) A control component which ensures that processing is in accordance with planning. Typically this provides feedback control.
- (6) A memory or information storage subsystem which may take the form of records, manuals, procedures, computer programmes or human experience.

In conclusion, although there is no agreement about the component subsystems of the organisation, there are three subsystems which are common among the above mentioned viewpoints; namely:

- (1) the operations system;
- (2) the decision-making system; and
- (3) the information system.

For the purpose of this study, the classification mentioned above is adopted. That is the organisation, as a system, may be viewed as consisting of three subsystems: (1) operations; (2) decision-making; and (3) information. The operations system is essential to achieve the goals of the organisation and it represents the main system within it. The decision-making system is necessary to direct the operations system towards these goals. The purpose of the information system is to produce information to facilitate the decision-making process, and guide the operations system. However, further insight into the relationships among these systems may be gained by discussing them, in detail, in this and the following two sections.

2.2.3.1 The Operations System

The operations system carries out the process activities of the organisation through the finance, manufacturing, manpower and marketing subsystems. The process of the operations system depends

on the nature of the operations to be carried out. In general, it encompasses the acquisition of resources and their conversion or preparation for customer use. The inputs of the operations system consist of materials, services, decisions and information. Its output would be products or services and data. In short, the operations system is interrelated and interdependent on the other two systems; i.e. the decision-making system and the information system.

SECTION 2.3 - THE DECISION-MAKING SYSTEM

Decision-making is the essence of management functions. Management directs the organisation to achieve specific goals. In a dynamic environment characterised by change, or even a static one, management finds itself confronted with problems that need to be solved. Decision-making is the process which tends to eliminate or solve these problems. The term "decision-making", as Simon claims can be "interpreted broadly - so broadly as to become almost synonymous with managing".²³ In addition, decision-making is almost defined as choosing between alternatives. Accordingly, it is closely related to all the traditional management functions. For example, when a manager plans, or controls, he is really making decisions. In other words, whether the activity is called planning or control, it always involved the choosing of one alternative over another.

2.3.1 Structure of The Decision-Making System

Decisions have a hierarchical nature and are made at various levels of the organisation. These levels can be described in terms

²³ Simon, Herbert A., The New Science of Management Decision, (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1977), p.39

of three categories. They are: (1) strategic planning; (2) tactical planning and management control; and (3) operational control.²⁴

Strategic planning is the process of deciding on organisational objectives and on the means for achieving them. The main concern of the decision-maker is the relationship between the organisation and its environment. The most important features of the strategic planning are that: first, it focuses on the choice of objectives for the organisation and on the activities and means required to achieve these objectives. As a result, a major problem in this area is predicting the future of the organisation and its environment. Second, the strategic planning process typically involves a small number of high-level people who operate in a non-repetitive and often very creative way.

Tactical planning is concerned with formulating in more detail the plans which are already determined in broad outline in the strategic planning. Management control, on the other hand, is the process by which managers ensure that resources are used effectively and efficiently in achieving the objectives of the organisation.

²⁴ See, for example:

Tricker, R.I., Management Information and Control Systems, (London: John Wiley & Sons, 1976), pp.6-7;

Lucas, Henry C., Kenneth W. Clowes, and Robert B. Kaplan, "Frameworks for Information Systems", INFOR, (October, 1974), pp.245-260;

Gorry, G. Anthony, and Michael S. Scott Morton, "A Framework for Management Information Systems", Sloan Management Review, (Fall, 1971) pp. 55-50;

Green, John F., "Management Information Systems and Corporate Planning", Long Range Planning, (June, 1970), pp.74-78;

Anthony, Robert N., Planning and Control Systems: A Framework for Analysis, (Cambridge, USA: Harvard University, 1965), pp.16-19

Operational control is the process of ensuring that specific tasks are carried out effectively and efficiently. The basic distinction between management control and operational control is that operational control is concerned with tasks such as manufacturing a specific part, whereas management control is most often concerned with the accomplishment of the organisation's plans.

Although the boundaries between these three levels of decision are often not clear enough, the informational requirements for each type of decision are very different from one another. Further, this difference is not a matter of aggregation, but one of fundamental character of the information needed by decision-makers at these levels.

On the other hand, the structure of the decision-making system can be viewed from another point of view. Decisions can be classified as to the procedures to be followed in their solutions. They may be programmed or non-programmed. "Decisions are programmed to the extent that they are repetitive and routine, to the extent that a definite procedure has been worked out for handling them so that they do not have to be treated de novo each time they occur ... Decisions are nonprogrammed to the extent that they are novel, unstructured and unusually consequential. There is no cut-and-dried method for handling the problem because it has not arisen before, or because its precise nature and structure are elusive or complex, or because it is so important that it deserves a custom-tailored treatment".²⁵

²⁵ Simon, Herbert A., The New Science of Management Decision, op. cit., p.46

In a programmed decision, then, the decision-maker knows what to do if certain events occur. He acts according to a predetermined plan which was established to solve specific problems in case they occur. In a non-programmed decision, the decision-maker is confronted with a new problem that he has not dealt with in the past. There is no predetermined prescription for these kinds of problems. The scope of programmed decisions is usually the operating activities or the routine operations; the scope of non-programmed is the top management kind of decisions. Both types of decisions, i.e. programmed and non-programmed, may be made by middle management, that is at the level of tactical planning and management control.

In conclusion, the structure of the decision-making system is based on the combination of two views. The first classifies decisions according to the nature of the managerial activity; that is, strategic planning, tactical planning and management control, and operational control. The second classifies decisions according to the way in which the decision-maker deals with the problems which confront him, namely programmed and non-programmed. Obviously, strategic decisions are non-programmed whereas operational control decisions are programmed. Tactical planning and management control decisions can be programmed and non-programmed.

2.3.2 Process of The Decision-Making System

The process of decision-making has three phases: (1) finding occasion to make a decision; (2) finding possible courses of action; and (3) choosing among these courses of action. From an informational²⁶ point of view, these phases may be restated as:

²⁶ The concept of information will be discussed in detail in section IV, see pp. 46-49.

(1) the acquisition and organisation of information about a problem situation; (2) the processing and transformation of the information about alternative courses of action; and (3) the choice of one of these courses of action according to the information presented and decision-maker's judgement.

Although the three phases mentioned above are followed to make any decision, the information requirements for each type of decision differ considerably. Table (2.1) on page 39 contrasts the distinctive nature of characteristics pertaining to information needed in making strategic planning, tactical planning, management control, and operational control decisions.²⁷

Since the characteristics of the problems with which each level of decision deals are distinctive, the relevant categories of the respective information characteristics form a distinctive set for each level of decision. Information needed for making strategic planning decisions is therefore broad in scope, summarised in form and gathered from a wide variety of sources. Timeliness and accuracy of the information are relatively less important because of the long-range nature and broad scope of strategic problems.

The scope of the information needed for tactical planning is narrower and shorter in range. Because of the short, regular cycles in tactical planning, the content of the information includes historical trends that serve as guides for forecasting future values.

²⁷ Wilkinson, Joseph W., "Specifying Management's Information Needs", Cost and Management, (September-October, 1974), pp.7-13

See also, for example: Tricker, R.I., op. cit., p.8;
Green, John F., op. cit., p.76
Anthony, Robert N., op. cit., p.67, p.93

TABLE (2.1)

Distinctive Information Needs for Various Classes of Decisions

Information Characteristic	Distinctive Characteristics of Needed Information by Class of Decision			
	Strategic Planning	Tactical Planning	Management Control	Operational Control
1. Source	Much external information as well as internal information; obtained by informal information system as well as formal information system	Mostly internal information, but some external information; obtained mostly by formal information system	Mostly internal information (plus transactions with external parties), but occasional nontransaction external information; obtained mostly from formal information system	Internal information (plus transactions with external parties); obtained solely from formal information system
2. Content	Expected flows and levels; specifications; developments; evaluations	Expected flows and levels; historical trends; specifications	Planned results; actual flows and levels; evaluations	Planned results; actual flows and levels
3. Compression	Summarised from detailed data	Detailed	Summarised at higher managerial levels	Detailed
4. Measurability	Quantitative (mainly financial) and qualitative factors	Quantitative (both financial and non-financial); few qualitative factors	Quantitative (financial primarily)	Quantitative (both financial and non-financial)
5. Accuracy	Low level of accuracy	Moderate level of accuracy	Moderate level of accuracy	High level of accuracy
6. Timeliness	Irregular planning; timely information not important	Regular or rhythmic planning cycles; moderately timely information	Moderately frequent, rhythmic control cycles; moderately timely information	Very frequent (although not necessarily rhythmic) control cycles; very timely information
7. Time Horizon	Long-range future	Short-range future	Recent past, plus middle-range future	Very recent past or present time, plus short-range future
8. Scope	Broad, often cutting across operating functions	Narrower than for strategic planning, being often confined to a single operating function	Relatively broad (i.e. coarse); spans a responsibility centre	Narrow (i.e. fine); spans a group or centre of well-defined operations
9. Sensitivity	Generally sensitive with respect to financial objective such as maximum cash inflow or return on investment, as determined by monetary comparison of alternatives; however, occasionally sensitive with respect to qualitative objective	Sensitive with respect to objective such as minimum cash outflow or to non-financial objective such as maximum production efficiency or minimum time required	Sensitive with respect to cost or profit variance, i.e. difference of actual results and planned results, for the centre being controlled	Sensitive with respect to quantitative deviation, i.e. difference between actual results and planned results, for the operations being controlled
10. Versatility	Low degree of versatility, since most items are suitable only for one use	Moderate degree of versatility, since most items are suitable for more than one use	High degree of versatility, since items are suitable for several uses	Moderate degree of versatility, since most items are suitable for more than one use
11. Presentation	Written narrative and tabular facts and figures; oral facts and judgements; computer printouts of simulation results and network analyses; special reports	Graphical projections and historical trends; "hard copy" plans and schedules; computer printouts and displays; regularly issued reports, such as inventory status report	Written report or computer printout of deviations from planned results, and possible causes of deviations	Written report or graph or computer display of deviations from planned results, and/or computer signals for automatic corrective actions
12. Feasibility	Much of the environmental information non-feasible for routine collection	Most of the needed information feasible for routine collection	All needed information feasible for routine collection	All needed information feasible for routine collection

The information provided for operational control needs to be timely, accurate, sensitive to deviations, and fine in scope. On the other hand, information needed in making management control decisions has characteristics representing a blend between those needed for strategic planning decisions and those needed for operational control decisions.²⁸

2.3.3 Input of The Decision-Making System

Inputs to the decision-making systems are as follows:

(1) Information. Each level of decisions will need a distinctive type of information as discussed previously. Further, not only the level of a decision affects the type of information needed, but also the cognitive style²⁹ of the decision-maker has an effect on some aspects of the information required such as the amount of information, this will be discussed in detail in Chapter III.

(2) Subjective judgement. Obviously, use of subjective judgement is necessary, especially in non-programmed decisions for which definite rules and procedures cannot be, or have not been, worked out. Moreover, often the decision maker has to fill in information that is missing because it is too expensive to collect, it cannot be obtained by any direct means, or because the information depends on events that have not yet occurred.³⁰ Subjective judgement may thus be regarded as essentially a substitute either for undefined or undefinable rules and procedures, or for unavailable information needed in making a decision.

²⁸ Wilkinson, Joseph W., op. cit., pp.10-11

²⁹ Cognitive style means the strategy by which a decision-maker operates to reach a decision or solve a problem. See Chapter III, pp.151-163

³⁰ Heise, David R., "How Do I Know My Data? Let Me Count the Ways", Administrative Science Quarterly, Vol. XVII, (March, 1972), p.58

From the preceding discussion, it may be possible to say that the output of the decision-making system, i.e. a decision, depends on, inter alia, how effectively the information is prepared and communicated to the decision maker, and how the decision maker perceives this information and includes it within his human information processing system which reflects his cognitive style. These will be discussed in the rest of this chapter and the following two chapters.

SECTION 2.4 - THE INFORMATION SYSTEM

2.4.1 The Information System: The Concept and The Structure

The purpose of the information system is to provide useful information to the other systems within the organisation, primarily to the decision-making system. Consequently, the information system should produce reports to the strategic level of management, to tactical planning and management control level, as well as to operational control level. In fact, any data processing activity within the organisation can be viewed as an information system, and when a number of these systems are integrated so as to provide management with the information needed, it can be called a Management Information System (MIS). The concept of a management information system is certainly not new nor does it necessarily imply the use of a computer. In fact, the concept is used by many researchers in a variety of ways.

2.4.1.1 MIS: The Concept

Despite the lack of agreement among the researchers on the concept of MIS, it is possible, however, to identify two approaches adopted to define MIS; the empirical business setting approach and the computerised system approach. The empirical business setting

approach is based on the theme that organisations operate as a total system in relation to information, whether or not they use computers.

MIS is defined according to this approach as:

a system which provides each manager in the organisation with the information he needs in order to take decisions, plan and control within his particular area of responsibility.³¹

This definition does not specify that a computer is required. In fact, information systems existed long before computers or even punched card equipment became available. Every organisation has MIS, the differences between one and another is only a matter of degree of sophistication.

The computerised system approach, in contrast, stresses that a computer is an essential element which makes the concept practical and allows it to become a working system. From this point of view, MIS is defined as:

an integrated man/machine system for providing information to support the operations, management, and decision-making functions in an organisation. The system utilises computer hardware and software, manual procedures ...³²
(Emphasis added)

³¹ Higgins, J.C., Information Systems for Planning and Control: Concepts and Cases, (London: Edward Arnold, Publishers, Ltd., 1976), p.1;

See also, for example:

Gul, Ferdinand A.K., "The Problem of Feedback in an MIS", Management Accounting (UK), (February, 1978), pp.62-63;

Adelberg, Arthur H., "Management Information Systems and Their Implications", Management Accounting (UK), (October, 1975), p.328;

Murdick, Robert G., and Joel E. Ross, op. cit., p.8.

³² Davis, Gordon B., Management Information Systems: Conceptual Foundations, Structure and Development, (Tokyo: McGraw-Hill Kogakusha Ltd., 1974), p.5;

See also, for example:

Walsh, Myles E., "MIS - Where Are We, How Did We Get Here and Where Are We Going?", Journal of Systems Management, (November, 1978), pp.6-21

Soden, V. and Charles C. Tucker, "Long-range MIS Planning", Journal of Systems Management, (July, 1976), pp.28-33

Whether the computerised system approach is adopted or whether the empirical business setting approach is used, a common purpose of a management information system is to provide the decision-making and the operations system with useful information.

2.4.1.2 MIS: The Structure

Management information systems can be conceived as a combination of a number of interdependent subsystems such as marketing, manufacturing, personnel and accounting systems, which became one of the information systems but not the major one. In fact, the traditional role of the accounting system as the major information system in organisations has been challenged by the several developments in other disciplines that emphasise changes in the information handling environment in organisations. These developments are, basically, as follows:³³

1. The invention of high-speed and high-volume computers which are able to extract, assimilate and correlate all pertinent internal and external data.
2. The increasing complexity of business operations and consequently management problems.
3. The development of management science techniques for the solution of management problems.
4. The formalisation of management information systems which are based on computers.

Each of these factors has had an impact on how the accounting system functions and what its new role is in the current information environment.

³³ American Accounting Association, Committee On Accounting and Information Systems, "Report of the Committee on Accounting and Information Systems", The Accounting Review, (Supplement to Vol. XLVI, 1971), p.293

However, the accounting information system in organisations may have two possible positions: (1) it may serve as one of several independent, to some extent, information systems; or (2) it may serve as an integral part of the formal management information system. In fact, the integration between the accounting information subsystem and the other information subsystems is an essential feature of the modern MIS. The main aim of this integration is to furnish some of the management reports, or most of them, from a very limited number of common files containing the organisation's data. Such collection of data is called a "data base".

The "data base" is defined as: "a collection of interrelated data stored together in a central location to serve multiple functions and/or departments".³⁴ The concept of a data base, then, means that some data are not divided among the various subsystems as is the typical arrangement, in which each function develops its own files to support its specific operations. Such files are used for reference purposes, or are updated with transaction data. These files often consist of records containing common data elements which are duplicated in several functional files. This situation creates redundancy, as the same data elements in each of the files are updated separately.

³⁴ Porter, W. Thomas and William E. Perry, EDP Controls and Auditing, (Belmont, California: Wadsworth Publishing Company, Inc., 2nd ed., 1977), p.28;

See also, for example:

Cerullo, Michael J., "The Data Base Concept", Management Accounting (USE), (November, 1977), pp.43-47;

Carr, J.G. and R.A. Coates, "A Framework for Management Information Systems", Certified Accountant, (October, 1974), pp.479-481

Thus, a data base aims at eliminating such duplication of storage and updating and providing the means for retrieving data elements for each of the application requirements, in the required combinations. However, this concept does not mean that the situation would be to have one large data base serving the needs of the organisation as a whole, since this leads to complexity in defining data relationships. Rather, it is practicable to implement small data bases serving the needs of several integrated systems, that is, several sets of functional groups, in respect of functions which have direct relationships with each other.

In conclusion, "the modern information function is the result of a number of developments stemming from many diverse disciplines. Where accounting was, historically, the primary information discipline, technology and especially computer technology, has broadened the information function and accounting is now only one of many disciplines underlying formal information systems - albeit an important one".³⁵ In fact, the formalisation of the several information subsystems in organisations and the integration among them will result in mixing some of the data of accounting information subsystem with the data of the other information subsystems and the distinction between them, within the "data base", will become less clear. Through these integrated subsystems, the managers will obtain some of their informational needs, especially the routine one. Consequently, the role of the accounting information system may be internally diminished, to some extent, as one of the major formal information subsystems in an organisation.

³⁵ American Accounting Association, Committee on Accounting and Information Systems, op. cit., p.348

However, the role of accounting information systems in an organisation will be determined by the degree of integration among the information systems; the degree of integration, in turn, will be determined by the degree of computerisation. On the other hand, totally integrated management information systems, may not in the real world, be possible of achievement.³⁶

2.4.2 The Input and Output of The Information System

The purpose of the information system is to provide management at all levels in the organisation with useful information. To achieve this purpose, the system consists of the operations needed to capture and transform data, as input, into useful managerial information, as output, and the transmission of this information to management. In order to understand the concept of information as output of the information system, it will be useful to distinguish among data, information and knowledge.

Data, as has been defined by Davis, is "groups of non-random symbols which represent quantities, actions, things", while information is "data that has been processed into a form that is meaningful to the recipient and is of real or perceived value in current or prospective decisions".³⁷ Riker, on the other hand, expressed

³⁶ Paretta, Robert L., "Designing Management Information Systems: An Overview", The Journal of Accountancy, (April, 1975), p.45

³⁷ Davis, Gordon B., op. cit., pp.32-33

See also, for example:

McRae, T.W., Computers and Accounting, (London: John Wiley & Sons, 1976), p.138;

Ciller, P.U., "IMS, MIS and NOW MIM?", Managerial Planning, (January/February, 1974), p.25;

Cushing, Barry, E., Accounting Information Systems and Business Organisations, (Menlo Park, California: Addison-Wesley Publishing Company, 1974), p.9

this distinction between "data" and "information" in a different way, he says: "data is scalar, it does not have dimensions or direction. Information is vector, it has dimensions and direction".³⁸ According to these definitions, the distinction between information and data is that: (1) data refers to items that are not evaluated, while information is evaluated data; (2) data is not captured and prepared for a specified manager, while information is furnished for a specified manager; (3) data is not related to a particular problem or decision, in contrast, information is data organised for a particular decision; and (4) data is unevaluated items, whatever the time of its capturing and storing, while information is evaluated data at a specific time.

Consequently, the concept of information requires implicitly or explicitly, that a specific situation or problem be kept in mind for information to be produced. In other words, information results from an idiosyncratic process of using data by individuals in specific circumstances. Information, then, is a result of three factors:³⁹

1. data - that are available to the user;
2. the user - involving his ability to understand the data and for it to have an impact on him, adding to his knowledge, or changing his pattern of thought;
3. The circumstances - the environment of the user which influences his perception of his role and information needs, which conditions his need to know.

³⁸ Riker, Richard R., "Data and Information. Are They Synonyms?", Journal of Systems Management, (September, 1979), p.22

³⁹ Tricker, Robert I., "The Impact of Information Systems on Organisational Thinking", Information Processing 77, Proceedings of IFIP Congress 77, Toronto, 8-12 August 1977, (Amsterdam: North Holland Publishing Company, 1977), pp.218-219

Further, it may be possible to distinguish between two levels of information; the semantic level and the pragmatic level. At the semantic level, information is the meaning derived from organised data, while at the pragmatic level, information refers to the impact upon the receiver. At the pragmatic level of information, which is the one of primary interest from the information user's viewpoint, the impact depends on two factors: first, how much the manager knows of the picture presented or, according to his knowledge of the situation, has already guessed, and, second, how correctly he can utilise the picture presented in view of both his abilities and the surrounding circumstances.⁴⁰

On the other hand, the concept of "information" is closely related to the concept of "knowledge". Knowledge is defined as "a kind of capital structure of information".⁴¹ Consequently, the meaning derived from organised data may result in an addition to the overall stock of knowledge of a manager receiving that data. Information, then is an incremental product of an evaluation process. In other words, data could be inputted to a system of a given stock of knowledge. When the data is evaluated and information is produced in the transformation process, then an increment of information is added to the original state of knowledge.

The stock of knowledge consists of the individual stocks of knowledge of a manager who receives management information reports.

⁴⁰ Gregory, Robert H. and Richard L. Van Horn, Automatic Data-Processing Systems. Principles and Procedures, (Belmont, California: Wadsworth Publishing Co., Inc., 2nd edition, 1963), p.554

⁴¹ Boulding, Kenneth, "The Specialist with a Universal Mind", Management Science, Vol.14, No.12, (August, 1968), B.P. 647

The inputted data consists of the report. The information gained is obtained by measuring the value of the change in the manager's knowledge state associated with the evaluation of the report as perceived by the manager. For instance, if the original state of a manager's knowledge could be represented by the symbol K_1 and the subsequent state by K_2 , then information was received if K_2 differs from K_1 . On the other hand, if K_1 and K_2 represent knowledge, their difference must also represent knowledge, hence, information is knowledge. Obviously it is knowledge only with respect to such manager and not some one else. As information can be conceived as knowledge, conversely, knowledge may become information when it is used in making a decision.

To sum up, data is the input to some given stock of knowledge. If the stock of knowledge is changed thereby, then information is the result. However, the distinction between data and information is, primarily, relative. In other words, what may be information to one manager could be data to another, or even for the same manager at a different time or for a different problem.

2.4.3 Information Utility

Utility is the ability of a product or service to satisfy some need or desire. It is a characteristic which explains the value of a product or service from the user's perspective. A product (or service) may possess different utilities such as form, time and place. Information, like products and services, may possess some of these utilities in addition to others, and these may be used in explaining the value of information from managers' perspectives.⁴²

⁴² Andrus, Roman R., "Approaches to Information Evaluation", MSU Business Topics, (Summer, 1971), pp.40-42

In fact, information has no intrinsic value; any value it may have is realised through the influence on the decision making. Such influence is exerted through human decision-makers. Thus, the value the managers attribute to information is the incremental effect it has on achieving a specific desired benefit. It is quite possible that the information contained in a report may have little value because it comes to the manager too late, is inaccurate, too complex, insufficient, and/or irrelevant. In brief, the value of the information is its various properties which make it desirable, or useful, or the degree to which these properties are possessed. These properties, in fact, are the utilities (time utility, form utility, quantity utility, etc.) which the information possesses. The value of information then, implies its utilities from the managers' perspective.

Consequently, value may be placed on information "by evaluating the presence of the various information utilities ... the determination of the value of information is a process dependent upon the evaluator's perception of these features".⁴³ This process, however, is not possible without use of a measure or measures for the assessment of the information utility. In fact, a measure or a criterion, solely, cannot assess the information utility. Because the information may have various utilities, hence a set of different criteria are needed, each is used in the measurement of one of the different aspects of the information utility.

2.4.4 Information Criteria

Information must meet certain criteria before they can be reported to users. In general, criteria or standards are "indicators

⁴³ Ibid., p.43;

See also: Gregory, Robert H. and Richard L. Van Horn, op. cit. pp.574-581

of what are regarded as the most appropriate practices in given situations. They are therefore also useful as gauges with which to justify and measure departures from what is advocated as the appropriate practice".⁴⁴ The accountancy literature, in fact, represents the primary source of these criteria. The literature abounds with suggested information criteria such as: usefulness, relevance, reliability, objectivity, accuracy, freedom from bias, verifiability, sufficiency, significance, understandability, readability, timeliness, practicality and many other criteria. The meanings of some criteria overlap, i.e. they appear to express identical or closely related ideas. Further, while most of the criteria found in the literature do represent the characteristics which information ought to possess, it appears that there is no agreement among the professional accountancy bodies and the various authors on a comprehensive framework of these criteria.

On the other hand, some authors have arranged the criteria specified by them in hierarchical order where some criteria are considered to be more important than the others, or where criteria of a lower order are supposed to lead to the attainment of criteria of a higher level. Furthermore, in some schemes substitution (or trade-off) among the suggested criteria is also permitted in the sense that an increase in the adherence to one can compensate for a decrease in another, while there is no trade-off among these criteria in the other schemes.

⁴⁴ Lee, T.A., "Accounting Standards and Effective Financial Reporting - II - a review in principle", The Accountant's Magazine, (February, 1975), p.74

2.4.4.1 A Framework of Information Criteria: Different Viewpoints

As stated previously, different frameworks of information criteria have been established. It may be useful to present some of these frameworks in order to reveal the differences among them. Each framework will be discussed briefly, and emphasis will be on the major features of it.

2.4.4.1.1 A framework suggested by AAA Committee (1966)⁴⁵

The all-inclusive criterion in this framework is the usefulness of the information. As usefulness is too general a concept, it is divided into criteria which can be practically implemented. These criteria are formulated by asking what characteristics should information have in order to be useful? The information to be useful should meet four basic criteria:

1. Relevance
2. Verifiability
3. Freedom from bias
4. Quantifiability

The criterion of relevance is primary among the four suggested criteria in this framework. However, it is not sufficient as a sole criterion. Consequently, the application of these criteria is governed by two related rules:⁴⁶

1. Adequate fulfilment of these criteria does not require complete adherence to any one or all of these criteria under all circumstances.

⁴⁵ American Accounting Association, Committee to Prepare A Statement of Basic Accounting Theory, A Statement of Basic Accounting Theory, (Evanston, Illinois: American Accounting Association, 1966).

⁴⁶ Ibid., p.8, 10

2. The required degree of adherence to each criterion is conditioned by the degree to which the other criteria are met. The relative significance of each criterion depends upon the nature of the information and its intended use.

Both the minimum conformity required with any one of the criteria and rates of substitution (trade-off) among the four criteria are conditioned by the circumstances.

In addition to the four criteria mentioned above, five guidelines (criteria) for information communication have been suggested:

1. Appropriateness to expected use.
2. Disclosure of significant relationships.
3. Inclusion of environmental information.
4. Uniformity of practice within and among entities.
5. Consistency of practices through time.

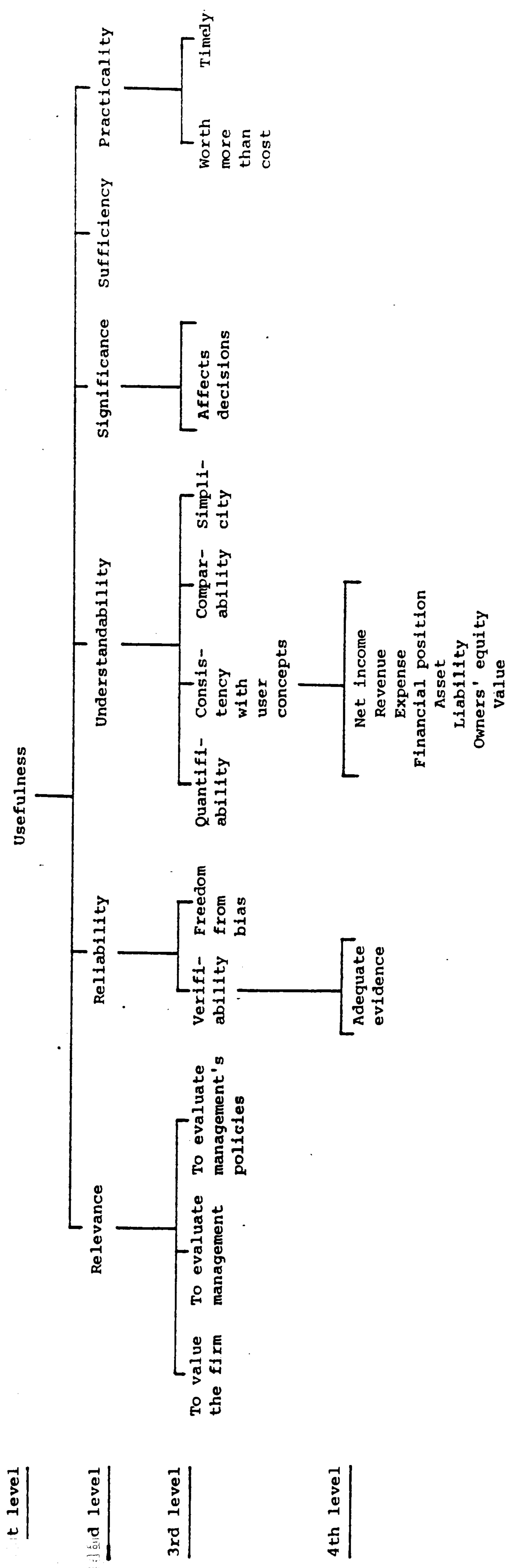
2.4.4.1.2 A Framework Suggested by Snavely (1967)⁴⁷

This framework is based on the theme of a hierarchy of information criteria. That is, the one criterion that appears to be vital and applicable to all cases of information preparation and communication occupies the first level of the hierarchy. Other criteria that are more restricted in scope, but which nevertheless are quite essential and broadly applicable occupy the second level. Those which are less in their effects on the information preparation and communication and more restricted in applicability are at the third level, etc. Four levels of the hierarchy constitute this framework as illustrated in Figure (2.2) on page 54.

⁴⁷ Snavely, Howard J., "Accounting Information Criteria", The Accounting Review, (April, 1967), pp.223-232

FIGURE (2.2)

Snavely's Framework Of Information Criteria



1st level

2nd level

3rd level

4th level

In fact, some of the criteria at the third and fourth levels are not consistent with the definition of the criterion. They merely are an explanation of the criterion at the highest level or the areas which are covered by that criterion. For example, net income, revenue, expense, etc., which are referred to as fourth level criteria and related to the criterion of "consistency with user concept" are merely areas of such consistency and cannot be conceived as criteria.

Two related rules are followed when this framework is applied, they are:

1. the criteria at the second level in the hierarchy are equally important, this leads to the second rule;
2. the trade-off among the criteria at the second level is not possible.

In other words, this framework is based on the theme that the criteria of relevance, reliability, understandability, significance, sufficiency and practicality which are at the second level in the hierarchy "are mutually exclusive and singularly powerful. If information does not meet any one of these criteria, it is not useful, even though it may comply perfectly with all the others".⁴⁸

However, the rule of being mutually exclusive and singularly powerful does not govern all of the criteria at the third level in this scheme. For example, the criterion of understandability (at the second level) is based on four criteria, i.e. quantifiability, consistency, comparability and simplicity (at the third level); however, information can be understandable even though it is not quantifiable.

⁴⁸ Ibid., p.232

From the comparison between the AAA committee's framework and Snavely's framework, it appears that from the four criteria identified by the AAA committee, only "relevance" seems to function at the second level. The other criteria, i.e. verifiability, freedom from bias and quantifiability, operate at the third level of the conceptual framework developed by Snavely. On the other hand, while the AAA committee sees that there exists a possibility of trade-off among the four criteria, Snavely, in contrast, believes that this is not possible, at least among the second level criteria in his framework.

2.4.4.1.3 A Framework Suggested by AICPA Study Group (1973)⁴⁹

Information contained in the reports should possess certain characteristics to satisfy users' needs. These characteristics can be conceived as criteria which should be applied when information is prepared and communicated to its users. Seven criteria have been suggested:

1. Relevance and Materiality
2. Form and Substance
3. Reliability
4. Freedom from bias
5. Comparability
6. Consistency
7. Understandability

Trade-off among these criteria is not clear. The study group has not mentioned whether it is possible or not. Also, it seems that the criteria suggested are equally important and the information

⁴⁹ American Institute of Certified Public Accountants, Study Group on The Objectives of Financial Statements, Report of The Study Group on The Objectives of Financial Statements, Objectives of Financial Statements, (New York: American Institute of Certified Public Accountants, October, 1973), pp.57-60

should meet all these criteria to satisfy users' needs. However, the study group stated that:

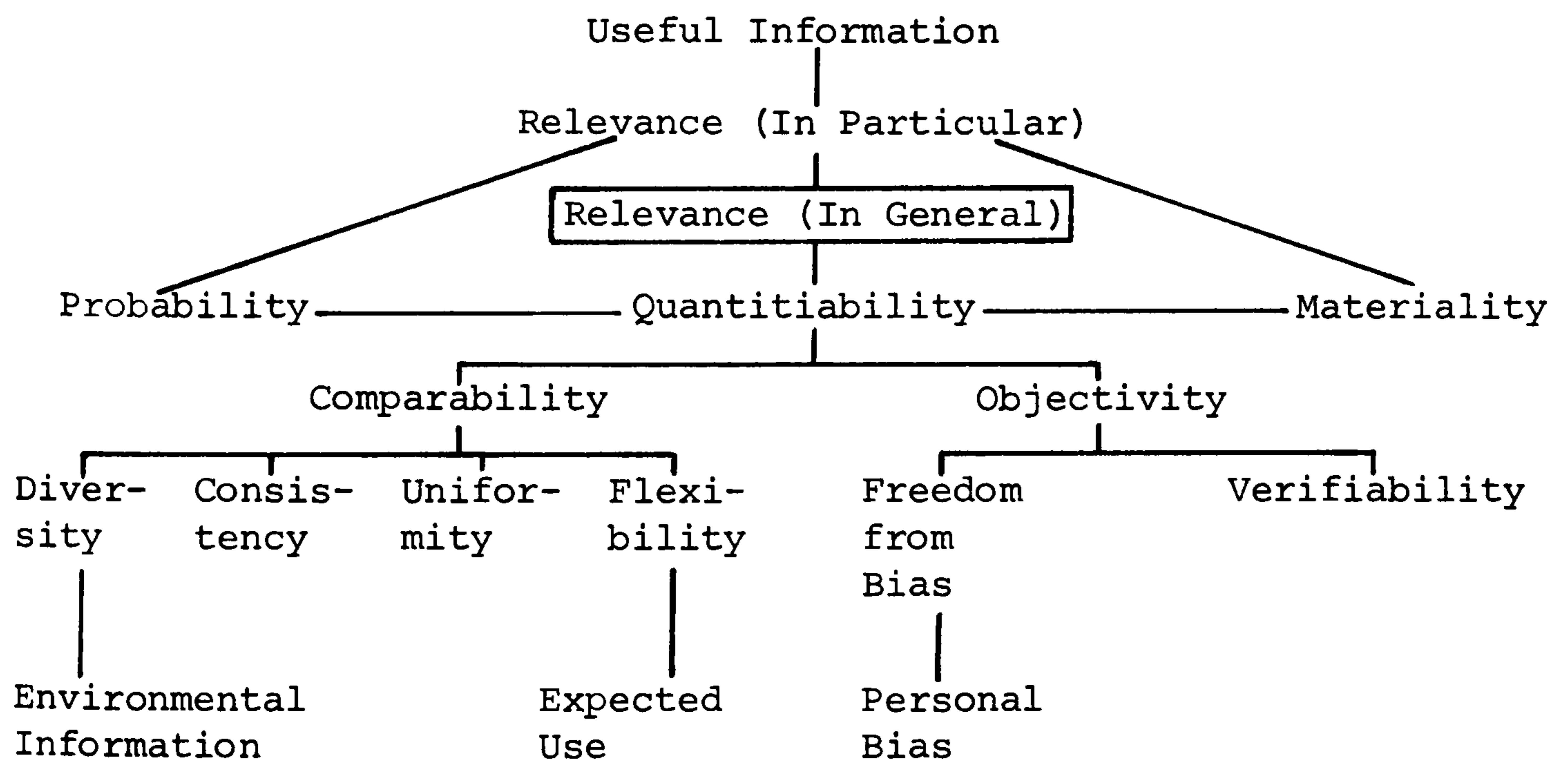
Information is useless unless it is relevant and material to a user's decision. Information should be as free as possible from any biases of the preparer. In making decisions, users should not only understand the information presented, but also should be able to assess its reliability and compare it with information about alternative opportunities and previous experience. In all cases, information is more useful if it stresses economic substance rather than technical form.⁵⁰

2.4.4.1.4 A Framework Suggested by Fisher (1974)⁵¹

The criteria suggested are arranged in hierarchical order. The criterion of relevance occupies the position of primacy. Probability, quantifiability, and materiality are secondary. Other criteria are found at various levels as shown in Figure (2.3).

FIGURE (2.3)

Fisher's Framework of Information Criteria



⁵⁰ Ibid., p.60

⁵¹ Fisher, J. "Financial Information and the Accounting Standards Steering Committee", Accounting and Business Research, (Autumn, 1974), pp.275-285

In fact, the rules governing the application of this framework have not been stated, explicitly or implicitly. Consequently, it is not clear whether the trade-off among these criteria is possible and at what level.

This framework, however, is similar to the AAA committee's framework in that, relevance is the primary criterion. While the AAA committee sees that verifiability, freedom from bias and quantifiability are secondary, only the criterion of quantifiability occupies this position in Fisher's framework. Further, in Fisher's framework, consistency, uniformity, environmental information, and expected use are criteria at two different levels in the hierarchy and related to the criterion of comparability at the higher level, these criteria are guidelines for information communication in the AAA Committee's framework.

2.4.4.1.5 A Framework Suggested by AAA Committee (1974)⁵²

The criteria suggested by this committee are classified into four groups. Each group represents a separate activity which with the others constitute an internal accounting information system.

The four activities are as follows:

1. Problem specification. The structuring of the decision situation by the decision maker and his perception of a desire for information. It also includes the accountant's perception of the decision maker's decision model and information desires.
2. Measurement. It includes the processing of data within the system to produce useful information.

⁵² American Accounting Association, Committee on Concepts and Standards - Internal Planning and Control, "Report of the Committee on Concepts and Standards - Internal Planning and Control", The Accounting Review, (Supplement to Vol. XLIX, 1974), pp.79-96

3. Transmission. Communicating the information to users.
4. Response. The user's reaction (answer) to the message transmitted by the information system.

Within each group mentioned above, the criteria are not equally important. They are ranked according to their importance to the user in a control context and in a planning context. Ranking "1" indicates a criterion of the greatest importance; "3" identifies a criterion of the least importance for the specific decision context. The suggested criteria and their ranking are presented below with the system activity to which they most directly relate:

<u>Activity</u>	<u>Criterion</u>	<u>Ranking</u>	
		<u>Control</u>	<u>Planning</u>
1. Problem specification:	Relevance	1	1
2. Measurement:	Neutrality	1	2
	Consistency	1	3
	Uniformity	1	3
	Comparability	1	2
	Objectivity	2	3
	Precision	2	3
	Reliability	2	2
	Accuracy	2	2
	Verifiability	2	3
	Traceability	2	3
	Adaptability	3	1
	Flexibility	3	1
3. Transmission	Timeliness	1	1
	Aggregation	1	1
4. Response	Understandability	1	1
	Acceptability	1	1
	Motivation	1	2
	Fairness	1	2
	Mutuality of objectives	1	1

A comparison of the rankings reveals that there are some differences which might be expected when comparing a control context with a planning context. For example, while neutrality is ranked as a criterion of greatest importance "1" in a control

decision situation, it is ranked as a criterion of moderated importance for planning decision context. Another example is the criterion of flexibility, in a control context, it is ranked as a criterion of a least importance "3"; in a planning context, on the contrary, flexibility is ranked as a criterion of a greatest importance. However, the comparison of rankings indicates some common rankings either among the criteria used in the same decision situation or between the two decision situations, i.e. control and planning. For instance, relevance, timeliness, understandability are ranked as criteria of the greatest importance in a control context and a planning context.

Although trade-off among these criteria has not been pointed out, the committee implicitly inferred that it is possible:

The nature and extent of the trade-offs between various properties [criteria] can be understood only through a more extensive study than this committee has undertaken.⁵³

2.4.4.1.6 A Framework Suggested by the Accounting Standards Steering Committee (1975)⁵⁴

Although it was not one of the major purposes of this committee to establish a framework of the information criteria, it has recommended some "desirable characteristics" of the reports which can be conceived as information criteria. The committee has pointed out that for a report to be useful, it must possess the following characteristics. It must be:

1. Relevant
2. Understandable
3. Reliable

⁵³ Ibid., p.95

⁵⁴ The Accounting Standards Steering Committee, The Corporate Report, (London: The Accounting Standards Steering Committee, 1975) Section Three, pp.28-31

4. Complete
5. Objective
6. Timely
7. Comparable

Although the committee has neither discussed the relative significance of these criteria nor the trade-off among them, it seems, however, that the committee has implicitly considered that these criteria are equally important and there is no trade-off among them:

... we conclude that the corporate reports should be relevant, understandable, reliable, complete, objective, timely and comparable.⁵⁵

2.4.4.1.7 A Framework Suggested by Staubus (1976)⁵⁶

This framework consists of nine major criteria:

1. Relevance
2. Reliability (Verifiability, Freedom from bias, Accuracy)
3. Comparability
4. Effects via other parties
5. Understandability and Readability
6. Timeliness
7. Optimal quantity
8. Cost of producing
9. Cost of utilising

To use this framework in preparation, communication and evaluation of the information, two points should be taken into consideration:⁵⁷

⁵⁵ Ibid., p.31

⁵⁶ Staubus, George J., "The Multiple-Criteria Approach to Making Accounting Decisions", Accounting and Business Research, (Autumn, 1976), pp.276-288

⁵⁷ Ibid., pp.276-277

1. In each case, a criterion may be partially met, or met to a degree. In short, the relative significance of a criterion may differ from one case to another.
2. Trade-off may be made among these criteria, but, on the other hand, none of the seven benefit criteria can be completely absent.

It is clear that this framework includes three criteria which have not been found in the others presented previously; namely, effects via other parties, cost of producing (Snaveley's framework is an exception), and cost of utilising. The criterion of "effects via other parties" means that in choosing among alternative accounting methods it should be taken into consideration the effects the methods may have on the interests of specific parties through the actions of other parties. Any choice affecting reported earnings could be given as an example of accounting decisions in which effects on an interested party (managers and shareholders) via other parties (union representatives) could be a significant consideration.⁵⁸ In fact, the main problem encountered in the application of this criterion is that it is difficult to isolate the contradictory potential effects of the various other parties (e.g., union representatives, lenders, new investors) on the interested party (e.g. managers and shareholders).

The criterion of "cost of producing" refers to the costs of performing activities of an information function (accounting or any other specialised information function) and the value of information provided. In fact, this criterion, in Snaveley's framework, presented previously,⁵⁹ has been conceived as one of two aspects of the practicality criterion. To be practical, information must be

⁵⁸ See for more details: Ibid., pp.280-281

⁵⁹ See, pp. 53-56

worth more than it costs to present. Thus, an analysis of costs and benefits would be required. The cost of information is equal to the sum of the costs of human effort, the materials used for recording, and any other cost involved in acquiring, processing data, and delivering the information to the users. From a benefit viewpoint, it may be difficult to determine a monetary value of the information (reports) provided externally and/or internally.

First, regarding external reporting, the parties who have the best feel for the costs (management) are not the same as the parties who obtain the benefits (e.g., investors, lenders, government agencies). In such a case, it may be difficult if not impossible, to determine a monetary value of the information provided, hence, cost-benefit analysis will be very difficult.⁶⁰

Second, in internal reporting, conceptually, the value of information should be measured in terms of its effect on the decisions outcomes. Assume that all factors influencing operating performance can be held constant. If a report is dropped or changed, the resulting decrease in performance would be an indicator of the value of information supplied by that report. If no decrease occurred, the report might be considered valueless. Actually, the effect of a single report on an overall result is difficult to measure. In other words, changes in revenue associated with any particular report are difficult to estimate.⁶¹

The third criterion which has been included in this framework and not been found in the others is "cost of utilising information" which means the effort and time expended by the user in extracting

⁶⁰ Ibid., p.282

⁶¹ Gregory, Robert H. and Richard L. Van Horn, op. cit., p.574

information from a report. If the information contained in the report is not easily comprehended by the user; if it is poorly organised so that the user must spend time searching for information which he needs to consider together; if he must read many pages of details in order to extract the information he needs, all of these circumstances add to the cost of utilising the information.

It seems, however, that "cost of utilising the information" may not be easily accepted as an information criterion. In fact, "cost of utilising" is directly related to, and affected by the criteria of comparability, understandability and readability, and optimal quantity. In short, the user's own effort and time consumed in extracting the information from a report is a consequence of the degree that the information contained in the report meets these criteria. The criterion of "cost of utilising information", if it is accepted, means combining three criteria in one. In brief, this criterion, indirectly, does measure the same dimensions of the information utility which the other criteria actually do.

2.4.4.1.8 A Framework Suggested by Reynolds (1978)⁶²

This framework consists of five criteria, they are as follows:

1. Understandability
2. Relevance
3. Reliability
4. Credibility
5. Cost-effectiveness

Three observations are necessary to clarify this framework and to explain differences between it and other frameworks presented

⁶² Reynolds, P.D., "Principles and Standards for Better Management Information", The Accountant's Magazine, (June, 1978), pp.253-255

previously. First, although the criterion of "reliability", as used in this framework, has the common meaning of this criterion; that is the recipient of the information should be able to rely upon it, the aspects of reliability as suggested in the framework are not consistent with the precise meaning of such criterion. In Reynold's framework, reliability is based on three aspects, timeliness, accuracy and consistency. Following this line of thought, it may be possible to say that information, if it is to be reliable, in addition to being timely, accurate and consistent, should be relevant, complete, and understandable as well. In such a case the criterion of reliability will lose its own meaning and overlap with another criterion, namely "usefulness". Indeed, there is no doubt that accuracy is an aspect of reliability, but timeliness and consistency are questionable.

Second, this framework is consistent with Staubas's framework presented previously regarding the necessity of including "cost-effectiveness" as a criterion within the framework. The cost-effectiveness criterion as used by Reynolds means that the twin aspects of usefulness and cost must be considered both from the information provider's and the user's viewpoints. Effectiveness is to be measured against the results intended to be achieved and the value of those results. The cost covers both the direct and indirect cost of preparing the reports, and no less important, any consequent demands on the recipients' time and effort required to assimilate the information contained in the reports. Indeed, the criterion of cost-effectiveness included in this framework is a combination of two criteria "cost of producing" and "cost of utilising" which we found in Staubas's framework, and both of which were discussed previously.

Finally, "credibility" is considered in this framework as a criterion which has not been found in the other frameworks. Credibility as used in this framework means that the user should recognise the terms and language of reporting and that the information should relate both to any specific information that the user may happen to have on that subject already and to accustomed ways of presenting other information to that user. Further, credibility means that information should be presented in a way so as to be believable immediately, in other words, the information presented should be accurate. Indeed, credibility, in the meaning mentioned above, overlaps with the concept of "understandability" and "reliability", both having been recognised by other frameworks as two separate criteria. Obviously, the two notions, i.e. understandability and reliability, are different, and no attempt should be made to combine both in one criterion.

The relative importance of the criteria formulated in this framework and the trade-off among them have not been discussed. However, it seems that Reynolds has treated these criteria as being equally important and consequently there is no trade-off among them.

2.4.4.2 A Comparison Among The Suggested Frameworks

The comparison among the previous frameworks, as shown in Table (2.2) on page 67 indicates that:

Firstly, "usefulness" is the all-inclusive criterion of information. Information should be useful otherwise it will not be acceptable by its users. The criterion of "usefulness" occupies the position of the primacy among the other criteria.

Secondly, there are different views regarding the set of criteria

which constitute a comprehensive framework for information reporting. However, there are some identical criteria which are recognised in all or some of these frameworks, such as relevance, comparability, reliability, understandability, freedom from bias, timeliness and sufficiency.

Thirdly, there is disagreement concerning the relative importance of these criteria, while in some frameworks they are equally important, in others, the criteria are ranked according to their importance in a different context.

Finally, the possibility of trade-off (substitution) among the criteria is somewhat unclear. However, there are two opposing points of view: (i) one conceives that the rates of trade-off (substitution) among the criteria are conditioned by the circumstances; (ii) while the other believes that an increase in the adherence to one criterion cannot compensate for a decrease in another.

2.4.5 A Suggested Framework of The Information Criteria

The primary goal of an organisation's information system is to provide useful information for the managers. Then, the measure of its fulfilment of this goal at any point in time, and in any particular context (i.e. planning and control) will be the degree of the response of the system to managers' needs for useful information at that particular time in that particular context.

To measure the degree of usefulness of the information provided, a set of criteria is needed. Yet there is disagreement among researchers on such a set. As indicated previously, various frameworks of information criteria have been established; each included different criteria from the others and different rules for applica-

tion. Thus, a framework of criteria is needed so that the providers of information (the system's staff) and the users of it (managers) can judge the usefulness of the information provided for internal use. The criteria which will constitute the suggested framework will not be arbitrarily selected; the criteria of the previous frameworks, in fact, will be the main source. Two points will be taken into consideration in selecting these criteria: one is that each criterion selected should represent a specific dimension of the information usefulness. Further, each dimension will be only represented by one criterion. The second point is that any criterion selected should be practicable; otherwise it will be rejected, even if it is very desirable.

The criteria which will be proposed will be applied to the information provided itself, not to any practices, procedures, methods, or rules being employed in producing the information; however, the practices, procedures, methods and rules employed must contribute to the production of information which satisfies these criteria.

The practical aspect of the framework suggested is important, and lies in the application of the criteria by the providers of the information (the system's staff) and by the users of it (managers). They do need to ask about any report: "Is the information contained in the report useful?"

2.4.5.1 Usefulness

Usefulness of information has been proposed as the all-inclusive criterion in the frameworks presented previously. Usefulness is that characteristic which fits the information to serve or to

facilitate its intended purpose.⁶³ In fact, usefulness of information is conditioned by the answer to two questions; useful to whom, and for what purpose? Obviously, usefulness is a relative matter, in the sense that information may be useful for one manager but not for another, and it is useful for that manager for a particular purpose at a specific time but may not be so at a different time or for a different purpose. Consequently, a report may contain a large amount of data without being "Informative" from the viewpoint of a specified manager.

Thus, it is important to determine what causes information to be useful to a specified manager. The information provided by an organisation's information system must enable the manager to make a more advantageous decision than he could have made without it. More advantageous, in fact, does not mean profit maximisation. Obviously, profit maximisation need not be the sole goal of the organisation. Other socially oriented goals may be formally or informally adopted by an organisation or its employees as well as the objective of making profit.

However, usefulness of information depends upon the content and the interpretation of a report. Content is a matter of data organised for a particular problem or decision and, hence, is directly affected by the effectiveness of an organisation's infor-

⁶³ See for example:

Lee, T.A., "Utility and Relevance - the search for reliable financial accounting information", Accounting and Business Research, (Summer, 1971), pp.244-245;

Anthony, Robert N., "Research in Accounting Measurement", in: Robert K. Jaedick, Yuji Ijiri and Oswald Nielsen (Eds.), Research in Accounting Measurement, (Evanston, Illinois: American Accounting Association, 1966), p.259

mation system. Interpretation, on the other hand, is a matter of judgement and is a function of the perception, cognitive style, goals and values of the manager.

Usefulness of information as the all-inclusive criterion next raises the questions: how is the provider of information to know if the information is useful; how useful must the information be; finally, can usefulness be measured and if so, how? To answer these questions, the dimensions of "usefulness" should be determined. These can be identified by asking: what characteristics should the information have in order to be useful? Each characteristic represents a dimension of usefulness and can be considered as a criterion.

From an analysis of the concept of "usefulness of information", it is possible to identify five dimensions: the association with the purpose intended; the quantity; the dependability, the time; and the comprehensibility. Accordingly, the criterion of "usefulness" can be divided into another five criteria as follows:

1. Relevance
2. Sufficiency
3. Reliability
4. Timeliness
5. Understandability

2.4.5.1.1 Relevance

"Relevance" is one of the most fundamental criteria which have been proposed in the frameworks presented previously. All of these frameworks have included this criterion. Further, in some of the frameworks, relevance has been considered the primary criterion of the others which have been proposed. The criterion of relevance means that:

... the information must bear upon or be usefully associated with actions it is designed to facilitate or results desired to produce.⁶⁴

Relevance, then, is determined from the viewpoint of a specified manager, and is to be associated with a particular decision to be taken at a specific time to achieve specific results.

Chambers, however, sees that the concept as defined above should be called "particular relevance" which is distinct from "general relevance". He explains that "general relevance" is related to a class of decision-makers, not to a specified one, it "is discoverable by examination of the circumstances in which they act, of the general bases of their choices, and of the kinds of action they may take; but without any supposition or presumption that a given actor [decision-maker] will take any specific action".⁶⁵ In fact, this view focuses on external reporting more than internal and on the viewpoint of the provider of information more than the user. General relevance is to be acceptable in external information reporting, on the contrary, particular relevance is appropriate for management information reporting.

On the other hand, Shwayder has introduced another concept of relevance which is called "semantic relevance". This concept refers to the effect of the message on its user. The point is that, information cannot affect goal fulfilment without changing the user's decision, decisions cannot be affected without information being understood by the user and influencing his impressions.⁶⁶ In fact,

⁶⁴ American Accounting Association, Committee To Prepare A Statement Of Basic Accounting Theory, op. cit., p.7, 9

⁶⁵ Chambers, Raymond J., Accounting, Evaluation and Economic Behaviour, (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1966), p.154

⁶⁶ Shwayder, Keith, "Relevance", Journal of Accounting Research, (Spring, 1968), pp.89-91

semantic relevance is concerned with communication of information and the meaning extracted from it by the user. Consequently, it may be conceived as one of the dimensions of "the usefulness", and can be studied with the criterion of "understandability". In brief, the concept of relevance refers to association of information with a particular decision or result, while the criterion of understandability is concerned with semantic relevance.

Relevance, as Boer believes, should be distinct from the concept of pertinence. He adopts the view that the concept of relevance should be restricted in its application. It is used to indicate the judgement of the information provider, while the user's judgement can be described by the concept of pertinence. Consequently, relevance refers to the property which assigns information produced by an information system (as answers) to a query (question asked of the system), while pertinence is the property which assigns information produced by the system (as answers) to an information need. According to this distinction, the provider of information interprets the query of user and makes a judgement about the information that is relevant to the user. If the user does not agree with this judgement, then the information has relevance but no pertinence.⁶⁷

Pertinence and relevance, obviously explain the same phenomena from two different points of view, that is the provider of information and the user of it. Both indicate the judgement of the two

⁶⁷ Boer, Germain and John O. Everett, "Information Science and Relevant Accounting Reports", Management Accounting (USA), (April 1976), pp.33-34

See also: Saracevic, Tefko, "The Concept of 'Relevance' in Information Science: A Historical Review", in: Tefko Saracevic (Ed.), Introduction to Information Science, (New York: R.R. Bower Company, 1970), p.122

different persons concerning the association of the information with a query. If the provider of information judges the information provided can be associated with a query, the information will be relevant. If the user judges the information received is relevant, the information would be referred to as pertinent. In fact, this distinction between "relevance" and "pertinence" is a matter of terms and no more. In brief, relevance and pertinence are two sides of one thing, that is the association of the information with the user's query or decision.

However, this view stresses the difference in judgement of relevance from the perspective of the provider and user of information. This raises the next question: does relevance come in degrees? At one extreme, "relevance is a qualitative rather than a quantitative characteristic. It is thus absolute rather than relative - that is, information is either relevant or irrelevant. Relevance does not come in degrees".⁶⁸ At the other extreme, relevance "is not a go, no-go criterion; there are degrees of relevance. Rarely will a criterion be met perfectly ...".⁶⁹

Although the two views mentioned above are extremes, both can be acceptable. That is, if we judge each item of information contained in a report, it would be either relevant or irrelevant.

⁶⁸ American Accounting Association, Committee on Concepts and Standards - Internal Planning and Control, op. cit., p.83

⁶⁹ Staubus, George J., op.cit., p.276-277

See also:

Caplan, Edin H., "Relevance - a 'Will-o'-the-Wisp'", ABACAUS, (September, 1969), p.52;

American Accounting Association, Committee to Prepare A Statement of Basic Accounting Theory, op. cit., p.10, p.27

In such a case relevance does not come in degrees. If we judge the information contained in the report, as a whole, our judgement would be in degrees. In this case, relevance is not a go-no-go concept, rather it is a relative one.

Accordingly, if most of the items in a report are judged relevant and they are the most significant, the report would be evaluated as highly relevant. On the contrary, if most of the items, which are judged relevant, are the least significant, the report would be assessed as least relevant. Obviously the judgement of relevance in this way, implicitly indicates to some extent, an interaction with the concept of materiality.

To sum up, the criterion of relevance is concerned with the type of information required. The user of information and his objectives and decisions are necessary to decide what is relevant. There are different degrees of relevance. Finally, relevance is a necessary but not a sufficient criterion for the evaluation of information.

2.4.5.1.2 Sufficiency

Sufficiency refers to the quantity of information (informational elements) contained in a report. "If information is to be useful, a certain quantity and quality must be available. In all instances, there is a point below which the information is useless, and in many instances, too little information may be worse than useless; it may have negative usefulness".⁷⁰ If a report contained too few informational elements, even if they are relevant, managers would find it necessary to conduct an expanded search to obtain

⁷⁰ Snavelly, Howard J., op. cit., p.230

additional elements and/or to obtain more details about an informational element contained in the report. On the other hand, if a report contained too many informational elements, managers would find difficulty in assimilating and using the information effectively.

The quantity of the information contained in a report is affected by the degree of aggregation. In fact, it may be difficult to determine what the optimum level of aggregation should be. The problem is that elements aggregation carries with it a loss of information contained in the unaggregated elements, since it is not possible to determine from aggregated elements the contents of unaggregated elements uniquely. Although an unaggregated element is identifiable, a decision-maker cannot handle variables beyond some handful of numbers. For this reason, it is not helpful to provide him with voluminous unaggregated informational elements even if the information is provided at a low cost.⁷¹

To sum up, if information contained in a report is to be useful, a certain quantity must be available. Such quantity is affected by the degree of aggregation. The optimum level of aggregation, in fact, is the main problem in determining the quantity of information contained in a report. The point is how to balance the effect of the limited capability of users in handling big numbers of informational elements and loss of identifiability of the aggregated elements.

2.4.5.1.3 Reliability

As with relevance, the term reliability also overlaps with some

⁷¹ American Accounting Association, Committee on Concepts and Standards - Internal Planning and Control, op. cit., pp.89-90

other concepts such as verifiability, objectivity, accuracy, precision. Perhaps the best two synonyms for reliability are dependability and credibility. "Reliability is that quality which permits users of a datum [information] confidently to depend on it as an accurate representation of the specific phenomenon it purports to represent".⁷² Consequently, for information to be reliable, it should be accurate, and it should be free from personal bias.

Information is accurate if it conforms closely with reality in the sense that it is free from errors such as: errors of recording at data base level, basic measurement errors, and processing errors, particularly in manual or semi-automated systems.⁷³ Accuracy of information, then, depends not only on the accuracy of data inputs, but also on the techniques applied to check the accuracy and the processing methods used in generating the information.

On the other hand, for information to be reliable, it should be free from personal bias. This is distinct from the bias which is inherent in a measurement method.⁷⁴ Personal bias, in fact, is due to the mental attitude of the provider of information. Consequently "for an observation to be unbiased it is necessary that every single possible interpretation be given an equal chance to be considered and accepted."⁷⁵

⁷² Staubus, George J., op. cit., p.277

See also:

Accounting Standards Steering Committee, op. cit., p.29

Snavely, Howard J., op. cit., p.228

⁷³ Higgins, J.C., "The Value of Accuracy in Information for Planning and Control". Long Range Planning, (August, 1974), p.67

⁷⁴ Staubus, George J., op. cit., p.279

⁷⁵ Mumford, M.J., "Objectivity and the Accounting Profession", Accounting and Business Research, (Autumn, 1971), p.285

Personal bias can affect a report by obscuring or leaving out some relevant information. When a provider of information finds the reporting of some informational items could promote a decision unfavourable to his personal goals or the goals of his group, he might try to obscure this information. This does not mean, however, that most of the personal biases are intentional, the opposite may be true.

However, if the rules of furnishing information are specified in detail for most purposes, one would expect the information contained in a report to show little deviation from one provider of information to another. In other words, since most providers of information would produce identical or very similar information, it does not matter which provider actually furnishes the information. Consequently, the manager as the user of such information can be confident that the information provided is free from the information provider's personal feelings and prejudices.⁷⁶

This is not to say, however, that information should be free from all judgemental thought processes of the information provider whether that judgement be biased or unbiased. Where no methodology is yet developed for certain situations, an individual provider of information cannot possibly be free from his personal judgement. In these situations the information provider's activities must necessarily be "inner-directed" rather than "outer-directed", i.e. they are directed by and dependent upon the individual provider's judgement, rather than an abstract methodology.⁷⁷

⁷⁶ Parker, James E., "Testing Comparability and Objectivity of Exit Value Accounting", The Accounting Review, (July, 1975), p.514

⁷⁷ Wodjak, Joseph F., "Levels of Objectivity in the Accounting Process", The Accounting Review, (January, 1970), p.96

In conclusion, intentional insertion of personal bias into information prepared and communicated by the information provider can rarely, if ever, be overlooked. The provider's unbiased judgement, however, is acceptable and in some situations is necessary. Obviously, unbiased judgement does not affect the information reliability while bias of a personal nature does. Further, whether or not the information is deemed reliable depends upon an appraisal by the user as well as the provider. There is a point at which the user feels that he is receiving reliable information; this point is different for different managers, and will vary depending upon the type and purpose of the report furnished.

2.4.5.1.4 Timeliness

Information, if it is to be useful, should be timely in the sense of being available at a suitable time - that is, well-timed. Timeliness or the age of information has two components: (1) interval (frequency in reporting); and (2) delay (lag in reporting).⁷⁸ Interval or frequency in reporting is the time period between the preparation of successive reports or answers to enquiries. It may be possible to report too frequently or too infrequently. If the period is too short, reports may come so fast that the receiver cannot make full use of one before he receives other reports, or even the next issue of the same report. Therefore, the time of reports must, of course, be matched with the user's ability to use them.

Delay or lag in reporting is the length of time between the

⁷⁸ See: Gregory, Robert H. and Richard L. Van Horn, op. cit., pp.576-580;

Staubus, George J., op. cit., p.280

end of the reporting period and the date at which the information is available for the users. This, obviously, covers the time required to process data and to prepare and distribute reports or to answer questions.

2.4.5.1.5 Understandability

For information to be useful, in addition to being relevant, sufficient, reliable and timely, it must be understandable. "Understandability focuses attention on the need for the users of information to be able to comprehend the message or messages being communicated".⁷⁹ In fact, the manner of presentation of information elements in a report and the terms and language used influence the quality-format of such reports; quality-format, in turn, influences understandability. Thus, the manner of presentation of information elements should be user-oriented, and the terms used should be in agreement with users concepts.

2.4.5.2 Trade-Off Among The Suggested Criteria

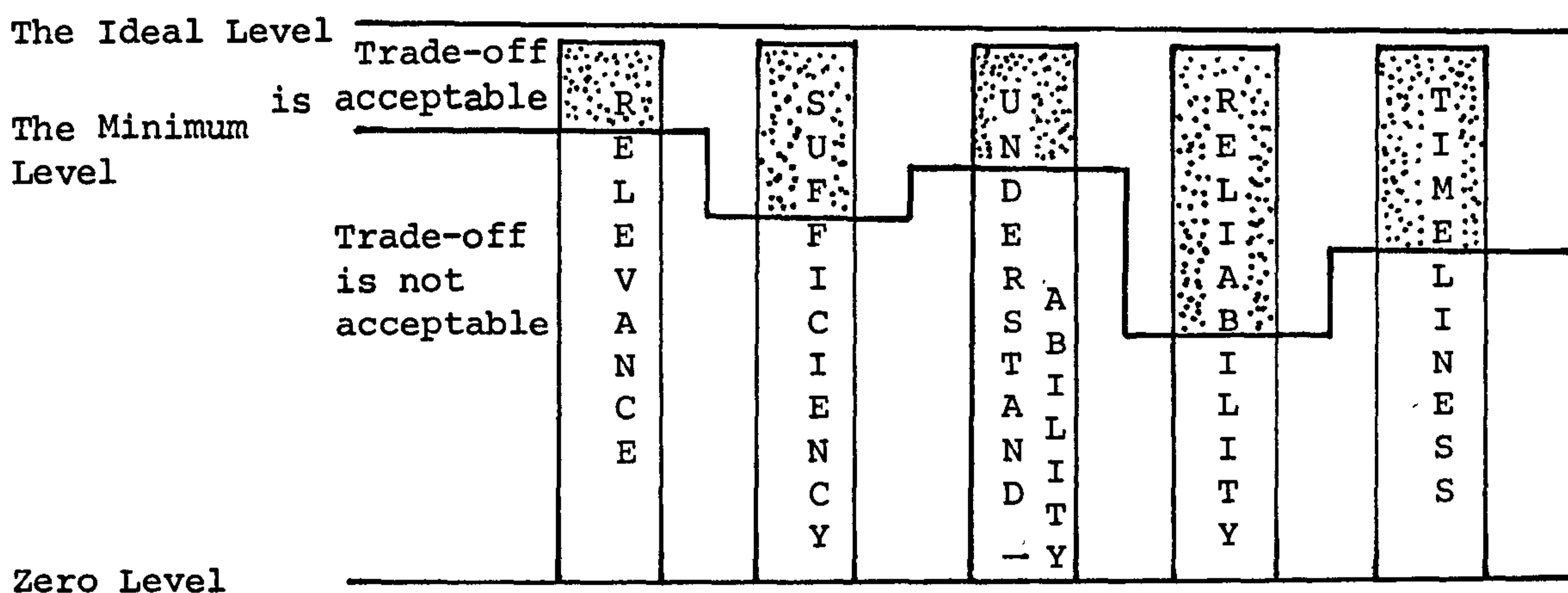
The five criteria suggested, i.e. relevance, sufficiency, reliability, timeliness and understandability, serve two purposes: first, they may be used by the information providers as guidelines for preparation and communication of the information needed; second, they may be used by managers for determining the degree of conformity of the information received with these criteria.

Thus, if information is to be useful, a minimum level of each criterion must be fulfilled, depending on the circumstances as illustrated in Figure (2.4) on page 81. For instance, if information does not meet the minimum level of a criterion such as

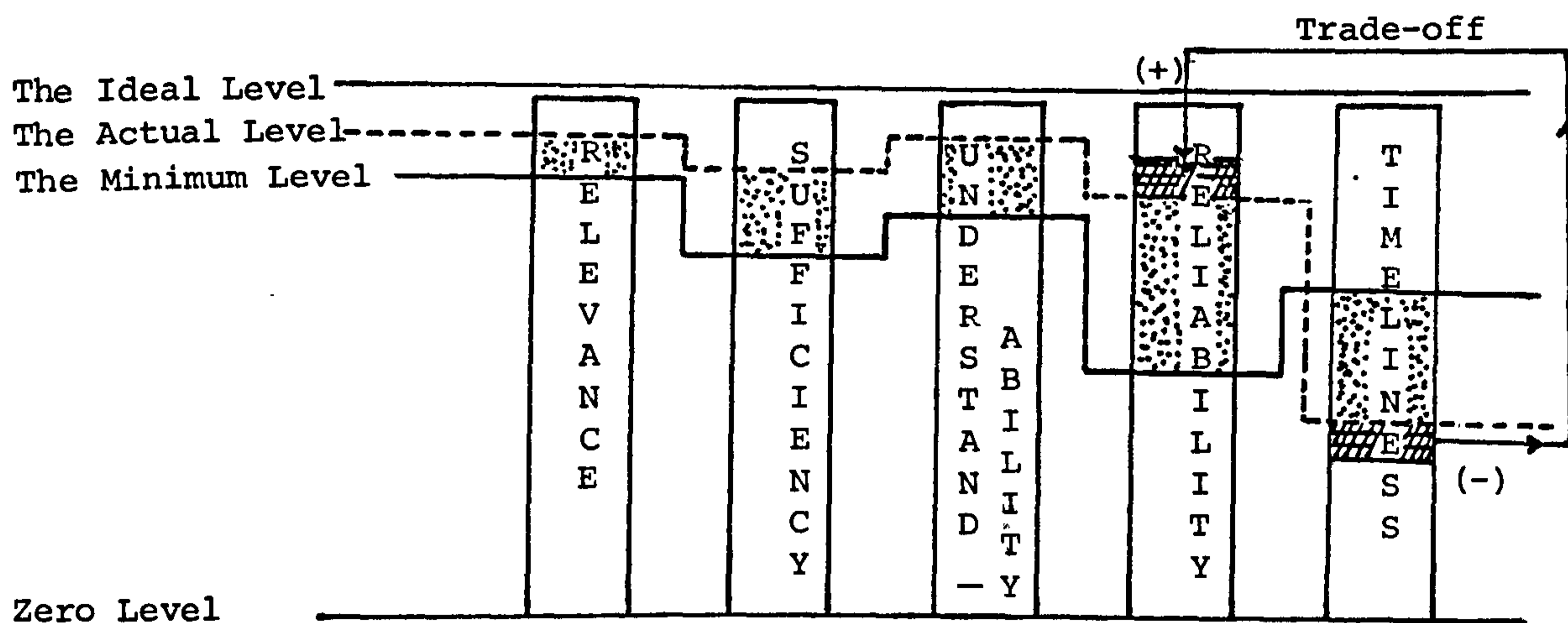
⁷⁹ Snavely, Howard, J., op. cit., p.229

FIGURE (2.4)

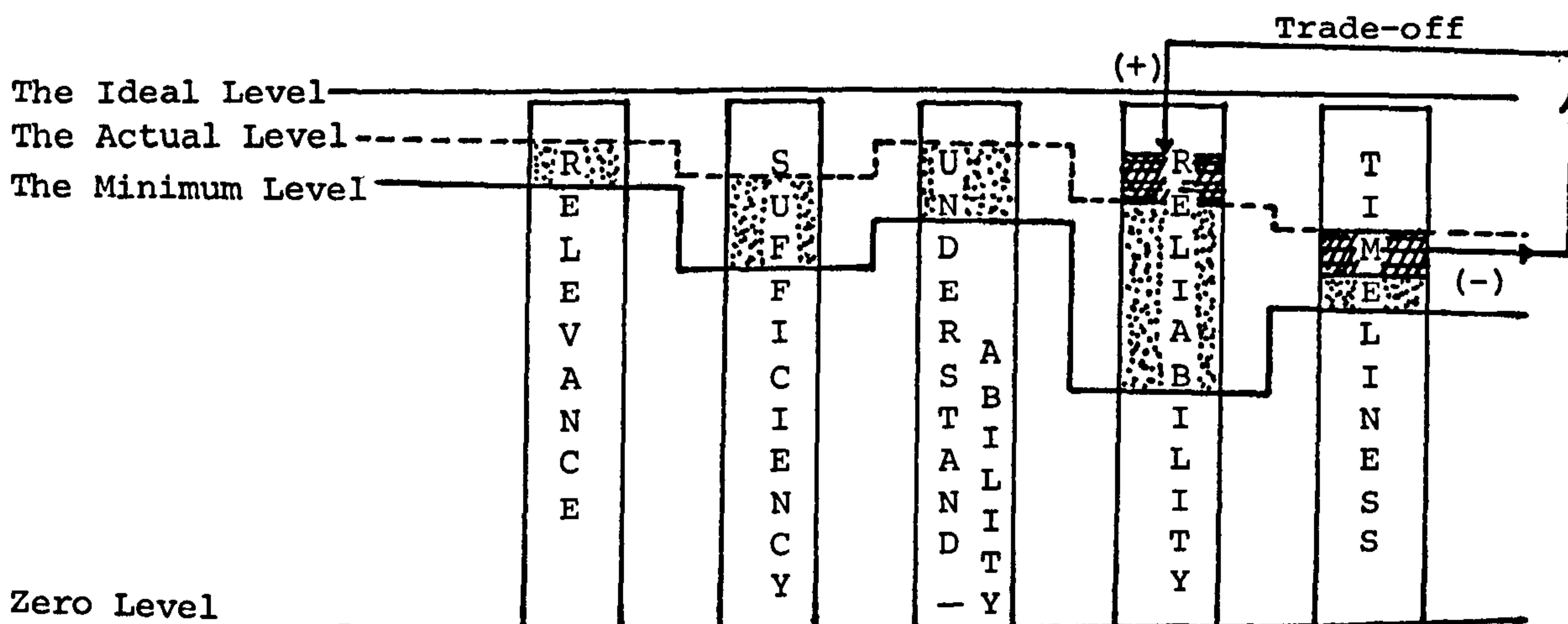
Trade-off Among The Information Criteria (A)



Trade-off Is Not Acceptable (B)



Trade-off Is Acceptable (C)



"timeliness", it may be useless, even though it may be perfectly relevant, sufficient, reliable and understandable. It is clear that none of the five criteria can be completely absent (zero level). Hence, complete trade-off among the information criteria is not acceptable in the sense that one can be substituted for another. On the contrary, partial trade-off may be acceptable, that is an increase in the adherence to one can compensate for decrease in the compliance with another. However, it should not be thought that partial trade-off is free of any condition. Indeed, partial trade-off is restricted, that is the minimum level of each criterion must be fulfilled first. Before reaching this level, trade-off among the criteria is rejected, otherwise information will be useless, as can be seen from the illustration in Figure (2.4B) on page 81. Of course, beyond the minimum level trade-off can be acceptable. This is illustrated in Figure (2.4C) on page 81.

Indeed, adherence to these criteria in different degrees may be acceptable and make the information suitable for different purposes and different users. After reaching the minimum level, adequate fulfilment of these criteria does not require complete adherence to any or all of these criteria under all circumstances. This theme, indeed, explains the existence of two levels in Figure (2.4), namely, the ideal and the actual levels.

Trade-off among these criteria is influenced also by the relative importance of each criterion. The problem is that the criteria may not be equally important in a particular use and to a particular user or group of users. In such cases the problem is how to determine the relative importance of each criterion. The literature on this point may not be very helpful for two reasons:

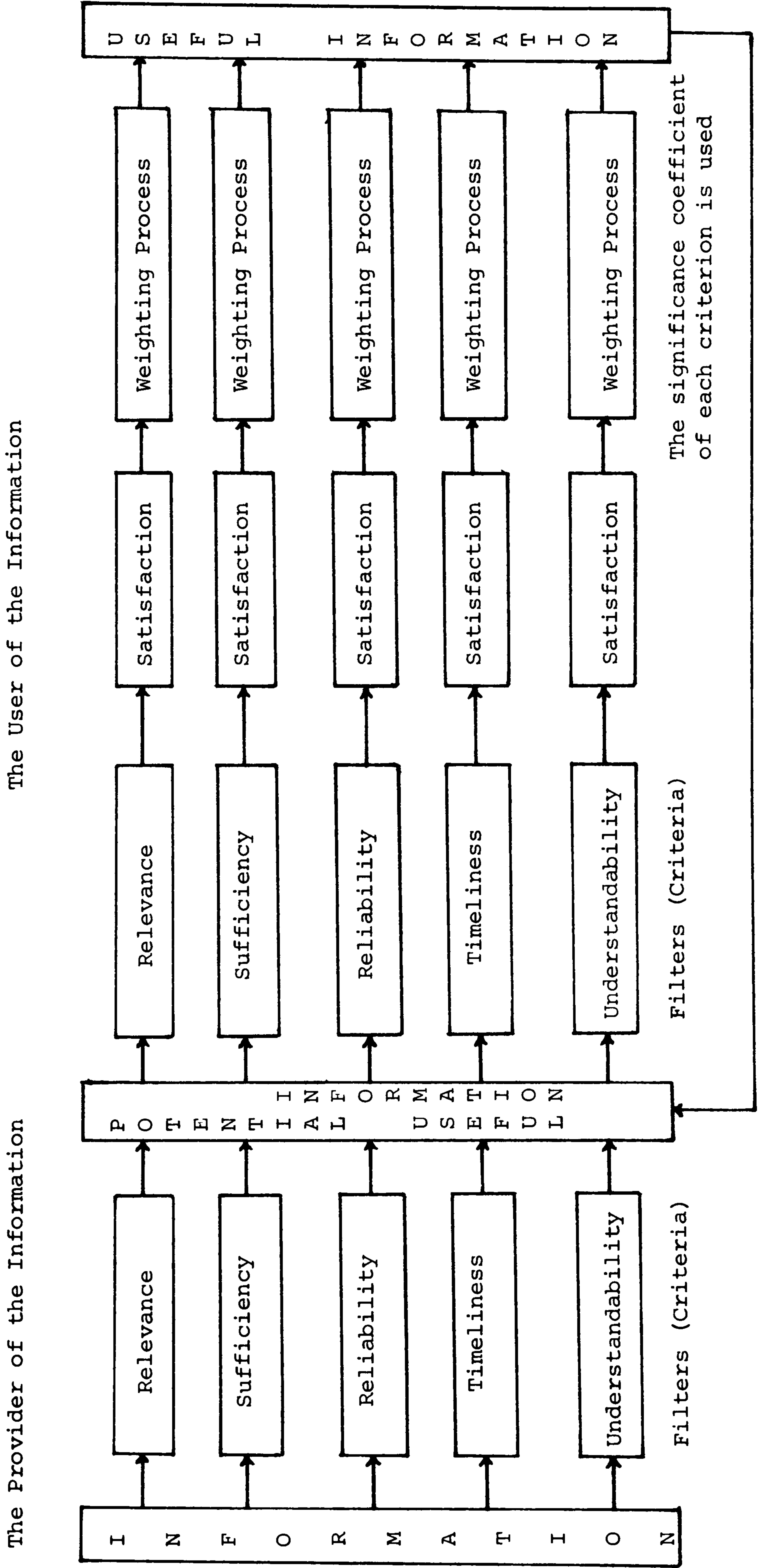
first, as previously stated, there is disagreement among researchers in this connection. At one extreme, the relative importance of each criterion is conditioned by the circumstances; at the other extreme, the criteria are equally important. Second, those researchers who have indicated that there are differences in the significance of each criterion, have not assigned weight to each one. This may be attributed, partially, to the fact that weights are a relative matter and are conditioned by the circumstances. If the situation is such, then it seems reasonable to determine the relative importance of these criteria from the perspective of users of information.

Apart from the problem of assigning the relative importance of each criterion, the provider of information may apply the suggested criteria to the preparation and communication of the information required by managers which must appear useful from the provider's perspective, but only if the information recipient (manager) feels that the five basic criteria have been met can the information be deemed completely useful. The use of the suggested criteria in the evaluation of the information provided is shown in Figure (2.5) on page 84. From the provider's perspective; in order that the information should reach managers in a useful form, information must "pass through" each criterion which works as a filter, used to ensure that each information attribute is met. While the provider may have personal concepts of each information attribute, it is not sufficient in itself. The provider must also satisfy the concept held by the manager.

Thus, the information received by the manager must pass through the same criteria to determine to what extent the manager is satis-

FIGURE (2.5)

A Suggested Framework Of Information Criteria



fied with each information attribute. However, a specific attribute could be more important than others, and consequently influences the usefulness of the information received. In other words, the relative importance of each information attribute may be used as a weighting coefficient of the manager's satisfaction with these attributes, so as to determine the usefulness of the information.⁸⁰

It is clear that if the information cannot pass through one of these filters (criteria) it would be completely rejected. That is, none of the five suggested criteria can be completely absent; any information which does not meet any of these criteria would be useless whether from the user's perspective or the provider's viewpoint.

2.4.6 Summary

The major purpose of a management information system is to collect and process data to produce information which is useful to all levels of management in planning and controlling the activities of an organisation. The system may be non-computerised or computerised. However, computers afford tremendous opportunities for sophisticated information systems. Obviously, all organisations have a management information system, but such systems vary greatly in their level of sophistication.

A management information system can be conceived as a combination of a number of interdependent subsystems, such as marketing, manufacturing, personnel and accounting. The latter, indeed, has

⁸⁰ The theme behind weighting managers' satisfaction with the attributes of the information provided will be discussed in Chapter V, while its application will be presented in Chapter VIII, see: pp.245-246 and pp.528-533, respectively.

become one of the information subsystems but not the major one. However, the role of accounting information systems in an organisation is determined by the degree of integration among all the information subsystems.

The input of an information system is data which is items that have not been evaluated for their worth to a specified manager in a particular situation. The system's output is information that is evaluated data furnished for a specified manager, for a particular problem and at a specific time. In fact, the distinction between data and information is a relative matter, in the sense that what may be information to one manager could be data to another, or even for the same manager at a different time or for a different problem.

The information provided by an information system must meet certain criteria so as to be useful. The literature, in fact, abounds with various frameworks of information criteria which can be used in preparation, communication and evaluation of the information. For the purpose of this study, five criteria have been suggested. They are, relevance, sufficiency, reliability, timeliness and understandability.

SECTION 2.5 - SUMMARY

An organisation may be viewed as a system consisting of three subsystems: (1) operations system; (2) decision-making system; and (3) information system. The operations system is essential to achieve the goals of the organisation and it represents the main system within it. The decision-making system is necessary to direct the operations system towards these goals. The purpose of the information system is to produce useful information to facili-

tate the decision-making and guide the operations system. The characteristics of the three systems are summarised in Table (2.3) on page 88. These systems are interrelated and interdependent in terms of their inputs and outputs. The overall purpose of the organisation is sought to be achieved by them. The relationship among these three systems, however, is illustrated in Figure (2.6) on page 89.

From the illustration in Figure (2.6), the following inferences can be drawn:

(1) The three subsystems are interrelated and interdependent. In the sense that input of one system is the output of another. The operations system depends, *inter alia*, on the outputs of both the decision-making system and the information system. The decision-making system, in its turn, depends, *inter alia*, on the output of the information system.

(2) An essential part of the three subsystems and the organisation as a system is the feedback loop, by which a system controls its own operation and takes corrective action so that the system functions in the proper manner to achieve its goals.

(3) It is clear that the three subsystems cannot achieve control and the feedback process effectively without the interdependence discussed in the first note. That is, the feedback of the operations system affects the input of this system, and consequently affects the outputs of both the decision-making and the information systems. On the other hand, the feedback process of the decision-making system affects its inputs which include, *inter alia*, the information that is the output of the information system.

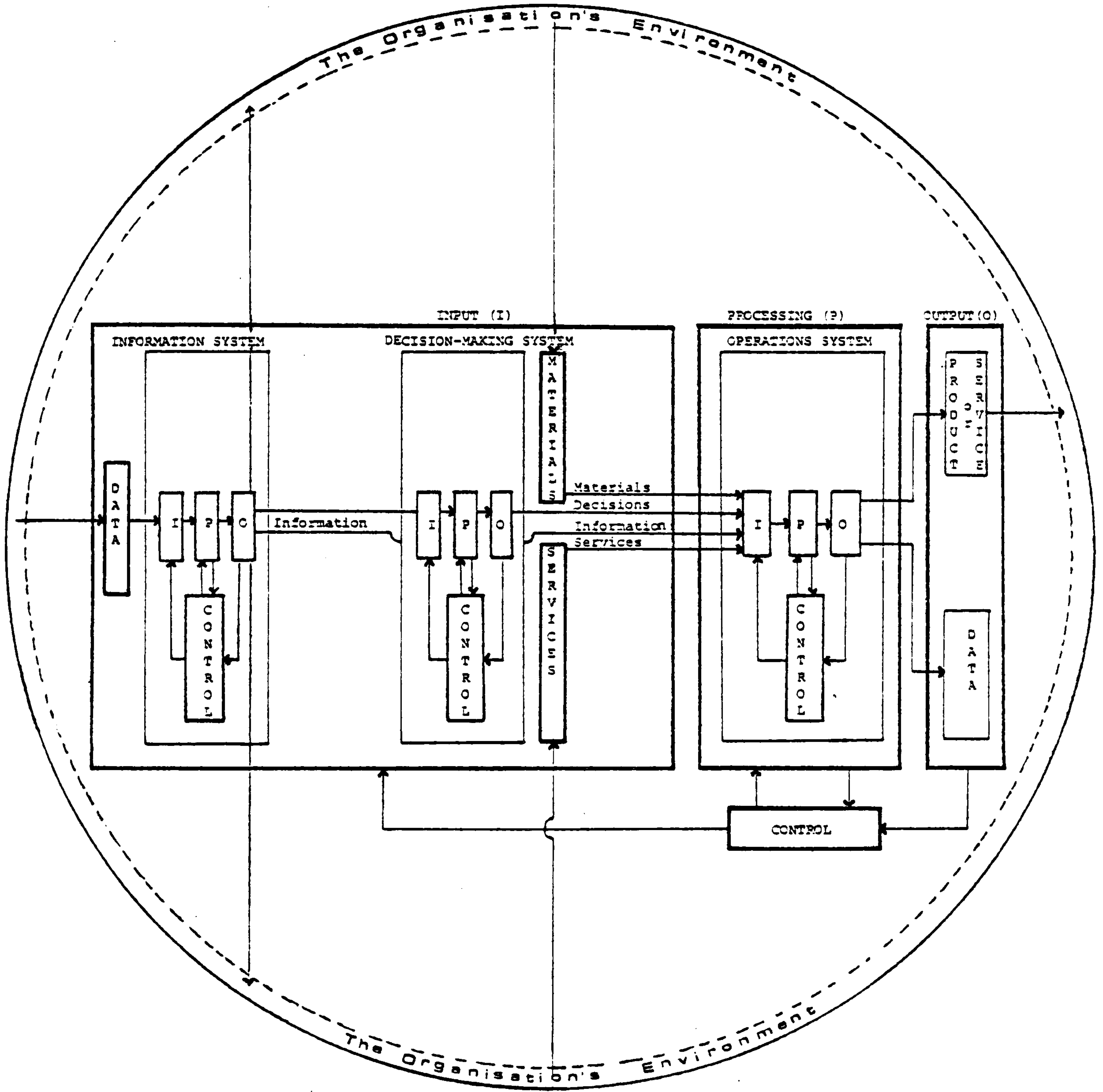
TABLE (2.3)

Characteristics of Systems Within An Organisation

System	Purpose	Structure	Process	Input	Output
Information System	To provide useful information to other systems	Marketing manufacturing, personnel and accounting systems	Recording storing retrieving, processing data and transforming information	Data	Information
Decision-making System	To select the appropriate alternative	Strategic planning, tactical planning, management control, and operational control	Finding possible alternatives, choosing among them	Information and subjective judgement	Decisions
Operations System	To carry out physical operations of the organisation	Marketing, manufacturing, personnel and finance	Acquisition of resources and converting them into useful products or services	Materials, services, decisions and information	Products or services and data

FIGURE (2.6)

The Interaction and Interdependence Among The Operations System, The Decision-Making System, And The Information System Within An Organisation



(4) The information system is of vital importance for the other two systems. Information constitutes an essential part of the input to the decision-making system and the operations system. The effectiveness of the latter two systems depends, to some extent, on the effectiveness of the information system in providing the information needed.

CHAPTER III

MANAGEMENT INFORMATION REPORTING:

THE BEHAVIOURAL ASPECTS

The management information system of any organisation is not solely a technical system in the sense that it is designed only for collecting, processing data and generating information. Rather, it is intended that the information produced and transmitted to managers should affect their decisions, i.e. behaviour. Unless the management information system reports have the potential to influence managers' decisions and actions, the cost of preparation of these reports may be difficult to justify.

In order to impact managers' decisions, the information provided by the management information systems should be useful from the managers' perspectives, that is, relevant, sufficient, reliable, timely, and understandable. Usefulness, as stated in Chapter II, has been recognised as the primary criterion for information reporting. In other words, the management information systems should satisfy their users by providing them with useful information as and when required. Thus, users' satisfaction has been pointed out as the basic purpose of the management information systems and as an indicator of the effectiveness of the systems.

However, management information reports would not satisfy managers and influence their actions, i.e. behaviour, as intended by the information providers, if the information were not perceived and comprehended as the latter actually intended. In other words, the information contained in the reports may not be perceived by managers because of some barriers, or it may be perceived and inter-

preted as something other than what was intended by the providers. Thus, the informational value of management information reporting is a function, not only of the information prepared and communicated by the providers, but also of the perception of this information by the users, i.e. managers.

Managers, of course, do not perceive the information contained in the management information reports if they do not use and rely on these reports so the management information systems can be considered effective. But, what does the utilisation of an informational system mean? Is a system utilised if a decision-maker, i.e. manager, merely receives its outputs? Is a system utilised if a decision-maker receives its outputs, examines these outputs and uses them?

Clearly, even if a decision-maker, i.e. manager, physically receives the system outputs, he may not examine them. Even if he examines these outputs there is no guarantee that his actions or decision-making have or will be impacted. In other words, the decision maker may not use the information provided by the system.

The utilisation of an information system means that the decision-maker includes the information provided by the system in his human information processing system. This system, i.e. the human information processing, is the cognitive system that has the capacity to organise, manipulate information for decision-making. An information system is, therefore, utilised if the output from the information system is organised and/or manipulated and/or integrated by the decision-maker.

In fact, utilisation of an information system is affected by

two factors: (1) factors inherent in the internal (human) information system of the decision-maker, and (2) factors inherent in the external (management) information system which supplies information to the decision-maker. The first set of factors will be discussed in this chapter. The second group of factors will be studied in the following chapter.

Therefore, management information reporting is conceived as a behavioural process. It is carried out by people and influences the behaviour of people. Thus, it may be possible to say that the most pervasive and fundamentally important aspect of management information reporting is the human component. In relatively simple information systems, all significant functions may be performed by persons and the output of the systems received and used by persons. Even in highly automated systems, the human aspect is essential as the designer, programmer, operator and the ultimate recipient of the system's output.

In fact, the user of information, i.e. manager or decision-maker, is the most important factor in the human component of management information reporting. His satisfaction with the information provided by the management information systems, indicates, to a great extent, the effectiveness of the systems. However, users' satisfaction is influenced, among other things, by his perception, the motivational effect of the information provided and his decision-making style, i.e. his human information processing system.

The purpose of this chapter is to discuss the concept of user's satisfaction with the information provided by an information system, and the psychological factors which may influence his satisfaction.

Therefore, this chapter is divided into five sections as follows:

- (1) Manager's satisfaction as a measure of the effectiveness of an information system.
- (2) Perception and management information reporting.
- (3) The motivational effect of management information.
- (4) The decision making style of the user of information.
- (5) Summary.

SECTION 3.1 - MANAGER'S SATISFACTION AS A MEASURE OF THE EFFECTIVENESS OF AN INFORMATION SYSTEM

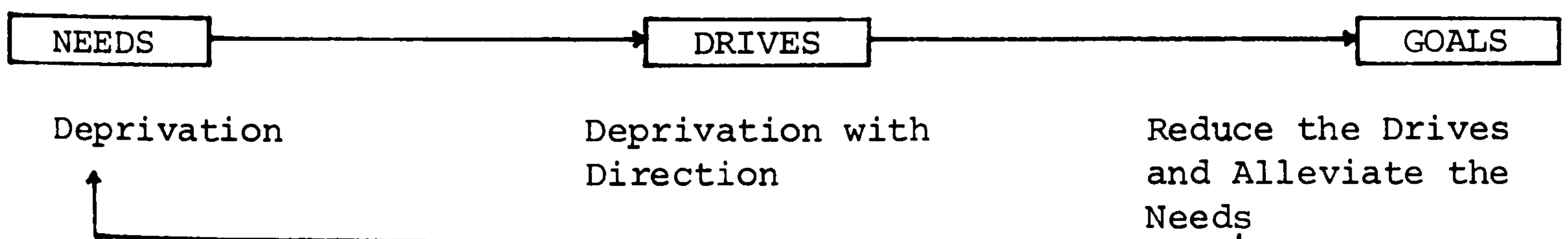
3.1.1 Need Satisfaction

3.1.1.1 Introduction

All individuals have certain needs for which they are continuously seeking satisfaction. The existence of unsatisfied needs produces tension and the motivation underlying behaviour is to reduce this tension. The key to understanding need satisfaction lies in the meaning and relationship between three terms. These are: needs, drives and goals, which represent what is called the basic motivation cycle. This cycle is graphically depicted in Figure (3.1).¹

FIGURE (3.1)

The Basic Motivation Cycle



¹ See for example:

Steers, Richard M. and Lyman W. Porter, Motivation and Work Behaviour, (New York: McGraw-Hill Book Company, Inc., 1979), p.7

Luthans, Fred, Organisational Behaviour. A Modern Behavioural Approach to Management, (New York: McGraw-Hill Book Company, Inc. 1973), p.392

The terms included in this cycle, i.e. needs-drives-goals, are explained below.²

1. Needs. The best one-word definition of a motivational need is deficiency. Needs are created whenever there is a physiological or psychological imbalance. For example, a need exists when a body is deprived of food, and a need develops when a person is deprived of other persons who serve as friends or companions.

2. Drives. Drives or motives are set up to alleviate needs. A drive can be simply defined as a deficiency with direction. Drives are action-oriented and provide an energetic thrust towards goal accomplishment. They are at the very heart of the motivational process. The example of the needs for foods is translated into the hunger drive and the need for friends becomes a drive for affiliation.

3. Goals. At the end of the motivation cycle is the goal. A goal in this cycle can be defined as anything which will alleviate a need and reduce a drive. Thus, attaining a goal will tend to restore physiological or psychological balance and will reduce or cut-off the drive. Eating food, and obtaining friends will tend to restore the homeostatic balance and reduce the corresponding drives. Food and friends are the goals in these examples.

3.1.1.2 Hierarchy of Needs

All individuals have certain needs for which they are continuously seeking satisfaction. The existence of unsatisfied needs produces tension and the motivation underlying behaviour is to reduce this tension. Although need satisfaction is generally

² Ibid., pp.6-8; pp.392-393

accepted as constituting the prime determinant of behaviour, disagreement exists among psychologists regarding the number of human needs which exist and the relative importance of each.

Human needs, in fact, are numerous. However, they can be reduced to a few underlying types. These needs can be arranged in order of importance, or to put it another way, in order of satisfaction priority. Some needs are more basic than others and have prior call. These needs can be classified into five classes: (1) the physiological needs; (2) the safety needs; (3) the belongingness and love needs; (4) the esteem needs; and (5) the need for self actualisation.³

The needs which have first priority are the physiological ones requiring food, air, water and others in this category. Their satisfaction is necessary for physical vitality. When these physiological needs are reasonably met, the next level of needs begins to emerge. These are the safety needs, among which are the avoidance of physical harm, and economic disaster. In a similar manner, satisfaction of the safety needs gives rise to the emergence of belongingness and love needs, then esteem needs, until the satisfaction of all of the above leads the person to be primarily concerned with the highest level needs; that is, self-actualisation which is characterised by the need for growth, achieving one's potential, and self-development.

Indeed, several observations are necessary to clarify this classification of needs:

³ Maslow, Abraham, Motivation and Personality, (New York: Harper & Row, Publishers, Second Edition, 1970), pp.35-47

First, it should not be inferred, that only one class of needs exists for a person at any given time, and that once satisfied, it completely disappears, giving way to the next higher level of needs. Rather, all levels of needs probably exist to some degree for the individual most of the time. Rarely is any one need completely satisfied, at least for very long.

Second, it is also important to recognise that much behaviour simultaneously satisfies several different needs, rather than just one. A manager, for example, may participate in a lunch with both his superior and peers to simultaneously satisfy his hunger needs, and his need to belong and be accepted by the group in which he works. On the other hand, the same need may be satisfied by different behaviours. For example, a need for esteem from others can be satisfied through a promotion within the formal organisation; also it can be met through informal influence in the work group.

Finally, if a need is largely satisfied at any given point in time, it ceases to serve as an important motivator until re-emerging again.

3.1.2 Satisfaction/Frustration And Management Information Systems

Management information systems should satisfy or participate in satisfying two groups of needs of managers: (1) their informational needs as decision-makers; and (2) their human needs. The former are discussed in this section, while the latter are presented in section three in this chapter.

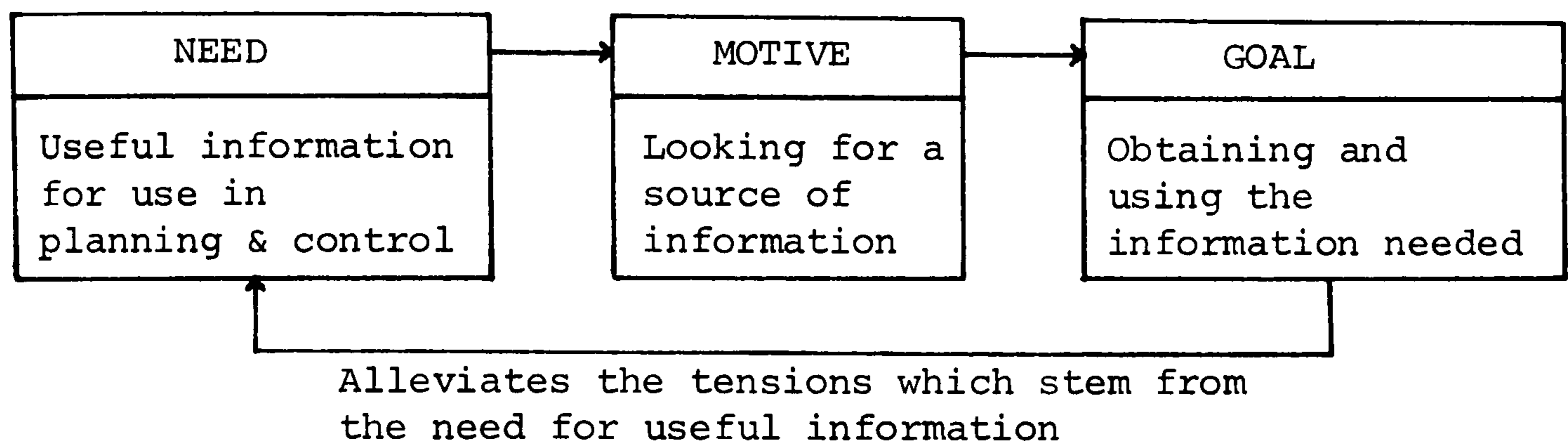
The informational needs of managers involved in decision-making in an organisation can be divided into two types: (i) information needed for planning; and (ii) information needed for control. Both types of information should be useful, that is: relevant,

sufficient, reliable, timely and understandable.

The process of satisfying the individual's informational needs can be illustrated in the same manner of the basic motivational cycle presented previously. The application of this cycle is illustrated in Figure (3.2).

FIGURE (3.2)

The Satisfying Cycle Of The Informational Needs



The process of satisfying the informational needs consists of three elements: (1) need for useful information; (2) motive for looking for a source of such information; and (3) obtaining and using the information needed. The individuals, as decision-makers, need useful information for planning and control. The need for useful information creates a drive or motive for looking for a source of information which can satisfy this informational need with the attributes required. The information obtained and used, if it is useful, will alleviate the individual tensions which stem from the need for information. If the individuals do not find, as they expected, that the information is useful they will rely less on this source, which does not eliminate their tensions, and consequently they will look for another one.

To sum up, from a behavioural point of view, one of the purposes of the information system is to alleviate the individual

tensions which evolve from a need for information. Individual satisfaction, for a decision-maker, is achieved by providing him with his needs, i.e. useful information. However, individual satisfaction is constrained by the attributes of the information provided, that is whether or not the information is relevant, sufficient, reliable, timely and understandable.

In fact, user's satisfaction has been recognised as the major purpose of the management information systems and as an indicator of the effectiveness of these systems. This can be seen from the following quotations:

"Effectiveness measures include: quality of programmer output, user satisfaction, operational quality, ..." ⁴
(Emphasis added).

"The information needs of the manager are thus crucial for the design of the system, and his satisfaction with the outcome is certainly a very important criterion of the success of the system." ⁵ (Emphasis added).

"There are two main characteristics of successful computer systems: the users of the systems are satisfied and the systems are paying their way." ⁶ (Emphasis added).

"... evaluating a data processing manager and the general effectiveness of his department is to find out what the operating people think of him. Since his main job is to provide a service to other groups in the company, if they are not satisfied with his service, there may be some question to its effectiveness." ⁷ (Emphasis added).

⁴ Sutton, Richard H. and Robert L. Mathis, "Performance Appraisal - Part 2", Journal of Systems Management, (July 1979), p.9

⁵ Edstrom, Anders, "User Influence And The Success of MIS Projects: A Contingency Approach", Human Relations, Vol.30, No. 7, (July, 1977), p.590

⁶ Gellman, Harvey, "Successful Use of The Computer Systems", The Business Quarterly, (Summer, 1973), p.39

⁷ Dearden, John and F. Warren McFarlan, Management Information Systems, (Homewood, Illinois, Richard D. Irwin, Inc., 1966), p.55

From the preceding quotations, the effective management information system is one which satisfies its users. In other words, the effective system is one which does not require additional searches for information that the system was designed to provide. An additional search is a cause of frustration to a manager, i.e. decision-maker or user of information. It indicates the lack of the information needed. Frustration is "the interference with or blocking of the attainment of a goal. If one wants to go somewhere, perform some act, or obtain something and is prevented, we say he is frustrated".⁸

In the psychological sense, the information system causes the frustration by actually blocking managers from carrying out, entirely or not effectively, the act of decision-making. The more frequent the managers must perform to obtain additional information and the systems do not provide it, the more they are frustrated with the systems.

In fact, individuals react to frustration in different ways, just as the importance of different needs varies from one person to another. However, two reactions to frustration can be identified; constructive behaviour and defensive behaviour. In other words, individuals sometimes react to frustration in a positive manner, that is they search for realistic and constructive approaches to meet their unsatisfied needs. In other cases, when frustrated, individuals may react by evoking one or more defence mechanisms instead of adopting constructive realistic approaches to solving

⁸ Freedman, Jonathan L., J. Merrill Carlsmith and David O. Sears, Social Psychology, (Englewood Cliffs, New Jersey: Prentice-Hall Inc., Second Edition, 1974), p.106

their problems. Although there are many defense mechanisms, they can be summarised into four categories. These are:⁹

- (1) Aggression. When a person becomes frustrated, it was thought that he would react physically or non-physically, attacking the barrier causing the frustration.
- (2) Avoidance or withdrawal. That is the person avoids or withdraws from the frustrating situations.
- (3) Fixation. The person continually tries to obtain satisfaction although there is an actual barrier.
- (4) Compromise. That is, substituting a new goal or a new direction.

The manager, when frustrated by the information provided by the information system, may react in positive manner (constructive behaviour) that is, he depends on the information available and provided by the system and tries to find another source of information such as the informal information systems. The manager may react to the frustrating situation by evoking defence mechanisms. However, two mechanisms appear applicable, (1) aggression, that is the manager complains about the effectiveness of the system, and (2) compromise, that is the manager tries to adapt to the information available.

Satisfaction, in contrast to frustration, is defined as "the feeling state in a person who has gratified an appetite or motive".¹⁰

⁹ See for example:

Richards, Max D. and Paul S. Greenlaw, Management Decisions and Behaviour, (Homewood, Illinois: Richard D. Irwin, Inc., 1972), pp.144-148;

Luthans, Fred, op. cit., pp.462-464

¹⁰ Wolmand, Benjamin B. (Ed.), Dictionary of Behavioural Science, (London: The Macmillan Press Ltd., 1974), p.333

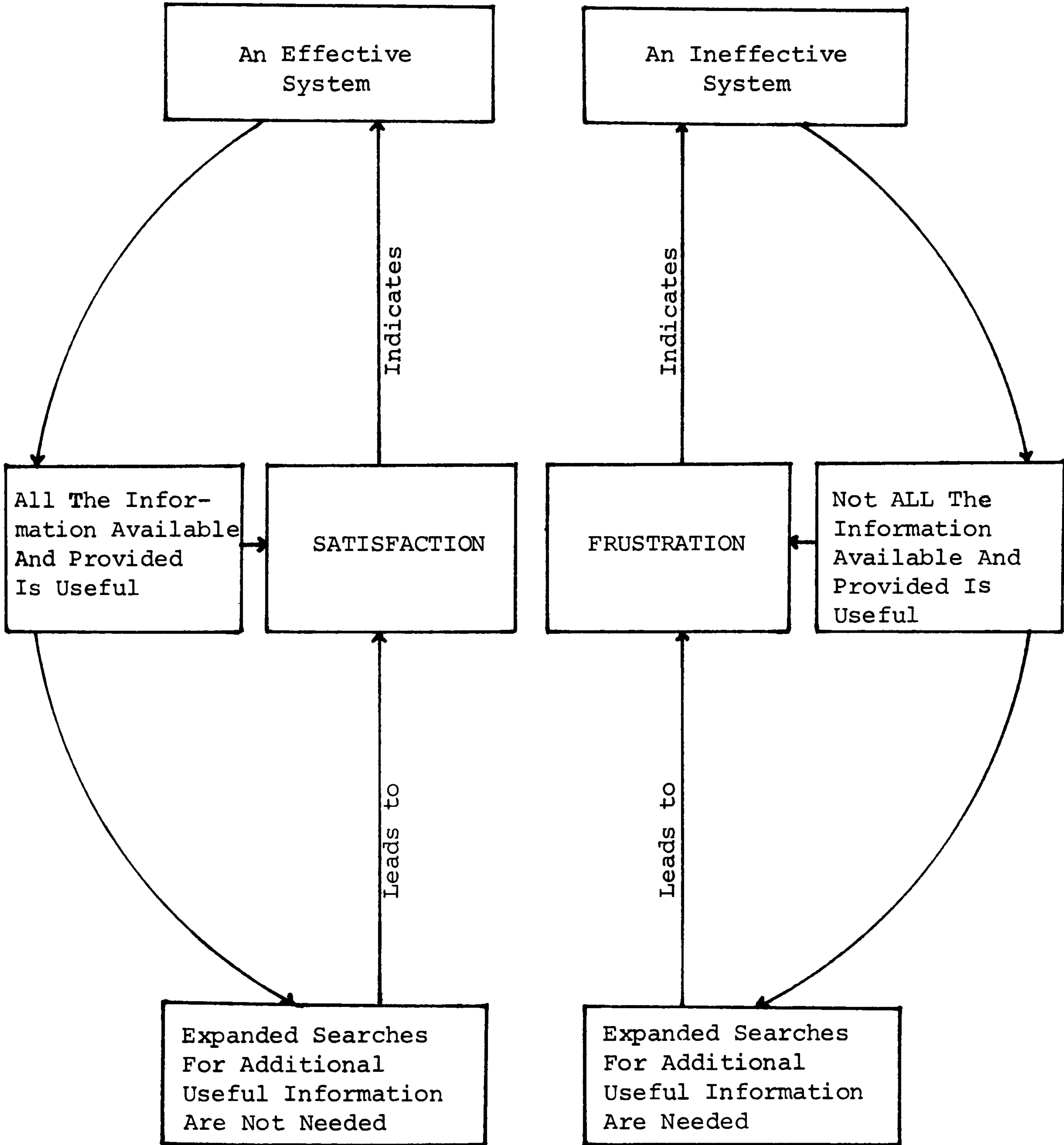
Satisfaction, in the psychological sense, occurs when frustration is reduced or avoided. If the information system supplies the information needed by the manager as and when required, the manager will be satisfied with the system, and accordingly frustration will not occur. Therefore, satisfaction with the information provided indicates that the information is useful and the system is effective. Figure (3.3) illustrates the relationship manager's satisfaction/frustration - useful information - the effectiveness of the system.

As can be seen from Figure (3.3) the effective information system is capable of providing all of the useful information needed which the system was designed to produce. No expanded searches for additional useful information from other sources of information are required. Then the present information system is satisfactory, i.e. effective. On the other hand, the ineffective system does not provide all of the useful information needed and accordingly expanded searches for additional useful information are required. Thus the manager, the user, is frustrated. This indicates that the system is ineffective.

Satisfaction with the information system may be considered to be inversely proportional to the number of expanded searches required by the manager for useful information which is not provided by the system. If the majority of the decisions taken by the manager requires expanded searches for useful information, the manager's satisfaction with his present information system will be reduced. In other words, the greater number of expanded searches the manager must perform, the less satisfaction he has with the system. By periodically measuring satisfaction with the information system, one can indirectly evaluate the effectiveness of the

FIGURE (3.3)

The Relationship Manager's Satisfaction/Frustration -
Useful Information - The System's Effectiveness



information system. However, the managers' satisfaction is influenced by some psychological factors such as perception, the motivational effect of the information provided and the decision-making style. These are discussed in the following sections.

SECTION 3.2- PERCEPTION AND MANAGEMENT INFORMATION REPORTING

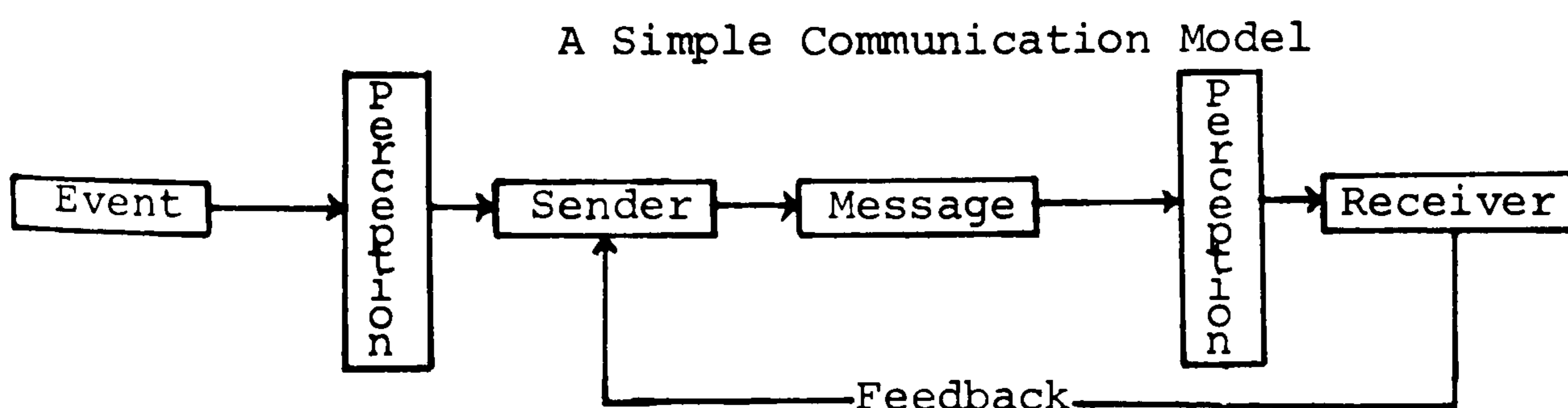
3.2.1 Introduction: Information Communicating Process

3.2.1.1 Communication

The term "communication" is derived from the Latin communis, which can be translated as "common" or "shared". Definitions cited in literature indicate that communication incorporates, in addition to commonality, the concepts of transfer, message, information, and meaning. These, obviously, require at least two persons to be involved; one acts as sender of a message which contains information, or ought to contain it, the other acts as receiver of the message (information). Communication, then, is an interactive process between three basic elements; sender, message and receiver.

The process of communication may be broken down into components in many different ways and degrees of detail, depending on the purpose at hand. For the purpose of this study, a simple communication model is adopted which is consistent with the following elements: (1) event(s); (2) sender; (3) message; (4) receiver; and (5) feedback.¹¹ This model is illustrated in Figure (3.4).

FIGURE (3.4)



¹¹ Jordan, John R., Jr., "Financial Accounting and Communication", (1970), pp.27-29

The communication process begins with an event which is external to the sender and the receiver. The event is perceived and interpreted by the sender. Based on his perception and interpretation, he develops a message. Once the message is developed, the sender faces the task of selecting the symbolic representations with which to express it. The message transmitted is perceived, understood, and interpreted by the receiver, and consequently his actions may be affected.

The responsibility of the sender is not only, of course, to transmit the message and the receiver's responsibility to understand it, but to ensure that the receiver understands the message. Feedback to the sender then, is exceedingly important in the whole process because it enables him to appraise the extent to which his message is understood. What is important about feedback is not that it exists, but what the sender does in the light of it. The greater the sensitivity of the sender to feedback in revising his message in the light of it, the greater his chance of communicating effectively.

Managers, as the receivers of information, actually have a direct method of controlling the messages transmitted. They state their information needs in advance of the sender's formulating and transmitting the messages. By doing so, managers actually initiate the communication process. This direct channel between managers and the provider is the homeostasis in management information reporting systems. This channel allows the system to continue functioning in a steady state. However, the feedback channel further ensures the success of the system. If the provider (sender) misunderstands the managers' statement of information needs, or if

the statement itself is not clear, the feedback channel carries that message back to the provider with a restatement of information needs for a recycling of the process.

Obviously, the ultimate goal of management information communication is to elicit a particular response from the intended manager (receiver). From the sender's perspective, the success or failure of a communication is largely determined by the extent to which the desired response is matched by the achieved response. Thus, it may be useful to distinguish between three components of the communication process; 'communication', 'effective communication', and 'influential communication'. The objective of the communication component is achieved if the receiver assigns the meaning intended by the sender to the message transmitted. Effective communication occurs only if the message possesses utility, i.e. useful information, to the receiver. Influential communication occurs only if in addition to the achievement of effective communication, the behaviour of the receiver is that intended by the sender.¹²

Accordingly, it may be possible to say that management information reporting has two purposes; to inform, and to persuade. Regarding the first purpose, the information provider's objective is to increase or alter the manager's store of knowledge; managers seek to acquire information. Additionally, the purpose of communicating management information is to persuade; the intent is to

¹² Smith, James E. and Nora P. Smith, "Readability: A Measure of the Performance of the Communication Function of Financial Reporting", The Accounting Review, (July, 1971), p.553;

see also:

Bormann, Ernest G., W.S. Howell, R.G. Nichols and G.L. Shapiro, Interpersonal Communication in Modern Organisation, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969), p.207

achieve a change in the manager's beliefs, attitudes, opinions and overt behaviour.

To achieve the purposes of communication, the message, which is assumed to contain information, should be properly understood by the person who receives it, otherwise its usefulness is reduced. In other words, mutual understanding between sender and receiver must occur so that we may say that there is communication. The problem, in fact, is that "the same words mean different things to different people. Unless the communicator does an exceptionally good job of framing his ideas in words or has at his disposal a technical vocabulary which is known to the recipient, the words he uses will be at best an approximation of his meaning and the recipient will decipher the communicator's meaning in light of his own experience and ideas".¹³

3.2.1.2 Communication is the Process of Creating a Meaning

Messages being transmitted must be within the range of experience of the received person before one can assign a meaning to the messages. Meaning, the semantic aspect of communication, is the major problem of the communication process. In fact, meaning is not inherent in messages and therefore, it is not conveyed by the sender but rather it is imposed by the receiver. Hence, the problem encountered is to give the precise meaning to the message that the sender intended.

Communication is thus "a word that describes the process of creating a meaning".¹⁴ Three terms in this definition are recog-

¹³ Tsaklanganos, Angelos, "Communication, A Managerial Myth", Management Accounting (U.K.), (July - August, 1978), p.295

¹⁴ Barnlund, Dean C., "Toward a Meaning-Centered Philosophy of Communication" in: Kim Giffin and Bobby R. Patton (Eds.), Reading in Interpersonal Communication, (New York: Harper & Row,

nised. They are: "process", "creating", and "meaning". Each term will be considered separately.¹⁵

(1) Interactive process. Communication is essentially an interactive process. It can be clarified by considering the interdependency which exists between the sender, the message, and the receiver. The receiver of a message depends upon the performance of the sender in encoding a message that the receiver can understand. In the same view, the sender of a message depends upon the receiver to properly decode the message transmitted. Thus, for successful communication to occur, both the sender and the receiver must perform their functions, i.e. encoding and decoding, adequately.

(2) Creating. The sender is faced with the task of formulating a message which expresses the idea that he wishes to transmit. To do this, he must select symbols that not only express the idea to be transmitted, but also symbols that the receiver can translate into the same idea. The creating process, then, can be described in detail as follows: the occurrence of an event is perceived by the sender, who selects some of the characteristics of the event from all that may be available. He evaluates these characteristics. The feelings resulting from the evaluation process are transformed by the sender into words, in accordance with his language habits. The sender makes his selection of words that he will use to transmit the message from a large inventory of words that he could use for such a purpose. The receiver, on the other hand, will receive the message which is also the occurrence of an event to him. He will repeat the same process as already discussed above. When the receiver and the sender transform their feelings in identical ways,

¹⁵ Ibid., p.42

it may be said that an identical transformation has occurred.

(3) Meaning. The last term to be considered in the concept of communication is "meaning" which is a somewhat illusive notion. This may be attributed partially to the relationship between a word and the object which the word stands for. Such relation exists only in the mind of the person using the word. Indeed, meaning is subject to change, because of changes in our experiences. Even if two persons were to experience the same situation, the meaning may not be the same since the experience is essentially a private affair.¹⁶

The problem, indeed, is that words can be described as having two types of meaning. They have an explicit or denotative meaning and a connotative meaning. An explicit meaning of a word is what we have agreed is the formal interpretation of that word. The connotative meaning of a word is the emotional release we get from that word. For example, the word "cheap" means inexpensive, but it can also mean immoral, stingy, or inferior. This word when used in a business community, has several different interpretations and will produce a variety of reactions.¹⁷

Thus, the difficulty which arises in the communication process is about the explicit or denotative meanings, versus connotative meanings, when one considers that most words have both meanings. But some words are strongly connotative. They may affect communication, since they mean different things for different individuals.

¹⁶ Schoderbek, Peter P., A.G. Kefalas and C.G. Schoderbek, Management Systems. Conceptual Considerations, (Dallas, Texas: Business Publications, Inc., 1975), p.99

¹⁷ Kahn, Charles, "Psycho-Linguistics and Business Communications", Journal of Systems Management, (June, 1975), pp.22-23

Further, persons are constantly in the process of evaluating their world, hence, as one encounters the world and learns the terms associated with each of the objects, events and people, will result. If the person's experiences have been favourable, then the connotative meaning of the term will be favourable and vice versa.

Thus, the meaning which the receiver may deduce from a message is what the sender must always consider. The problem is that any message communicated can have three different meanings.¹⁸

1. One meaning is that which the sender intended to send.
2. A second is the meaning actually contained in the message.
3. The third is the meaning which the receiver perceives.

Obviously there may be differences between the intended and/or the actual content of the message and its perception by the receiver. Yet, if the purpose of the message is to produce action on the part of the receiver, the only interpretation of its meaning that is significant is the meaning perceived by the receiver and by which his action may be affected.

The sender of a message, of course, wishes to achieve what is called "perfect fidelity", that is a complete correspondence between what is understood by the receiver of the message with what the message is intended to be, expressed by the sender. Thus, if a message is produced with complete fidelity and interpreted also by the receiver with complete fidelity, then it can be said that there is perfect communication of the message.¹⁹ Fidelity or

¹⁸ Caplan, Edwin H., Management Accounting and Behavioural Science, (Reading, Massachusetts: Addison-Wesley Publishing Company, 1971), p.54

¹⁹ Bedford, Norton M. and Vahe Baladouni, "A Communication Theory Approach to Accountancy", The Accounting Review, (October, 1962), p.654, p.656

correspondence in meaning is influenced, indeed, by differences in perception between the sender of the message and the receiver of it.

3.2.2 Perception: Its Influence on Information Communicating

Apart from the information needed, managers, as users of information, perform two functions in the communication process:

(1) receiving the messages contained in the reports; (2) interpreting these messages. In order to be interpreted, a message must first be received by the prospective manager; there must be a conscious registration of message stimulus on the nervous system. Accurate receipt is achieved when the stimulus provided by the sender is consciously and correctly registered in the nervous system of the manager. It requires adequate stimulus, acceptable conditions of presentation, and attention directed towards the message by the manager. Interpreting or decoding a message means reconstructing it and attaching a meaning to the message. Meaning, as previously stated, is provided by human beings, it is not found in a message. The meaning which a manager may attach to a message is influenced by his perception.

3.2.2.1 The Concept of Perception

"Perceptions are associated with the organisation and integration of sensory attributes, that is, the awareness of 'things' and 'events' ..."²⁰ In other words, perception is a psychological process whereby past experience, reasoning and judgement are involved. It is, indeed, interpretation of a situation, not an exact recording of it and consequently the perception process may yield a picture of the situation as quite different from reality.

²⁰ Schiffman, Harvey Richard, Sensation and Perception: An Integrated Approach, (New York: John Wiley & Sons, Inc., 1976), p.1

A person uses his physical senses such as vision, hearing, touch etc. to perceive the world around him, yet perception is not sensation. Although all the knowledge of the world depends upon the physical senses and their stimulation, the raw sensory data are not sufficient to produce or to explain the coherent picture of the world. A mental process is needed. Obviously perception largely depends upon the sense for raw data. However, the perceptual process may filter, modify, or completely change these data through its complex interactions. Perception, then, is much more complex and much broader than sensation. The perceptual process involves a complicated interaction of selection, organisation, and interpretation of the information.

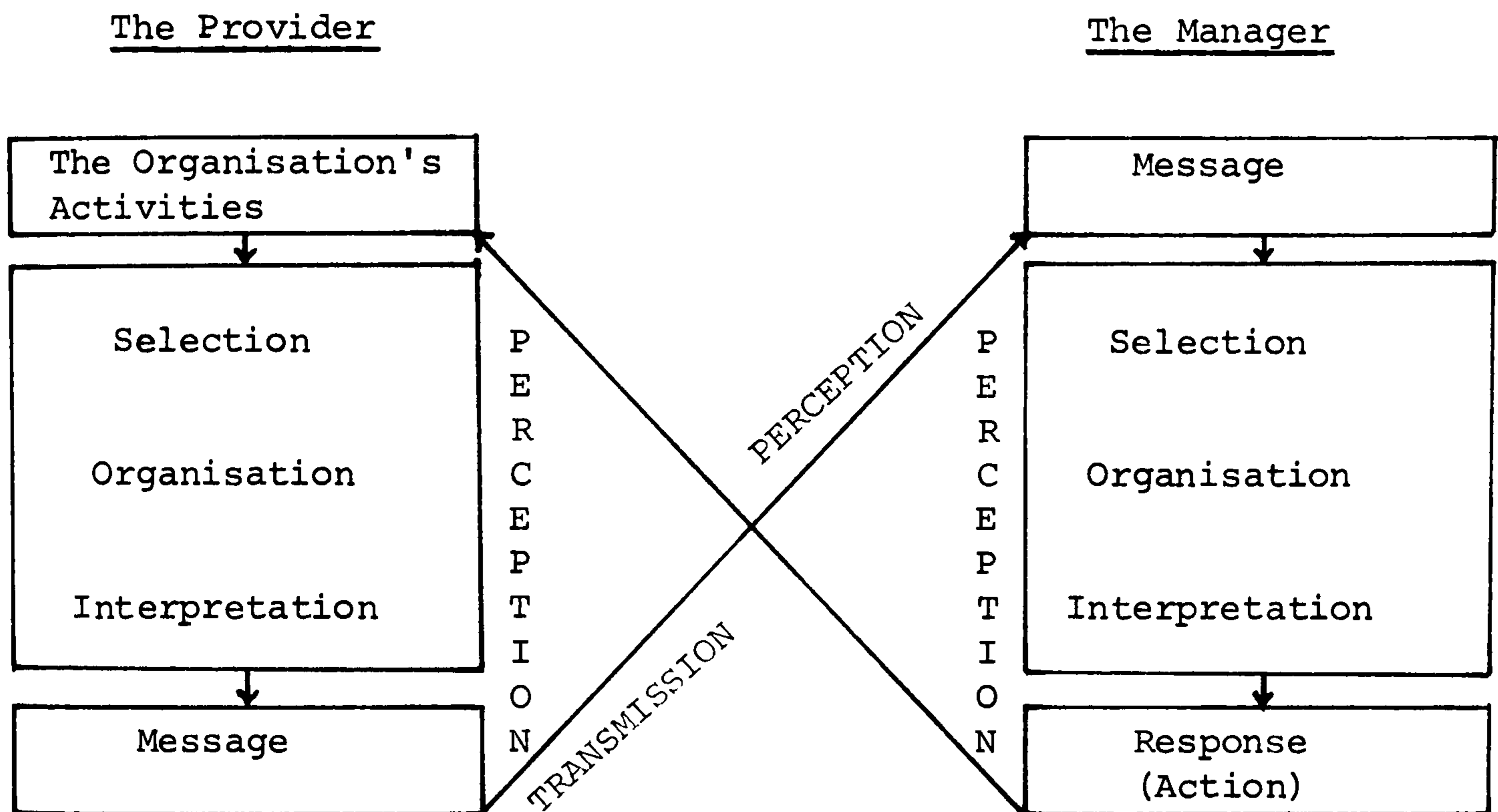
3.2.2.2 Subprocess in Perception

The perception process of a provider of information and a manager, as user of it, is illustrated in Figure (3.5). This process consists of the three interacting subprocesses mentioned above. The information provider's perception begins when he is confronted with the occurrence of the organisation's activities. In the selection subprocess, the provider chooses certain characteristics of the observed activities for inclusion in his data bank and for containing in the management information reports. The provider's data bank includes all of his storage facilities, whether the information system is manual or computerised. In the second subprocess, organisation, bits of data are compiled into a meaningful whole. In the final subprocess which probably is the most significant, i.e. interpretation, the provider's experiences aid in judging the data selected and compiled. Based on the perception process, the provider formulates the message and transmits it to the

manager. In fact, the provider's perception process of the organisation activities is restricted, to a great extent, by the predetermined criteria of selection and organisation of data and by the other procedures of the information system in operation.

FIGURE (3.5)

The Perception Process of Information Provider and Manager



The manager, on the other hand, receives the transmitted message. The message passes through the same subprocess of perception. Based on his perception of the message, the manager takes action (responses) which affect the organisation's activities. The provider of information, in turn, selects data from these activities to be included in the data bank, organises it, interprets the data compiled, and so forth. Obviously the manager's perception is less restricted than that of the information provider, since he is free from most of the criteria which confine the provider.

3.2.3 The Differences in Perception

Perception, as stated previously, is a psychological process, so our needs, values, intelligence, motives, experiences, and our social and organisational position all affect our perception. Viewing the same thing, different individuals will each perceive something quite different. Each uses his learning, culture position in society or in his organisation, and his experience, to interpret what he sees. Thus, the same stimulus may be perceived in two completely different ways because of the way the individual is set to perceive. Some of these factors which influence perception will be studied below.

3.2.3.1 Personal Values and Needs which Influence Perception

A value is a "... type of belief, centrally located within one's total belief system, about how one ought or ought not to behave, or about some end state of existence worth or not worth attaining".²¹ The major influence of personal values on perception derives from their effect on the focusing of attention. Values act to delimit what is relevant to an individual and thereby direct him to focus on certain characteristics of a stimulus and to pass over or reject others. In addition to the effect of the personal values, needs influence perception as well.

For example, children from poorer homes overestimate the size of coins more than children from wealthy families. Presumably the poorer children have more intensive positive attitudes towards money; it is literally more valuable to them than to the wealthier children. Industrial employees, when asked to describe the people

²¹ Rokeach, Milton, Beliefs, Attitudes and Values, (San Francisco: Jossey-Bass, Inc., Publishers, 1970), p.124

they work with, talk more about their bosses (the people more important to their needs) than about their peers or subordinates.²²

When needs and personal values are taken into consideration in information communicating, it can be presumed that "the information user will only use and perceive from items of information which he regards as relevant and useful to him. Knowledge of these needs and values, therefore, would be extremely helpful in determining the relative usefulness of various types and items of reportable accounting information".²³

3.2.3.2 Perception is Restricted by a Person's Capacity

"Just as the human ear does not hear sounds above a certain pitch, so does human perception all together, not perceive what is beyond its range of perception".²⁴ Although numerous stimuli may be presented to us at any one time, we make a selection by turning our attention on certain items. In other words, an individual selects a limited amount from the outside simply because he cannot assimilate, mentally, all the information available.

Because of such limitations in an individual's capacity to perceive, perception is a selective process. Indeed, it is this selective process which may cause difficulties in financial

²² See: American Accounting Association, Committee on Behavioural Science Content of The Accounting Curriculum, "Report of The Committee On Behavioural Science Content of The Accounting Curriculum", The Accounting Review, (Supplement to Vol. XLVI, 1971), p.250;

Leavitt, Harold J., Managerial Psychology, (Chicago: The University of Chicago Press, Second Edition, 1964), p.31

²³ Lee, T.A., "Psychological Aspects of Accounting", Accounting and Business Research, (Summer, 1972), p.226

²⁴ Drucker, Peter F., Technology, Management and Society. (London: Heinemann, 1970), p.5

information reporting.²⁵

Thus, the provider of information should be fully aware of the relevance and the optimum quantity of information which the managers can perceive. Up to a certain point, more information reduces uncertainty and results in better decisions. However, when more information than can reasonably be used is transmitted, information overload sets in. Under this condition the usual reaction of managers is to select certain information from the mass available and base their actions entirely on this, ignoring the rest. In such a case it is likely that not all relevant information will be selected and consequently the accuracy of the decisions may be affected. In brief, if more and more information is given to a manager, it does not necessarily lead to better decisions if the quantity of information is beyond the manager's capacity of perception.

3.2.3.3 Situational Influences in Perception

Interpersonal relationships as well as the organisational setting influence the perceptual process. Social forces affect perception through group identification. Within organisations, the departmental identification may influence managers' perceptions of the principal problems of their organisations. In a sense, managers' perceptions of a specific situation may be limited to those aspects of a situation that relate specifically to the activities and goals of their departments. Sales managers may tend to view problems

²⁵ Collins, Frank and Robert Seiler, "Perceptual Limitations: Their Effect on Financial Reports", The Internal Auditor, (June, 1978), pp.24-33;

Tweedie, D.P., "The Psychological Background to Financial Reporting", The Accountant's Magazine, (December, 1976), p.471

with a sales bias; production managers may see problems from a production point of view, and finance managers see the principal problems in terms of finance. In brief, the same problem may be differently perceived by each manager who may be influenced by his own previous experiences and departmental affiliation.²⁶

3.2.3.4 Perception is Influenced by Functional Fixation

Resistance to change influences perception and consequently represents a communication barrier. Individuals, in some situations, may not properly recognise that the message transmitted conveys new ideas. They tend to perceive what they want and expect to perceive, something which is not necessarily actually present in the stimulus pattern. Learning probably plays the biggest role in developing such cases. It may affect perception by creating a readiness or expectancy to perceive in a certain manner. In the communication context, the learning effect would be reflected in an individual's failure to alter his interpretation to be in agreement with changes in the message received. Obviously, misinterpretation of the message contained in a report may lead to an inappropriate decision.

Inability to perceive that the information contained in a report is prepared by a method which may be significantly different from that used in the past, is a phenomenon called "functional fixation". This notion, indeed, is borrowed from the literature

²⁶ Dearborn, Dewitt C. and Herbert A. Simon, "Selective Perception: A Note on the Departmental Identifications of Executives", in: Michael Schiff and Arie Y. Lewin (Eds.), Behavioural Aspects of Accounting, (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1974), pp.187-190

of psychology and applied in management information reporting.²⁷

The concept of functional fixation states that: "a person associates a meaning with a title or label through his past experience, and is unable to see alternative meanings or uses. He does not recognise that the actual situation represented by the title may be different from what it was in the past. Therefore, when he is placed in a new situation he views the title as used previously".²⁸ If the information produced by different accounting methods is called by the same term, the manager may tend to neglect the fact that alternative methods may have been used to prepare such information. In brief, functional fixation may influence managers' perception and consequently the interpretation of the reports produced by an information system.

Obviously, not all situations in which the manager is unable to recognise changes can be attributed to the phenomenon of functional fixation. Changes in accounting methods require, of course, an announcement and adequate explanation. Without such announcement and explanation, the failure of the manager to note the change is not fixity, but lack of sufficient information regarding the change and its consequences.²⁹ In other words, the possibility of functional fixation appears to be negated, or reduced, if information presentations including different treatments are

²⁷ For extensive review of the literature, see: Ashton, Robert H., "Cognitive Changes Induced by Accounting Changes: Experimental Evidence on the Functional Fixation Hypothesis", Journal of Accounting Research, Vol.14, (Supplement 1976), pp.1-24

²⁸ Jain, Tribhawan N., "Alternative Methods of Accounting and Decision Making: A Psycho-Linguistical Analysis", The Accounting Review, (January, 1973), p.99

²⁹ Chang, Davis L. and Jacob G. Birnberg, "Functional Fixity in Accounting Research: Perspective and New Data", Journal of Accounting Research, Vol.15, No.2, (Autumn, 1977), p.308

clearly differentiated in the manager's mind. "Report titles, presentation formats, and content descriptions may serve this purpose".³⁰

3.2.3.5 Effects of Illusions on Perception

Perception is not entirely affected by the internal factors such as needs, personal values, the capacity to perceive, etc., but is also influenced by how a stimulus is presented. The mode of presentation, in fact, may lead to mistakes in perception. These may happen when the context leads us to supply qualities to an object which it does not actually possess. Figure (3.6) illustrates such mistakes. It represents a well-known illusion in psychology. The two lines in (A) look the same length and they are. In (B) these lines do not appear to be the same length. The one on the right appears longer because of the context, i.e. the "whiskers"; these, differently arranged in the line on the left, tend to make it appear shorter. However, it is easy to confirm that the two lines in (B) are the same by measuring them. In conclusion, presentation of a stimulus may induce an illusion and consequently distort perception.³¹

FIGURE (3.6)

An Example of an Illusion



³⁰ Dascher, Paul E., "Internal Reporting: Some Behavioural Aspects", Managerial Planning, (July/August, 1971), p.30

³¹ McBurney, Donald and Virginia Collings, Introduction to Sensation/Perception, (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1977), pp.250-251

The notion of illusions may have particular significance in management information presentation. How information is presented in a report may distort a manager's perception of the actual message contained in that report. The order of presentation in a report may play the same role of the 'whiskers' as illustrated in Figure (3.6) and affect the manager's perception. For example, "presenting good news first may psychologically swamp any bad news".³² In fact, the mode of presentation has been considered as one of two ways suggested to improve the decision-maker's perception: "one way to improve his perception might be to give him additional training; he may need to learn how accountants arrive at their figures. The other main alternative is to change the presentation of the data (information)".³³

3.2.4 Summary

Communication is influenced by people's perception, i.e. the sender and the receiver of the message. Perception is a psychological process influenced by the person's needs, motives, experiences, and other factors. Thus, the same stimulus may be perceived in two completely different ways. In general, the significance of this concept to accounting information reporting can be derived from the following questions:³⁴ does the information user perceive the same things in the message contained in the reports as the provider perceived when preparing them? If not, to what extent do these perceptions vary, and by how much do they affect decisions and actions subsequently taken by him?

³² Thomas, Andrew, "Some Perceptual Illusions in Accounting", Accountancy, (June, 1978), p.56

³³ Feltham, Gerald, "The Value of Information", The Accounting Review, (October, 1968), p.695

³⁴ Lee, T.A., "Psychological Aspects of Accounting", op. cit., p.226

Similarly, in management accounting, "it is possible that substantial differences exist between the manner in which the accounting process is viewed by accountants and the way it is viewed by managers and workers. From the standpoint of actions taken as a result of the operations of accounting and control systems, the only effective views are those held by the (usually non-accounting) individuals who actually manage and perform the work of the organisation".³⁵

In conclusion, perception plays an important role in communication because if the messages transmitted are not perceived and interpreted in the manner intended, decisions and actions taken will be affected in a manner which may not lead to the achievement of the organisation's goals.

SECTION 3.3- THE MOTIVATIONAL EFFECT OF MANAGEMENT INFORMATION

3.3.1 The Nature of Motivation

There is general agreement among psychologists that, with a few exceptions, all behaviour is motivated; people have reasons for doing the things that they do, and that behaviour is oriented towards meeting certain perceived goals and objectives. Indeed, motivation, like other concepts employed in psychology, is an abstraction, in the sense that we do not observe motivation, only behaviour. In other words, motivation is inferred from certain aspects of behaviour.³⁶

³⁵ American Accounting Association, Committee on Behavioural Science Content of The Accounting Curriculum, op. cit., p.252

³⁶ See for example:

Ferguson, Eva Dreikurs, Motivation. An Experimental Approach, (New York: Holt, Reinhart and Winston, 1976), p.2

Steers, Richard M. and Lyman W. Porter, op. cit., pp.5-8

As previously stated in section one in this chapter, while needs reflect a deficiency, motives are deficiency with direction. They are the internal activity which leads an individual towards the satisfaction of needs and the attainment of goals. Although psychologists do not totally agree on how to classify the various human motives, they acknowledge that some motives are unlearned and physiologically based and others are not. In other words, needs and motives can be reclassified into two categories: primary and secondary.³⁷

Two criteria are necessary in order for a motive to be included in the primary classification: it must be unlearned, and it must be physiologically based. Thus, the most commonly recognised primary motives include hunger, thirst, sleep, pain and sex. These motives, in fact, correspond to the first level of the aforementioned hierarchy of needs.

A motive must be learned in order to be included in the secondary classification. Numerous important human motives meet this criterion. Some of the more important ones are power, achievement, affiliation, security and status. Each of these motives contributes significantly to human behaviour in particular. It is clear that the secondary motives correspond with the other levels of hierarchy of needs.

3.3.2 Motivation and the Level of Aspiration

Closely related to the needs hierarchy is an individual's level of aspiration. Aspirations represent the ever-changing shift of goals which occurs as need satisfaction is accomplished.

³⁷ Luthans, Fred, op. cit., pp.394-411

That is, when needs are satisfied at one level, the individual usually readjusts his sights to higher levels. This endless personal search for alternatives to satisfy increasing aspirations is an important source of individual motivation.³⁸

In fact, motivation is a cycle of needs which sets drives or motives in motion to achieve goals. Needs, the first element in this cycle, can be built up of five levels: physiological needs, safety needs, belongingness and love needs, esteem needs and self actualisation needs. Much of human behaviour is motivated by these needs which require satisfaction. Indeed, the drives and motives direct an individual's behaviour to accomplish this goal. Motives may be classified into primary, and secondary. The primary motives are unlearned and physiologically based. They correspond to the lower level in the hierarchy of needs; i.e. physiological needs. In contrast, the secondary motives are learned. Power, achievement, affiliation, security and status are included in this category. These motives could be considered to be equivalent to the other levels of hierarchy of needs.

3.3.3 Motivation and Management Information Systems

3.3.3.1 Introduction: Goal Congruence

Motivation involves stimulating managers and employees to contribute to the achievement of the goals of an organisation. The crucial problem in the accomplishment of these goals is that the organisation is made up of a number of individuals and each of these has his or her own personal, social, psychological and economic goals. Organisations do not have the single objective of profit

³⁸ Haimann, Theo, and William G. Scott, Management In Modern Organisation, (Boston: Houghton Mifflin Company, Second Edition, 1974), p.344

maximisation as suggested by classical economic theory. It would be safer to say that an organisation and the managers and workers employed by it have a number of diverse goals. Thus, motivation in this context is the attempt to achieve "goal congruence" between the goals of the individuals within the organisation and the goals of the organisation itself which are normally the goals of its dominant members. In short, goal congruence is a situation in which there is as much consistency as possible between the goals of the individuals in an organisation and the goals of the organisation itself. To put it another way, each individual, when striving to achieve his own individual goals, should be making a positive contribution to the achievement of the goals of the organisation. Obviously, absolute goal congruence is probably unattainable but efforts must be made to achieve as high a degree of goal congruence as is possible.³⁹

3.3.3.2 Satisfying Individual Needs

The essence of "goal congruence" is satisfying the individual's needs in an organisation. Goal congruence is achieved by creating "a situation in which an individual perceives that his personal needs can best be met by working toward accomplishment of the goals of the organisation".⁴⁰ In such a situation, the individuals do not need to be forced to work towards the goals of the organisation, but will willingly assume responsibility for meeting these goals under conditions which provide them with need satisfaction.

³⁹ Jones, D.M.C., "Behavioural Aspects of Management Accounting", Management Decision, Vol.14, No.1, (1976), pp.18-19

⁴⁰ American Accounting Association, Committee On Behavioural Science Content of The Accounting Curriculum, op. cit., p.255

How does the information provided by an information system within an organisation motivate the individuals to accomplish the organisation goals? Motivation means satisfying needs, and this raises the next question: how does the information system satisfy the needs of individuals within the organisation? It may be possible to say that the information system should satisfy or participate in satisfying two groups of needs of the individuals: (1) their information needs as decision-makers; and (2) their human needs. The former was already discussed in section one in this chapter.

In fact, satisfying some of the human needs of the individuals working in an organisation is one of the responsibilities of the provider of information. His responsibility should extend beyond the classification and transmission of information and includes the information's effect on the user's behaviour. In other words, the information providers cannot ignore the behavioural implications of management reporting because this function, in fact, is basically behavioural. The information provided by an information system is furnished by people - even in highly automated systems, human factor is essential as the designer, programmer and operator, to facilitate formulating plans set up by people, and to measure the progress of people in the achievement of these plans.

The information provided by the information systems in the organisations should assist in motivating individuals to make and implement decisions which will lead to the accomplishment of the organisation's goals. To motivate the individuals to achieve these goals, the human needs of the individuals should be satisfied. Obviously, the information department staff in the organisation is

not aware of the physiological needs. Rather, it is interested in the higher levels of the hierarchy of needs which are classified as secondary needs or motives, such as esteem, and self-actualisation.

Thus, the information department staff should be aware of the modern assumptions about the behaviour of the individuals in the organisation. These assumptions can be summarised as follows:⁴¹

1. Individuals within the organisations are motivated by a wide range of psychological, social and economic needs and motives. The relative strength of these diverse needs differs between individuals and within the same individual over time.
2. The decision of an individual to join an organisation, and the separate decision to contribute his productive efforts once he becomes a member, are based on the individual's perception of the extent to which such actions will further the achievement of his personal goals.
3. The primary role of management of the organisations is to maintain a favourable balance between: (a) the contributions required from the individuals; and (b) the inducements, i.e. perceived need satisfactions, which must be offered to secure these contributions.

⁴¹ Caplan, Edwin H., Management Accounting and Behavioural Science, op. cit., pp.30-31

For some detail regarding the classical assumptions, see:
Ibid., p.17

4. The management role is essentially a decision-making process subject to the limitations on human rationality and cognitive ability. The manager must make decisions himself and must effectively influence the decision premises of others so that their decisions will be favourable for the organisation.

In the light of the above mentioned assumptions, the information provided by the information system within an organisation can be used to satisfy, directly or indirectly, some of the higher levels of individual needs, particularly through the feedback. To explain such role, two aspects will be discussed below. These are:

- (A) influences of the information provided on individual aspiration levels; and
- (B) influences of the information provided on individual self-esteem.

3.3.3.2.1 Influences of The Information Provided on Aspiration Levels

Aspiration is the internal expectation established by individuals with respect to their own performance. Repeated failures to achieve a goal will cause an individual to lower his expectations. In turn, the lowered expectations can have a negative effect on both present and future performance. Conversely, an individual who has experienced success in achieving reasonable goals in the past, tends to set higher aspiration levels for the future and is more strongly motivated to achieve high levels of performance. In brief, aspiration is strengthened by success and weakened by failure.⁴²

Since actual performance is influenced by an individual's level of aspiration, among other things, it becomes necessary to

⁴² Ibid., p.51

tie budgets to such levels. In such a case, budgets may be conceived as a motivating device. However, it should be clear that "while budgets which are best for motivational purposes need to be stated in terms of aspirations rather than expectations, the budgets which are so necessary for planning and decision purposes need to be stated in terms of the best available estimate of expected actual performance".⁴³

Indeed, an individual's aspiration levels can be influenced by the motivational effect of feedback.⁴⁴ The information system within an organisation will provide the individuals with information regarding the "proximity of the goal" which depends on how much effort has been spent. However, aspirations can change during the process of approaching the goal. In this regard, the information systems can reinforce an individual's wish to reach a goal by monitoring the individual's progress and telling him how close he has already come to his goal. This, of course, will affect his efforts. However, to achieve this purpose effectively, i.e. influence individual aspiration levels, the information provided to these individuals through feedback should have the following characteristics:

⁴³ Hopwood, Anthony, Accounting and Human Behaviour, (London: Haymarket Publishing Ltd., 1974), p.63

⁴⁴ See for example:

Heopfner, F.G. "What Behavioural Science Implies for Cost Accounting", Management International Review, Vol.13, No. 2.3, (1973), pp.57-58;

Pittman, Clarence R., "Organisational Behaviour and The Management Accountant", Management Accounting (USA), (July, 1973), pp.26-27;

Cook, Doris Marie, "The Psychological Impact of Certain Aspects of Performance Reports", Management Accounting (USA), (July, 1968), pp.33-34

1. Be provided as frequently as costs and other circumstances permit.
2. The information provided should give appropriate credit for favourable performance rather than emphasising only failures, errors and weaknesses.
3. Should include, if possible, the reasons that performance was below standard.

3.3.3.2 Influences of The Information Provided on Individual Self-Esteem

Self-esteem refers to:

"the evaluation which the individual makes and customarily maintains with regard to himself: it expresses an attitude of approval or disapproval, and indicates the extent to which the individual believes himself to be capable, significant, successful, and worthy. In short, self-esteem is a personal judgement of worthiness that is expressed in the attitudes the individual holds toward himself."⁴⁵

Self-esteem is one of the individual needs and is classified as a secondary motive. According to the "expectancy theory", self-esteem is conceived as an intrinsic reward. The expectancy theory, in its simplest form, argues that individuals allocate their effort in much the same manner that they all allocate any scarce resource to achieve an optimal or satisfactory level of rewards. Thus effort is expended in the manner that will secure for the individual the requisite level of satisfaction. These satisfactions arise from two locations. Some are the personal satisfactions such as enjoyment of work, or self-esteem with success. These are called intrinsic rewards. Others are external to the individual

⁴⁵ Coopersmith, Stanley, The Antecedents of Self-Esteem, (San Francisco: W.H. Freeman and Company, 1967), pp.4-5

and flow to him from other sources, such as salary, or bonus. These are called extrinsic rewards.⁴⁶

Indeed, the problem with self-esteem as a motive is partially attributed to the nature of the intrinsic rewards in general which is not visible nor so readily controllable by an organisation. Thus, the organisation through its information and control system must provide an environment in which the individual can relate intrinsic rewards to performance.⁴⁷

For an information system, such as a management accounting system, to be useful in providing and communicating performance goals and achievement results, it must be perceived as legitimate and fair by those subject to these goals.⁴⁸ These two characteristics are discussed in detail below.

(1) The system must be legitimate. In the sense that the goals ought to measure effectively key measures of self-performance, the goals and measures must be developed by some appropriate process, and the measures and goals must be used in a legitimate manner.

(2) The system must be fair. In the sense that goals are of appropriate levels of difficulty. The goals must be accepted as fair in order to have intrinsic motivational force. This force will be absent or diminished if the goals are set at a level for which there is difficulty in achieving them. In short, for an

⁴⁶ Birnberg, Jacob G., "Behavioural Research and Managerial Accounting", The Accounting Forum, (May, 1977), p.12

⁴⁷ San Miguel, Joseph G., "The Behavioural Sciences and Concepts and Standards for Management Planning and Control", Accounting, Organisations and Society, Vol.2, (1977), p.179

⁴⁸ Collins, Frank, "Management Accounting and Motivation - The Relationship", Management Accounting (USA), (March, 1979), p.23

information system, such as the management accounting system, to perform effectively in the goal-setting and performance reporting process, the goals must be of appropriate difficulty or they will be perceived as unfair. In order to stimulate intrinsic motivation, the motivational force tends to increase as the level of goal difficulty is increased from easy to a higher level, say "high but attainable" because achieving difficult goals is more important to self-esteem feelings. Above this latter point, intrinsic motivation tends to decrease because goals may be set so high that performance will fall far short. In this situation one would likely feel disappointed and discouraged and might give up.

Goals can be perceived as legitimate and fair through participation in goal-setting. Participating, of course, should be "real" not "pseudo-participation" in the sense that participation is allowed, but top management continually changes the goals resulting from participation, and consequently real participation does not exist. Indeed, participation in goal-setting affects intrinsic motivation, such as self-esteem. An individual through the participation process becomes personally committed to the goals. A goal success becomes a personal success and a goal failure becomes a personal failure. This is deemed to results from self-investment, that is the time and effort committed by the individual in setting goals.⁴⁹

⁴⁹ See: Collins, Frank & John J. Willingham, "Contingency Management Approach to Budgeting", Management Accounting (USA) (September, 1977), p.45;

Collins, Frank, "Management Accounting and Motivation - The Relationship", op. cit., p.25

On the other hand, to motivate individuals by satisfying their self-esteem, performance reports should consider the different types of self-esteem. Individuals can be divided into three groups based on their type of self-esteem. They are: (1) those who have low self-esteem; (2) those who have high self-esteem; and (3) those who have medium self-esteem.⁵⁰

(1) Low self-esteem. A person with this type has a tendency to interpret responses (evaluative feedback) as negative when actually they are neutral. This interpretation can cause self-doubts and can have an effect on future performance.

(2) High self-esteem. A person with this type is more realistic in his reaction to the responses to others. Even when these responses are critical he is free to use them to his advantage and does not have the same tendency to become discouraged as does a person with low self-esteem.

(3) Medium self-esteem. A person with this type is most uncertain about his personal worth and tends to be particularly dependent on social acceptance.

In conclusion, individual types of self-esteem should be "an important factor in ... determining whether evaluative feedback will produce positive or negative behavioral consequences".⁵¹ For example, when an individual with low self-esteem receives many criticisms in a performance report, his future performance may be

⁵⁰ Sorensen, James E. and David D. Franks, "The Relative Contribution of Ability, Self-Esteem and Evaluative Feedback to Performance: Implications for Accounting Systems", The Accounting Review, (October, 1972), pp.736-737

⁵¹ Ibid., p.737

negatively affected, while when he receives fewer criticisms in the report he may improve his performance.

3.3.4 Summary

Most of human behaviour is motivated by the desire to satisfy certain needs. Although the behaviour of all individuals is directed towards need satisfaction, the importance of different needs and the approaches taken to satisfy them, vary considerably from one individual to another.

However, motives which are set up to alleviate needs can be classified into two main groups; primary and secondary. Primary motives are physiological and unlearned such as hunger, thirst and sex. On the contrary, secondary motives are learned. Affiliation, security and status are examples of such type of motives.

To motivate individuals within an organisation to achieve a specific goal is to satisfy their needs. Obviously, information systems are concerned with the higher levels of individual needs, i.e. secondary motives. Indeed, two groups of individual needs within the organisation can be identified: (1) their informational needs as decision-makers, and (2) their human needs.

One of the major purposes of the information system is to provide individuals, as decision-makers, with the information needed for planning and control. On the other hand, the information provided can be used as a stimulus to intended behaviour. This is achieved by affecting the individual's aspiration levels and satisfying his self-esteem. By monitoring the individual progress and telling him how close he has already come to his goal (proximity

of the goal), his aspiration level is affected and his need for self-esteem is satisfied, and consequently his performance may be enhanced.

SECTION 3.4 - THE DECISION-MAKING STYLE OF THE USER OF INFORMATION

3.4.1 Introduction

3.4.1.1 The Impact of Information Quantity and Report's Format On Decisions

The designers of information systems want to ensure that the systems they develop are utilised. The systems to be utilised should provide useful information to their users. In considering the usefulness of information, some researchers on information reporting, either externally or internally, have investigated the relationship between decisions' effectiveness and the quantity of the information provided. In other words, the possible decision effect which may result from reporting too much or too little information is studied. The point is that more than sufficient information may be irrelevant and possibly dysfunctional, while less than sufficient information may imply that reports are not meeting the usefulness criterion.

Schroeder and Benbasat,⁵² for example, studied such relationship between decision effectiveness and the amount of information. They conducted an experiment using an inventory simulator. In this experiment, the subjects could decide on the order quantity, the reorder point, the time until the next set of decisions and the amount and type of information to be used in monitoring system

⁵² Schroeder, R.G. and I. Benbasat, "An Experimental Evaluation of the Relationship of Uncertainty in the Environment to Information Used by Decision Makers", Working Paper No. 73-06, Management Information Systems Research Centre, University of Minnesota, (August, 1973).

performance, the cost of operating the inventory and decision confidence. The results indicated that there was no relation between the amount of information used and decisions' effectiveness or confidence of the decision-makers in the decisions reached.

On the contrary, Chervany and Dickson⁵³ in their study have found opposite results of the above mentioned study's findings. The researchers conducted their study in the form of experimental gaming which covered decisions concerning production, inventory, and the workforce. The data was available for decision makers in two forms: raw detailed data, and statistically summarised data. The results of their experiment indicated that decision makers given data summarised through the use of simple descriptive statistics made higher quality decisions and took longer to make their decisions than those who received the raw detailed data.

A possible explanation for the difference between Chervany and Dickson's results, and Schroeder and Benbasat's results is that it may be difficult to isolate the effects of the amount of information from other factors that also affect decisions' effectiveness.

In fact, the problem of information sufficiency has been considered first in the psychological researches and its application recently extended to management information reporting and external reporting of the accounting information. Both the psychological and accounting literatures focus on a phenomenon called "information overload". Information overload refers to:

information inputs so excessive as to exceed the capabilities of the human information processing

⁵³ Chervany, Norman L. and Gary W. Dickson, "An Experimental Evaluation of Information Overload In A Production Environment", Management Science, Vol.20, No.10, (June, 1974), pp.1335-1344

system. Increasing information loads eventually overwhelm the information processor and his responses to higher loads become progressively less effective.⁵⁴

Yet with respect to organisational setting, Slovic,⁵⁵ for example, points out that the interest among some providers of information has been mainly focussed on processing and supplying decision makers with ever more information. This implicit assumption which is based on the theme that more is preferable to less, is also borne out by Sorter in his study of accounting theory.⁵⁶ His solution to the information provider's inability to specify users' decision models is to report every possible piece of data and give the user the option of selecting the data he considers relevant to his purpose.

In fact, too much detail data could result in a less structured information perception which might hinder the making of rational decisions. This can be attributed to the limited capacity of the decision-maker as a human being to accept inputs (data) and produce outputs (responses). When the human processing system is overloaded, the response rate can decrease. However, the point at which a human information processing system is overloaded is different

⁵⁴ Snowball, Doug, "Information Load and Accounting Reports: Too Much, Too Little or Just Right?", Cost And Management, (May-June, 1979), p.22

See also:

Jacoby, Jacob, "Information Load and Decision Quality: Some Contested Issues", Journal of Marketing Research, (November, 1977), p.569;

Gehrlein, William V. and Peter C. Fishburn, "Information Overload In Mechanical Processes", Management Science, (December, 1976), p.391.

⁵⁵ Slovic, Paul, "Psychological Study of Human Judgement: Implications for Investment Decision-Making", The Journal of Finance, Vol.27, No.4, (September, 1972), pp.779-800

⁵⁶ Sorter, George H., "An 'Events' Approach to Accounting Theory", The Accounting Review, (January, 1969), pp.12-19

from one decision-maker to another. For this reason, information contained in reports should be suited to the user's ability (capacity) to assimilate and process information.

On the other hand, some researchers have focused on the relationship between decisions' effectiveness and the time taken to make them, and the form in which information was presented. For example, Prokop and Brooks⁵⁷ have analysed the difference between presenting reports on Cathode Ray Display Tubes⁵⁸ versus presenting them in hard copy form. They have found that the decision-makers who used display units took less time to make decisions compared to the ones who used hard copy (printed) output.

Regarding the form of information presentation and its impact on decisions taken, Barrett⁵⁹ has pointed out the debates among accounting researchers with respect to this issue. While some researchers say that what is presented in accounting reports is more important than how accounting information is presented, others argue that how accounting information is presented can dramatically affect decision making. In fact, neither "what or how" is more important than the other.

⁵⁷ Prokop, J.S. and F.P. Brooks, Jr., "Decision Making With Computer Graphics in Inventory Control Environment", Proceedings of the Full Joint Computer Conference, Houston, Texas, Vol.37, (17-19 November, 1970), pp.599-607.

⁵⁸ Cathode Ray Tube (CRT): an electronic tube in which a beam of electrons can be controlled and directed by an electronic lens so as to produce a visible display of information on the surface of the tube or to store data in the form of an energized portion of the tube's surface.

⁵⁹ Barrett, Michael J., "Cognitive Style: An Overview of The Developmental Phase of A Decision Process Research Programme", Working Paper, Graduate School of Business Administration, University of Minnesota, (May 1978), p.2

3.4.1.2 Tolerance for Ambiguity

The suitable quantity of information depends among other things, on the user's tolerance of ambiguity. Ambiguity is defined as uncertainty of meaning, and ambiguous situations are those which cannot be adequately structured or categorised by an individual. It is possible to identify three such situations: (1) a completely new situation in which there are no familiar cues; (2) a complex situation in which there are a great number of cues to be taken into account; and (3) a contradictory situation in which different elements or cues suggest different structures; in short, situations characterised by novelty, complexity, or insolubility.⁶⁰ Management decisions fall into these classes. In fact, decisions become even more complex when the decision maker is uncertain as to the quality of information provided by the management information systems.

Intolerance for ambiguity is defined as an implied need to avoid undefined or misinterpretable stimuli. Thus individuals intolerant of ambiguity perceive ambiguous situations as a source of threat and behave in a manner to reduce this threat. Conversely, tolerance of ambiguity implies that contact with ambiguity is acceptable.⁶¹

⁶⁰ See:

McGhee, Walter, Michael D. Shields and Jacob G. Birnberg, "The Effects of Personality on a Subject's Information Processing", The Accounting Review, (July, 1978), p.683;

Dermer, Jerry D., "Cognitive Characteristics and the Perceived Importance of Information", The Accounting Review, (July, 1973), p.512;

Budner, Stanley, "Intolerance of Ambiguity as a Personality Variable", Journal of Personality, Vol. XXX, (March -December, 1962), pp.29-30.

⁶¹ Ibid.

Although ambiguity is a type of uncertainty, it is distinct from two other levels of uncertainty, risk and ignorance.⁶² A decision situation is said to be risky if the decision maker does not know for certain what the ultimate outcomes of his choices will be; yet he holds very orderly opinions about the relative chance of the possible outcomes actually occurring. A choice is made under ignorance if the decision maker has no basis whatever on which to judge the relative likelihood of the potential outcomes of his decision options. Ambiguous decision situations exist between the extremes of risk and ignorance.

On the other hand, the concepts of "intolerance of ambiguity and rigidity" have been used interchangeably. In fact, the two concepts are theoretically and empirically separate.⁶³ Whereas ambiguity tolerance implies tendencies to relate to and interact in differing ways with certain classes of phenomena, rigidity refers to a more generally pervasive, singular response mode. A rigid person may be viewed as one who perseveres in a given response, whereas an intolerant person may be more likely to replace one response with another. In other words, intolerance of ambiguity may be conceived of as a content characteristic of the individual,

⁶² Yates, J. Frank and Lisa G. Zukowski, "Characterisation of Ambiguity in Decision Making", Behavioural Science, (January, 1976), pp.19-20;

See also:

Loasby, Brian J., Choice, Complexity and Ignorance, (Cambridge, U.K.: Cambridge University Press, 1976), pp.7-9

⁶³ See for example:

MacDonald, A.P. Jr., "Revised Scale for Ambiguity Tolerance: Reliability and Validity", Psychological Reports, (Vol. 26, 1970), p.791;

Brown, Roger, Social Psychology, (New York: Free Press, 1965), pp.505-509;

Budner, Stanley, op. cit., pp.30-31

as a tendency to evaluate particular phenomena in a particular way; rigidity, as a formal characteristic of the individual, as a tendency to manifest certain modes of response irrespective of the phenomena being dealt with.

The importance of "the intolerance of ambiguity concept" to information systems design can be due to the relationship between the amount of information preferred by a decision maker and one of his personality characteristics; that is, level of tolerance of ambiguity. Tricker has referred to this point indirectly by asking: "What is it that causes one person to search for more data, to extend the information process, while another is inactive? ... we can suggest that it is the difference between his felt need to know and what he knows ... given identical data, one decision maker will feel the need for further information searching, while another will terminate the search".⁶⁴ Dermer,⁶⁵ however, has examined such relationship in detail. In his field study, subjects were sales supervisors, district sales managers, and regional sales managers of an integrated oil company. They were asked to role play in one of two district sales manager jobs with which they were familiar. Subjects also were classified as to the level of intolerance of ambiguity based on their scores on a questionnaire designed for that purpose. Results of Dermer's study have indicated a significant positive correlation between ambiguity intolerance and the amount of information perceived to be important. In other words, individuals with an intolerance of ambiguity preferred a greater amount of information than those tolerant of ambiguity.

⁶⁴ Tricker, Robert I., "The Impact of Information Systems on Organisational Thinking", Information Processing 77, Proceedings of IFIP Congress 77, Toronto, (August 8-12, 1977), p.219

⁶⁵ Dermer, Jerry D., op. cit., pp.511-519.

The conclusion, according to the results of the previous study, is that orientation or predisposition to the ambiguity in the environment may affect the way an individual evaluates information in order to cope with and adapt to his environment. One way the level of ambiguity tolerance may differentiate individuals is in the amount of information they prefer. Those intolerant of ambiguity, being more troubled by inconsistency than their ambiguity-tolerant counterparts, may attempt to resolve ambiguous situations by collecting more information. Another way that individuals intolerant of ambiguity attempt to reduce the threats inherent in ambiguous situations is by manifesting a preference for readily interpretable stimuli. Thus, when evaluating the importance of information, they may tend to judge factual data (e.g., expressed by numbers) to be more important than abstract or conceptual data. Accordingly, the predisposition of an individual towards ambiguous situations, i.e. his level of ambiguity tolerance, may be a determinant of the amount and type of information he perceives to be important.

3.4.1.3 How Decision-Makers Perceive and Use Information

The degree of perception and assimilation of information may, however, be not only dependent on report form; the amount of information contained in the report; or the level of intolerance of ambiguity of the decision maker, but may also be a function of the human information processing predispositions of the decision-maker. Findings in the field of psychology suggest that individuals have a set of cognitive structural variables which interrelate to form the individual's set. These findings suggest that a particular configuration of such structural variables affects the way a person

combines or processes information and thereby may affect his ability to perceive and assimilate information from data. Thus, data presented in a specific form and/or at a level of aggregation or decomposition not consistent with a decision-maker's mental set might have a detrimental effect on his subsequent decision actions.

For this reason, both psychologists and, recently, some researchers in information systems and accounting fields⁶⁶ suggest that reports generated by an information system should be congruent with the user's information processing capabilities in order to obtain the most effective decision making.

In fact, researchers in management information systems and accounting seem to have not paid enough attention to a very important aspect of the information production-transmission-reception cycle. Even though the user of the information seems to be the focal point of the output of the process, considerable attention has not been paid to the conditions that govern the reception, acceptance, assimilation and use of the information provided by information systems. These may either be environmental conditions, such as the existence of competing (alternative) sources of information which

⁶⁶ For example, see:

Libby, Robert and Barry L. Lewis, "Human Information Processing Research in Accounting: The State of The Art", Accounting, Organizations and Society, Vol.2, No.3, 1977, pp.245-268;

Lucas, H., Jr., "A Descriptive Model of Information Systems in the Context of the Organisation", Database, Vol.5, (Winter, 1973), pp.27-36;

Mason, Richard O. and Ian I. Mitroff, "A Program for Research on Management Information Systems", Management Science, Vol. 19, No.5, (January, 1973), pp.475-487;

Bieri, J., "Cognitive Structure in Personality", in: H. Schroder and P. Suedfeld (Eds.), Personality Theory and Information Processing, (New York: The Ronald Press, 1971), pp.178-208;

Schroder H., "Conceptual Complexity and Personality Organisation" in: H. Schroder and P. Suedfeld (Eds.), op. cit., pp.240-273

also issue signals that appear to be relevant to the decision-problem under consideration, or attributes of the respondent (receiver) to the information.

In fact, the unremarkable attention paid to the psychological characteristics of the user (decision-maker) of financial and management information can be attributed to the fact that this field is a new research area for accountants which is not universally valued. For example, Hofstede and Kinard, in their discussion of future behavioural accounting research, argue against the examination of psychological or personality constructs of individuals (decision-makers), stating:

Studying individual differences in the psychological make-up of the decision maker is inefficient for behavioural accounting. The research programme should emphasise behavioural consequences of common informational contexts in which choices are being made. The pertinent questions, therefore, are not those that ask about the relation of individual differences to behaviour, but rather those that ask how choices relate to the way in which the information is presented.⁶⁷

Similarly, Jensen warned against readily accepting "empirical evidence obtained in behavioural experiments as a basis for establishing accounting policy. Not only is it difficult to extrapolate from such studies, but often the studies themselves have conflicting results".⁶⁸

However, Wright has summarised the issue by saying:

⁶⁷ Hofstede, Thomas R. and James C. Kinard, "A Strategy for Behavioural Accounting Research", The Accounting Review, (January, 1970), p.48.

⁶⁸ Jensen, Robert E., "Empirical Evidence from the behavioural sciences: Fish Out of Water", The Accounting Review, (July, 1970), p.503

One problem continually encountered in accounting practice and research is a lack of descriptive evidence concerning actual usage of financial information. By providing explicit models of individual information processing based on financial information, human information processing research can provide evidence relevant for both analytical and empirical work in accounting ...⁶⁹ (Emphasis added).

The fact is that all decision-makers are not the same, even at the same organisational level, and in the same job. The style of different decision-makers can vary substantially, particularly in the way information is assimilated and the way decisions are taken.

3.4.1.4 Shifting Towards the Psychological Characteristics of Decision-Makers

As stated previously, the focus of attention was on how and whether changes in the information systems led to changes in decisions and actions. The user of the system was essentially considered to be a constant. In other words, much attention has been paid to providing information suited to the managerial level of the decision-maker with less attention to the psychological characteristics of the decision-maker himself. That is, managers at the same organisational level, in the same job may be provided with the same type of information which suits their organisational level and the type of decisions that may be made, with less attention to the differences among them, i.e. managers, as decision-makers who have different types of human information processing systems.

In fact, the designers of information systems have the problem of tailoring systems to suit the varied psychological characteristics of managers. The reasons underlying the difficulties in solving this problem were that:

⁶⁹ Wright, William F., "Financial Information Processing Models: An Empirical Study", The Accounting Review, (July, 1977), p.676

Firstly, little evidence existed to ensure that division performance could be enhanced by tailoring the systems to suit individual psychological characteristics.

Secondly, there was a lack of adequate measures of individual differences to use in research or practice by the system designer.

Finally, assuming performance differences exist and systems for individuals can be constructed, it follows that there may have to be as many information systems as there are decision makers using these information systems. This solution, of course, is not practical nor economical.

As a result, the common theme among systems designers and researchers is that: at direct management level (operational level) they provide decision makers with information which has the following characteristics: very detailed, frequently reported, historical, internally generated, very accurate, repetitive and often non-financial. At middle management (tactical planning and management control level), the information is moderately detailed, regularly reported, historical and predictive, mostly internally generated, accurate within decision bounds, often presented according to exception reporting and mainly financial. On the contrary, the information provided to top management (strategic planning level) is aggregated, infrequently reported, predictive, accurate in magnitude only, unique to problems under consideration, and includes both financial and non-financial information.

However, in addition to emphasis on the managerial level of the decision maker, increasing attention has recently been paid to the decision maker himself as a human information processor, as an explicit intervening variable between the information signal and the ultimate decision or action.

In a recent report of the American Accounting Association, the Committee in charge of preparing a report on concepts and standards - managerial planning and control, has referred to such a shift.

Management information specialists have shifted the focus of the system from the production of information to the users of the information.⁷⁰ (Emphasis added)

Information providers will shift attention from data production based on a priori assumptions about managers needs to creation of systems that produce data that fits the needs of individual managers.⁷¹ (Emphasis added)

In another study into human information processing and its relevance to accounting, San Miguel has called for studying the behavioural characteristics of the users of the information.

The relevance of human information processing theories to both external and internal accounting reporting issues needs fundamental research. Questions of the effects of data aggregation, data expansion, information overload, and information value cannot be resolved without making behavioural assumptions about the users of accounting information and their decisions. This has particular relevance to the designer of accounting information systems.⁷² (Emphasis added)

In a third study conducted by Dickson, Senn and Chervany on research in management information systems, the authors have emphasized that it is wrong to assume that all decision makers are the same and can effectively function with undifferentiated information systems.

"The Characteristics of the decision maker must become prime considerations in all areas of information systems development".⁷³

⁷⁰ American Accounting Association, Committee on Concepts and Standards. Managerial Planning and Control, "Report of The Committee on Concepts and Standards - Managerial Planning and Control", The Accounting Review, (Supplement to Vol.52), 1977, p.62

⁷¹ Ibid., p.63

⁷² San Miguel, Joseph G., "Human Information Processing And Its Relevance to Accounting: A Laboratory Study", Accounting, Organisations and Society, Vol. 1 No.4, 1976, p.358

⁷³ Dickson, Gary W., James A. Senn and Norman L. Chervany, "Research in Management Information Systems: The Minnesota Experiments", Management Science, Vol.23, No.9, (May 1977), p.914

As a result of such shifting towards the psychological characteristics of decision makers, the domain of cognitive psychology and personality variables such as perception, predispositions, styles, attitudes and motivation become relevant to the more complete study of information systems evaluation.

3.4.2 Approaches To Human Information Processing

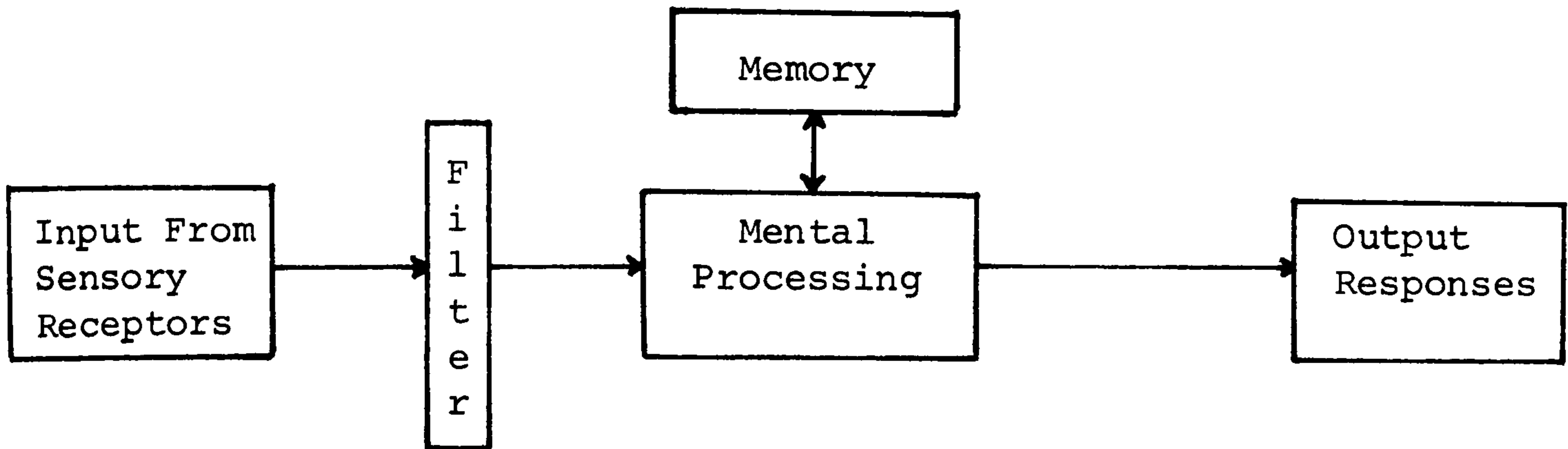
3.4.2.1 Introduction

As stated previously, the designers of information systems want to ensure that the systems they develop are utilised. That is, the decision makers include the information generated by the system in their human information processing system which is the cognitive system that has the capacity to organise, manipulate and integrate information for decision making.

A decision maker as an information processor consists of sensory receptors (eyes, ears, nose, etc.) that pick up signals and transmit them to the processing unit (brain with storage). Some inputs are blocked and prevented from entering processing through the use of a filter which blocks them. The filter is based on the decision maker's experience, background, custom, etc.. The filtering process is not consistent, in the sense it may be changed by decision making circumstances. In other words, the filtering process may be increased under the stress of decision making, that is reducing the data to be processed by the decision maker. The data filtered is entered in the processing unit which produces output responses (physical, spoken, written, etc.), Such relationships among these units is presented in Figure (3.7).

FIGURE (3.7)

Decision Maker As An Information Processor



The attributes of a decision maker as an information processor, as identified by McKenney, were as follows:

1. He relies upon cognitive representations such as words, symbols, images, numbers and impressions of movements to store and retrieve experience.
2. Each decision maker interprets symbols in accordance with a range of personal concepts which he has developed by use in his culture.
3. He is a limited conscious information processor.
4. He continually changes his capacity to cope with ever-changing complexity by inventing new conceptual schemes for his culturally dependent symbols.
5. He processes information in a repetitive fashion which requires an initial familiar situation or he switches to a habitual search pattern.
6. He is a purposeful being when he guides his information processing to resolve perceived problems."⁷⁴

The previous discussion of the decision maker as an information

⁷⁴ McKenney, James L., "Human Information Processing Systems", Working Paper, Harvard Business School, (Working Paper No. 72.4, 1972), p.7

processor was, in fact, a general description of a human information processor. However, in contemporary research in the human information processing field, it may be possible to identify three approaches. Each approach takes a distinctly different way to explain how a human processes information. These approaches are:

- (1) The level of information processing approach.
- (2) The structure of the human information processor approach.
- (3) The cognitive style approach.

3.4.2.2 The First Approach - The Level of Information Processing

Schroder, Driver and Struefert⁷⁵ have studied the way the human information processor organises information for a problem-solving process. The organisation is what Schroder, et al. call the level of information processing. The main point of the theory is tied to a construct called "integrative complexity" which was proposed by Biere as a personality variable.⁷⁶ This term describes how a person combines information he perceives from his environment as well as information he generates for internal purposes. The greater the ability to combine information elements and therefore create new information, the greater the "integrative complexity of that person".

Schroder, et al.,⁷⁷ have proposed that persons scoring high on measures of conceptual structure (complexity) are more "information oriented" and should generally process more information in complex decision making situations than individuals having low

⁷⁵ Schroder, Harold M., Michael J. Driver and Siegfried Strufert, Human Information Processing, (New York: Holt, Rinehart and Winston, Inc., 1967).

⁷⁶ Bieri, James, "Complexity-Simplicity as a Personality variable in Cognitive and Preferential Behavior" in: D.W. Fiske and S.R. Maddi, (Eds.), Functions of Varied Experience, (Homewood, Illinois: Dorsay, 1961), pp.365-379

⁷⁷ Schroder, Harold M., M.J. Driver and S. Streufert, op. cit., pp.24-41

complexity scores. The differentiation and integration involved in behaviour (performance) should increase with increasing complexity of the environment until an optimal performance level is reached. If environmental complexity were increased beyond this optimal point the level of performance would then begin to decrease.

3.4.2.3 The Second Approach: The Structure of The Human Information Processor

A somewhat different approach to human information processing has been undertaken by Newell and Simon.⁷⁸ Rather than describe the way the human information processor organises information for a problem-solving process, they describe the structure of a human information processor. Under their approach, man is characterised as being a serial information processor with limited short-term memory, infinite long-term memory (slow storage) and a stored set of programmes called operators. This theory focuses mainly on how the human information processor internally represents task environment, i.e. the problem as it exists. This internal representation Newell and Simon call a problem space which means the way a particular decision-maker represents the task in order to work on it. In other words, confronted by a problem, the decision maker formulates a representation to use in working on the problem. Behaviour to resolve a task (a problem), as this task is described in the problem space, can best be characterised by being a tree; that is, the human information processor can widen his search for alternative

⁷⁸ Newell, Allen and Herbert A. Simon, Human Problem Solving (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972), Chapters 1-4;

See also:

Simon, H.A. and A. Newell, "Human Problem Solving: The State of The Theory in 1970", American Psychologist, Vol.26, (February, 1971), pp.145-159

paths to a solution, or deepen the search down one particular alternative until either coming to a dead end or a solution. It is the internal representation of the task environment or the problem space that determines which operators can be applied to a particular task. These representations can, of course, differ not only among individuals but over tasks within individuals.

3.4.2.4 The Third Approach: The Cognitive Style

The third approach to human information processing does not describe the level at which the human processes information or the structure of the human information processor but rather classifies individuals by decision making type or "cognitive style". The cognitive style describes the approach taken by an individual in solving a problem or reaching a decision. This approach will be discussed, in detail, in the following pages.

3.4.3 The Cognitive Style of The Decision Maker

3.4.3.1 Introduction

As mentioned above, cognitive style describes the approach taken by an individual in solving a problem or reaching a decision. The cognitive style approach is concerned with understanding how people make decisions and process information. In studying this approach, three distinct schools of thought can be identified. These are: (1) generalist; (2) differential; and (3) unique.⁷⁹ On a continuum of specificity, the generalist school can be placed at one end, the unique school at the other end, and the differential school at the middle. The assumption of the generalist school is that individuals are basically the same; that is, any random sample

⁷⁹ Driver, Michael J. and Theodore J. Mock, "Human Information Processing, Decision Style Theory, and Accounting Information Systems", The Accounting Review, (July, 1975), pp.494-495

of individuals could be used for generalisation to all mankind. The unique school suggests that each individual represents a unique or special case with regard to his or her information processing. The differential school assumes that persons differ in cognition but that categories of individuals can be identified with similar cognitive processes or cognitive sets. The differential school approach appears to hold the most promise for the design of effective information systems.

Within the differential school approach, three basic models of cognitive style can be identified. They are:

- (1) Flexible/integrative and decisive/hierarchic model.
- (2) Field independent/dependent model.
- (3) Heuristic/analytic model.

3.4.3.2 Flexible/integrative and Decisive/hierarchic Model

Extensions to "the level of information processing approach" have been developed by Driver and Mock.⁸⁰ This model which is illustrated in Table (3.1) on page 153 postulates two dimensions of information processing: (1) amount of information used; and (2) degree of focus. A minimal data user (i.e. one of low conceptual structure) is seen as a person who uses just enough data to make an adequate decision and then moves on. On the other hand, a maximal data user, who is not satisfied until all data perceived to be relevant is examined. The focusing dimension is viewed as a continuum where the person who views all data as leading to one conclusion lies at one end while at the other end is the person viewing all information as having varied meanings.

⁸⁰ Ibid., pp.496-498

TABLE (3.1)

Flexible/Integrative and Decisive/Hierarchic Model

Degree of Focus in Use of Data	Amount of Information Used	
	Minimal (Satisfier)	Maximum
Multiple Solutions	Flexible	Integrative
One Solution	Decisive	Hierarchic

Combining these two information processing dimensions, i.e. amount of information used and degree of focus, the authors derive the four basic decision style categories shown in Table (3.1)

The decisive style is one in which a person habitually uses a minimal amount of data to generate one firm opinion. It is a style characterised by a concern for speed and consistency. A decision maker using the flexible style also uses minimal data, but sees it having different meaning at different times. A flexible decision maker can confront the same data and give it one interpretation one day, another interpretation the next day. It is a style associated with speed, adaptability, and intuition. In sharp contrast, the hierarchic style uses masses of carefully analysed data to arrive at the one best conclusion. It is associated with great thoroughness, precision, and perfectionism. The integrative style also uses masses of data, but will generate a multitude of possible solutions. Unlike the flexible, the integrative system will produce these varied interpretations not at successive appraisals, but at the same time. It is a highly experimental information style, often very creative.

In fact, some persons use one style predominantly, whereas others employ one style as often as another. A mixed style, for

instance, may be the integrative/hierarchic mix. This type of person mixes both styles in a complex approach to data. This mixture has been given a specific title - the complex style.

3.4.3.3 Field Independent/Dependent Model

One of the best known cognitive style models is that of field independent/dependent. This model, which was largely developed by Witkin et al.,⁸¹ classifies individuals as perceiving data as either (1) patterns of data which are relatively independent of their context (high analytic) or (2) discrete items embedded in their context (low analytic).

This model's concept of field dependence stresses the ability of an individual to indicate perceptually the various aspects of his experience. Specifically, Witkin, et al. state:

The person with a more field-dependent way of perceiving tends to experience his surroundings in a relatively global fashion, passively conforming to the influence of the prevailing field or context.⁸²

The field independent person possesses a more differentiated, analytical approach to his world and can better discriminate between figure and ground in his perceptual behaviour.⁸³ Witkin, et al. consider these differences among individuals to be a basic stylistic variable in personality with cognitive functioning subdivisions in a variety of modes of behaviour.

3.4.3.4 Heuristic/Analytic Model

The heuristic (intuitive)/analytic (systematic) model differentiates individuals on the basis of their "way of reasoning" in

⁸¹ Witkin, H.A., R.B. Dyk, H.F. Faterson, D.R. Goodenough and S.A. Karp, Psychological Differentiation, (New York: John Wiley and Sons, Inc., 1962).

⁸² Ibid., p.35

⁸³

solving a problem or reaching a decision. Individuals are categorised as analytic (searching the data for causal relationships which help to find an algorithmic solution) or heuristic (searching the data by trial and error hypothesis testing).

A more complete description of the analytic and heuristic reasoning tendencies is provided by Huysmans:⁸⁴

(1) Analytic reasoning:

This type of reasoning reduces problem situations to a core set of underlying causal relationships. All effort is directed towards detecting these relationships and manipulating the decision variables (behaviour) in such a manner that some "optimal" equilibrium is reached with respect to the objectives. A more or less explicit model, often stated in quantitative terms, forms the basis for each decision. Factors not included in the model, perhaps because they could not be quantified, are considered only insofar as they may require a significantly different course of action than the one suggested by the model solution. Available alternative courses of action are evaluated primarily in terms of significance of their deviation from the model proposed course of action.

(2) Heuristic reasoning:

A person using this type of reasoning emphasises workable solutions to total problem situations. The search is for analogies with familiar, solved problems rather than for a system underlying causal relationships, which is often thought illusory. Common sense, intuition, and unquantified "feelings" of future developments play an important role to the extent that heuristic reasoning

⁸⁴ Huysmans, Jan H.B.M. "The Effectiveness of the Cognitive Style Constraint in Implementing Operations Research Proposals", Management Science, Vol.17, No.1, (September 1970), pp.94-95

considers the totality of the situation as an organic whole rather than as a structure built up from clearly identifiable parts.

The purpose of Huysman's study⁸⁵ was to test the impact of cognitive style differences between the operation researchers and managers on the managerial implementation of operations research recommendations. He presented the subjects' implementation strategies, which were in two different versions, called the "explicit-understanding" and the "integral understanding" versions. The difference between the two versions was the inclusion of formulae in the "explicit-understanding" version to support the research findings.

The results indicated that analytic subjects reached a higher degree of implementation of the operations research proposal than heuristic subjects when the "explicit-understanding" approach was used in presenting the operations research proposal. The degree of proposal adoption reached by analytic subjects who received the "explicit-understanding" approach did not differ significantly from the degree of proposal adoption by either analytic or heuristic subjects who received the "integral-understanding" approach. Moreover, heuristic and analytic subjects who received the "integral-understanding" approach reached a higher degree of implementation of the operations research proposal than heuristic subjects who received the "explicit-understanding" approach. The degree of proposal adoption by heuristic subjects who received the "integral-understanding" approach did not differ significantly from the degree of proposal adoption by analytic subjects who received the same approach.

⁸⁵ Ibid., pp.92-104

The description of analytic and heuristic mentioned above, is consistent with Barrett's study⁸⁶ which sets out the processing strategies thought to be employed by the heuristic and analytic cognitive styles along six problems solving or decision making dimensions. These are shown in Table (3.2) on page 158. Barrett found differences in information preferences between analytics and heuristics. Heuristics preferred aggregated summary reports to disaggregated detail reports, while analytics wanted to use more of the detail reports.

As previously stated, the model (heuristic/analytic) looks at the strategy of the human information processing system as it operates to reach a decision or solve a problem. Therefore, in the nature of its approach to cognitive style, this model is somewhat similar to Witkin's field independent/dependent model.⁸⁷ However, while they are related, these models are not identical. Witkin's field independent cognitive style closely parallels the analytic way of reasoning. In fact, field dependence as defined by Witkin differs from the heuristic way of reasoning. Heuristic implies that one exhibits a tendency to reason by means of broad rules of thumb, attempting to combine and transfer from one experience to the next; field dependence merely implies that one has little capacity in what Witkin defines as the high analytic cognitive style.

The heuristic/analytic model, however, has been developed further by McKenney.⁸⁸ He has tried to develop this model by sub-

⁸⁶ Barrett, Michael J., et al., "Information Processing Types and Simulated Production Decision Making", Working Paper No.73.2, Management Information Systems Research Centre, University of Minnesota, (May, 1973).

⁸⁷ See p.154

⁸⁸ McKenney, James L., op. cit.

TABLE (3.2)

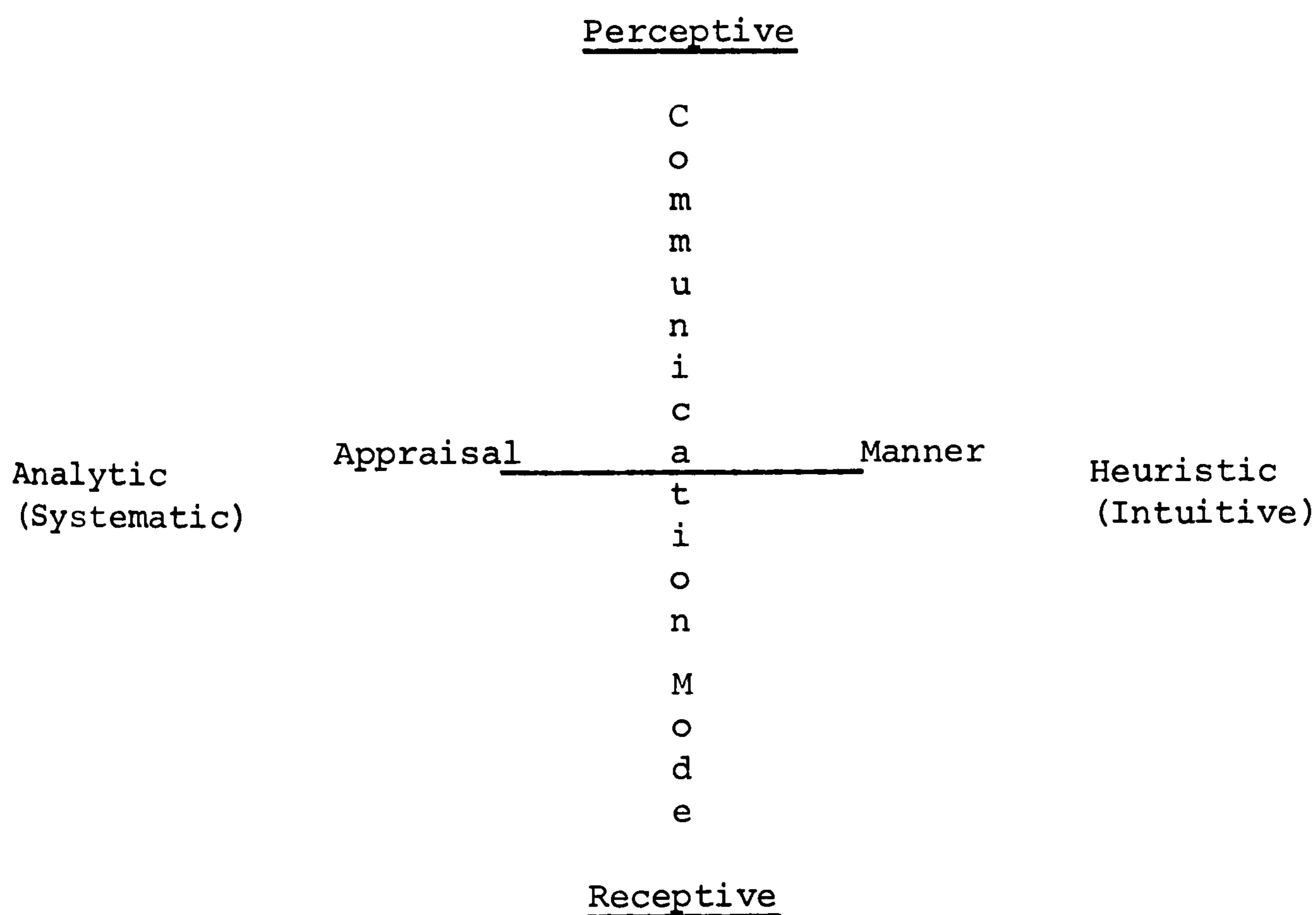
Characteristics of Analytic and Heuristic Cognitive Styles

<p>Cognitive Style</p> <p>Problem Solving Dimension</p>	<p>Heuristic</p>	<p>Analytic</p>
<p>Approach to Learning</p>	<p>Learns more by acting than by analysing the situation and places more emphasis on feedback</p>	<p>Employs a planned sequential approach to problem solving; learns more by analysing the situation than by acting and places less emphasis on feedback</p>
<p>Search</p>	<p>Uses trial and error and spontaneous action</p>	<p>Uses formal rational analysis</p>
<p>Approach to Analysis</p>	<p>Uses common sense, intuition and feelings</p>	<p>Develops explicit, often quantitative, models of the situation</p>
<p>Scope of Analysis</p>	<p>Views the totality of the situation as an organic whole rather than as a structure constructed from specific parts</p>	<p>Reduces the problem situation to a set of underlying causal functions</p>
<p>Basis for Inferences</p>	<p>Looks for highly visible situational differences which vary with time</p>	<p>Locates similarities or commonalities by comparing objects</p>

dividing decision making into problem identification and problem solving parts. Each of these parts, he states, requires separate and different modes of behaviour. According to this model, a problem identification requires individuals to use a communication mode whereas problem solving requires an appraisal manner. Communication mode refers to the way an individual acquires data and creates information; while appraisal manner reflects the degree to which an individual plans and forms his information processing activities. This model, as developed by McKenney, is shown in Figure (3.8)

FIGURE (3.8)

A Schematic of Cognitive Style



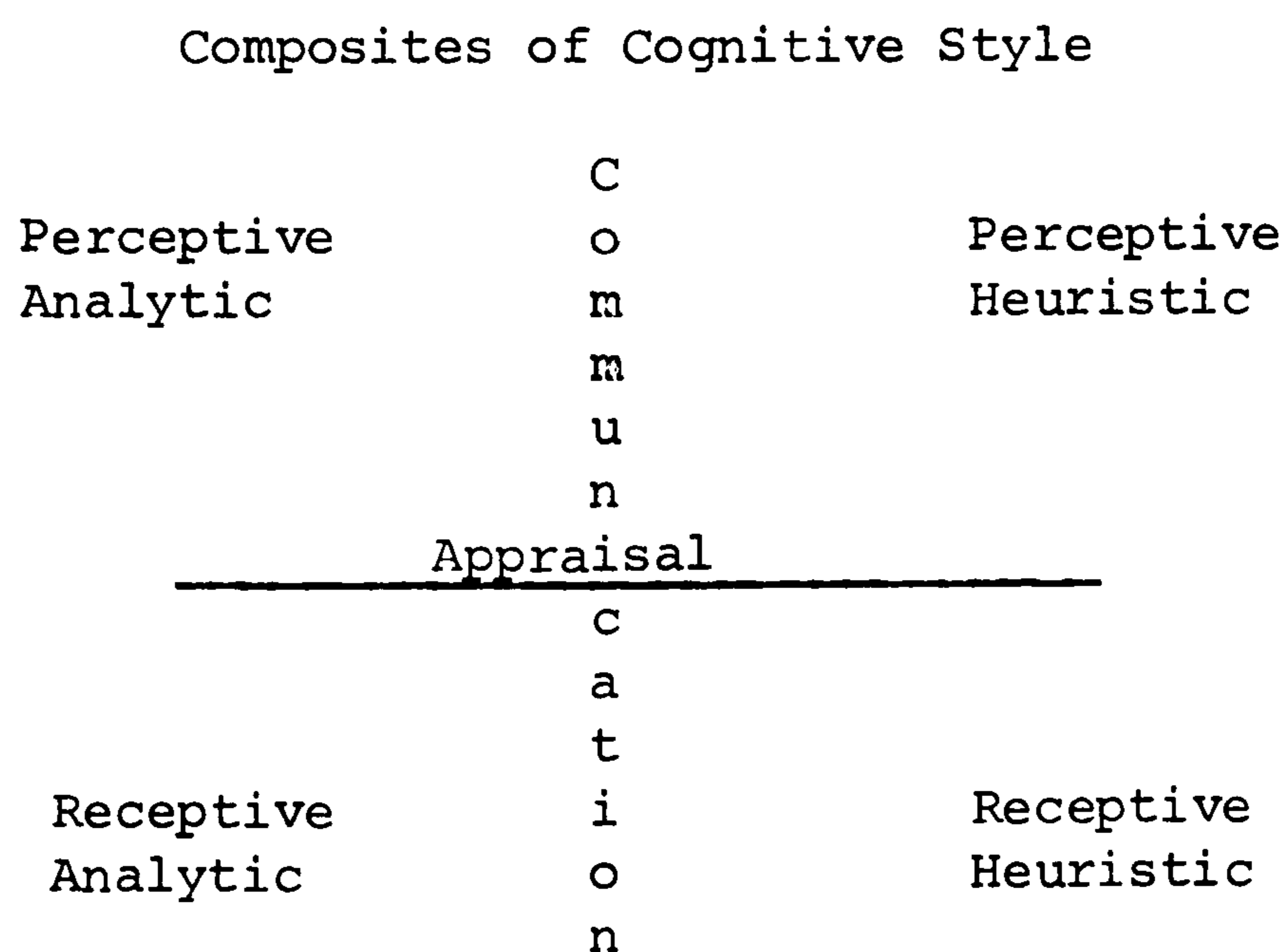
In this model there are two ideal types of communicative mode behaviour representing the opposite ends of the communication mode continuum - receptive and perceptive. The receptive individual concentrates upon assimilating precise impressions of situations and focuses his attention on specific relationships in the environment

as they exist. In contrast, the perceptive individual observes situations and attempts to relate the data to a conceptual organisation, and in fact, seeks specific cues to fill in his concept.

For the appraisal manner, the analytic (systematic)/heuristic (intuitive) cognitive style model has been used. An analytic appraiser plans a programme for the development of information to establish a range of alternatives to serve as a basis of his appraisal. The heuristic appraiser implicitly relies upon familiar information patterns of analogous situations derived from experience to interpret information and tends to rely upon the situation itself to guide his appraisal activities.

In fact, individuals demonstrate combinations of the behaviours (i.e. communication mode and appraisal manner) to form four distinct styles in situation analysis. The four composite cognitive styles as suggested by McKenney⁸⁹ are presented in Figure (3.9).

FIGURE (3.9)



⁸⁹ Ibid., pp.14-21

The analytic receptive individual develops an understanding of a situation by creating a plan for dealing with specific details often guided by an established concept. He tends to follow an information plan to consider specific facts to understand the attributes of a situation as characterised by a given concept. A systematic perceptor also has a plan for acquiring the necessary information, but he is more concerned than the receptor with organised data to support his concepts rather than data per se.

On the contrary, the intuitive receptor works with no information plan but uses nuances he perceives in specific details to guide his acquisition of data and eventually to organise his information. Within human bounds he is immersed in understanding the world as it is, and might rely upon an information system to refresh his memory and aid his plan when details seem lacking. He is a person who is very involved in several dimensions of detail of the situation and uses the aspect he is considering to guide him to which aspect to look at next. An intuitive perceptualist, on the other hand is a decision maker who relies upon the specifics in a situation to guide his information plan but implicitly relies upon concepts to organise his information acquisition and test his understanding of reality.

3.4.3.5 Summary

In contemporary research in the human information processing field, three approaches were identified. They were: (1) the level of information processing; (2) the structure of the human information processor; and (3) the cognitive style. Although each approach takes a distinctly different way to explain human information processing, they possess several commonalities:

First, each explains how a human structures and organises data. Second, each acknowledges the physical limitations of the human information processing system. Last, each notes that differences in processing occur between individuals.

However, the cognitive style approach, the third one, is the popular and common way of looking at human information processing. This can be attributed to three reasons:

First, cognitive style is an intuitively agreeable concept when considering individual decision making differences, i.e. it makes sense to believe that different groups of people take different approaches to solving problems. Researchers can easily identify with the attributes of contrasting cognitive styles. This identification makes cognitive style somewhat easier to grasp than the other two approaches, i.e. the level of information processing and the structure of the human information processor. In the cognitive style approach, behaviour is viewed and not an implied structure which cannot be observed. Secondly, this approach is applicable in both experiments and the business environment. Lastly, cognitive style appears to be easily measured.

In the cognitive style approach, three models were discussed.

They were:

- (1) The first model classifies individuals into flexible/integrative and decisive/hierarchic according to the amount of information used.
- (2) The second model, field independence/dependence, classifies individuals as perceiving data as either: (a) patterns of data which are relatively independent of their context (high-analytic),

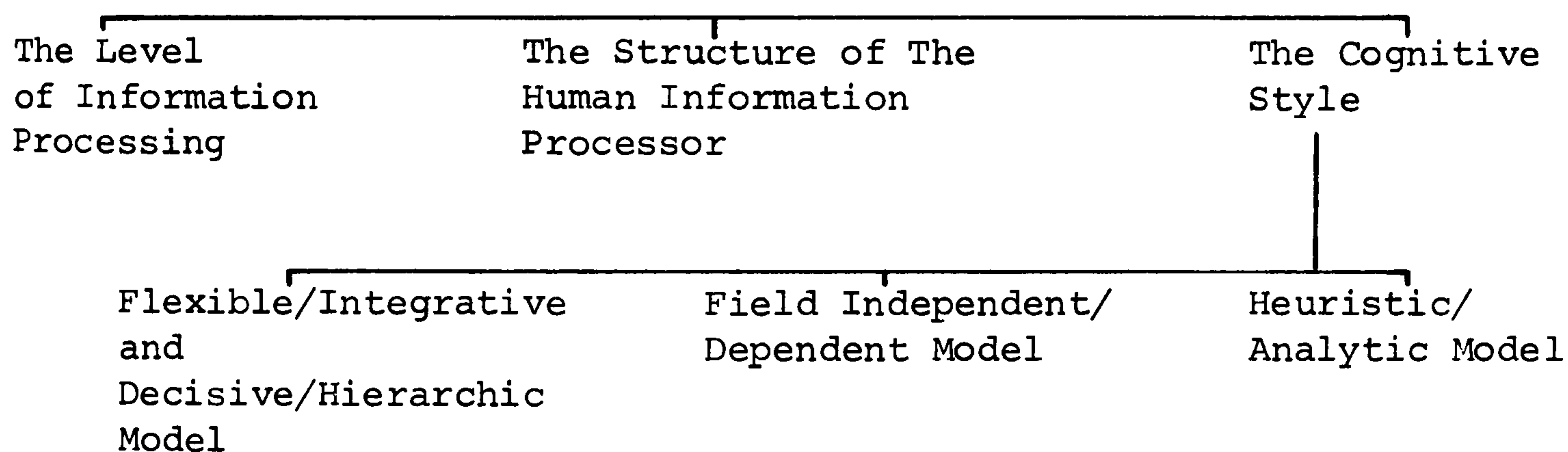
or (b) discrete items embedded in their context (low analytic).

(3) The last model classifies individuals as analytic; searching the data for causal relationships which help to find an algorithmic solution, or heuristic; who emphasises workable solutions to solve problems. He solves problems through his common sense and relies more heavily on feedback.

A schematic summary of the three human information processing approaches and the three models of the cognitive style approach is illustrated in Figure (3.10).

FIGURE (3.10)

Human Information Processing Approaches



3.4.4 The Effects of Heuristic/Analytic Cognitive Style
On The Information Perceived and Used

As each model of the three models of the cognitive style discussed previously is composed of different styles, it is assumed that each style has a different impact on the information perceived and used in the decision making. In fact, a review of the literature of the three models indicates that the results of the studies on the effect of the heuristic/analytic cognitive styles on the information perceived and used are more consistent than the results of the studies on the effects of the other two models, i.e. flexible/integrative and decisive/hierarchic, and field independent/dependent.

Because of this, the analytic/heuristic cognitive style model is adopted in this study. In order to identify the differences between the heuristic and analytic cognitive styles in perceiving and using information in the decision making, it is necessary to discuss the results of some of the empirical studies found in the literature.⁹⁰

Barrett, et al., studied heuristic and analytic decision makers in a simulated production gaming environment using business student subjects.⁹¹ The purpose of their study was to examine, among other things, the relationship between the characteristics of the two styles of the decision makers and information preferences. The analysis of the study's results revealed that there was a difference in the type of report acknowledged to be useful. Compared to analytic decision makers, the heuristic decision makers placed greater emphasis on summarised production reports in formulating and changing their strategies, while the analytic styles stressed detailed reports.

⁹⁰ For details about the results of the studies related to the differences between the cognitive styles of the other two models, i.e. flexible/integrative and decisive/hierarchic, and field independent/dependent, see for example:

Driver, Michael K. and Theodore J. Mock, op. cit., pp.499-507;

Savich, Richard S. "The Use of Accounting Information in Decision Making", The Accounting Review, (July, 1977), pp.642-652;

Doktor, Robert H. and William F. Hamilton "Cognitive Style and the Acceptance of Management Science Recommendations", Management Science, Vol.19, No.8, (April, 1973), pp.884-894;

Lusk, Edward J., "Cognitive Aspects of Annual Reports: Field Independence-Dependence", Empirical Research in Accounting; Selected Studies, 1973, pp.191-202

⁹¹ Barrett, Michael J., et al., "Information Processing Types and Simulated Production Decision Making", op. cit.

Dickson and Barkin⁹² also investigated the relationship between cognitive style (heuristic or type I/analytic or type II) and data selection from a computer-based information system. The production gaming was chosen as the environment of their experiment. Subjects (students) were required to make decisions covering a week of simulated operation of a manufacturing facility.

The results of this study indicated that the two cognitive styles differed significantly in the data selection. Heuristic decision-makers (subjects) selected more data elements than did the analytic decision-makers. It is clear that there is a difference in the findings of this study and the preceding study of Barrett, et. al., in regard to data selection by the analytic and the heuristic decision-makers. The results of the preceding study indicated that the analytic style selected more data elements and preferred detailed reports, while the heuristic style selected less data elements and placed greater emphasis on summary reports.

Benbasat and Schroeder,⁹³ in another study conducted in the form of an inventory management decision environment, investigated, among other things, the relationship between the cognitive style, i.e. analytic versus heuristic or low analytic, and the numbers of the reports requested for making a decision in the experimental game. The results indicated that the heuristic (low analytic) decision makers (subjects) with a low functional area knowledge used the most

⁹² Dickson, Gary W. and Stephen R. Barkin, "An Investigation of Data Selection and Cognitive Style", Working Paper No. 76-08, Management Information Systems Research Centre, University of Minnesota, (April, 1976).

⁹³ Benbasat, I. and R.G. Schroeder, "An Experimental Investigation of Some MIS Design Variables" The Management Information Systems Quarterly, Vol.1, (March 1977), pp.37-49

reports. On the other hand, the high analytic decision makers who were using decision making aids such as formulae for determining optimum order-point and order-quantities used less reports than the heuristic decision makers (low analytic) who were using decision making aids. However, "for subjects with no decision aids the situation was reversed with the high analytics using more reports than low analytics",⁹⁴ (emphasis added).

Finally, Vasarhelyi has conducted a laboratory experiment into decision styles and attitudes in interactive man-machine decision making systems.⁹⁵ He classified the subjects used in his experiment as to heuristic and analytic. Among other hypotheses, three related to cognitive style and information utilisation have been tested. They are:

- (1) Heuristics use qualitative information more than analytics.
- (2) Analytics use quantitative information more than heuristics.
- (3) Heuristics, on the whole, use less information than analytics.

Although the first two hypotheses were statistically rejected, the last one was accepted. That is, heuristic decision makers use less informational elements than analytics.

From an examination of the previous studies it is clear that, with the exception of Dickson and Barkin's study (on page 165), the findings of these studies were consistent. Regarding the study of Dickson and Barkin, a possible explanation of its results which

⁹⁴ Benbasat, J. and R. Schroeder, op. cit., p.46

⁹⁵ Vasarhelyi, Miklos Antol, "Man-Machine Planning Systems: A Cognitive Style Examination of Interactive Decision Making", Journal of Accounting Research, Vol.15, No.1, (Spring, 1977), pp.138-153

contradicted the results of the other studies is that the subjects in these studies were older and had more experience than Dickson and Barkin's subjects. Further, Dickson and Barkin's subjects, probably tended to be more analytic than those participating in the other studies. In fact, the studies did not contain data which can support the explanation mentioned above and no other evidence was found.

However, the overall conclusion which can be drawn from these studies is that an analytic decision maker is one who reduces a problem to a set of causal relationships and tries to find a solution by using formulae and models. In comparison, the heuristic decision maker solves problems through intuition and relies more heavily on feedback. Obviously, decision makers are not expected to be at the extremes in terms of this classification but may tend towards one style or the other. Based on the characteristics of the two styles, the analytics use more information, prefer detailed reports, while the heuristics use less information and like aggregated summary reports.

In fact, the purpose of classifying cognitive styles in this fashion, i.e. analytic and heuristic, is not to force decision makers into very specific categories and to argue that such a style is more suited for this or that kind of a job, or better than the other. The question is rather: given that we find different styles there, how are the cognitive styles of the decision makers different, and what are the implications for the design of information systems.

3.4.5 The Cognitive Style of Decision Makers As A Variable Influences Information Systems Design

3.4.5.1 Introduction

The decision makers are different in their approaches to decision making, risk taking, training, experience and work at different organisational levels in a firm having differing characteristics. Consequently, management information systems, to be effective, theoretically ought to be designed according to the cognitive style of the decision makers, in addition to the organisational levels they are at, the functional area, and the environment in which the organisation is operating. "To design an efficient (effective) information system, assumptions must be made as to the approach the manager takes in reaching a decision".⁹⁶ In fact, the cognitive structure acts as a filtering device in weighing the importance to be attached to different informational signals received by a decision maker who has to make a decision.

The importance of the cognitive style as a filtering device has been recognised by some professional and academic bodies. For example, a committee of the American Accounting Association has pointed out the need to learn more about a manager's process of choosing among alternative decision models and the extent to which different information signals actually bias his choice. Further, the committee suggests that the choice of information and models may also be influenced by the differences among managers in cognitive style.⁹⁷

⁹⁶ Mock, Theodore, J., Teviah L. Estrin and Miklos A. Vasarhelyi, "Learning Patterns, Decision Approach, and Value of Information", Journal of Accounting Research, Vol.10, No.1, (Spring, 1972), p.131

⁹⁷ American Accounting Association, Committee on Managerial Accounting, "Report of the 1969-70, 1970-71", The Accounting Review, (Supplement to Vol. XLVII, 1972), p.323., p.330

The point is, that when information is presented to a decision maker at a given organisational level, a given characteristic of the information system, such as format, amount of information, frequency of presentation, may be more effective for a certain cognitive style of decision maker, than for others.

Consequently, an important factor in the design of an information system is the cognitive style of the decision maker - the recipient of its output. In fact, selection of an information system is dependent upon "the behavioural factors of the manager who will receive the messages and who will specify the requisite actions. An understanding of the behavioural aspects will then enhance the information designer's choices of selecting a satisfactory or even optimal structure".⁹⁸ Further, Mason and Mitroff⁹⁹ have emphasised that decision makers need information that is prepared and suited to their cognitive style rather than that of their designers. This places a heavy burden on the designers of information systems. They must not only find out what information the decision maker actually needs, but the designers must also find out which mode of displaying the information is more appropriate to the decision maker's cognitive style.

3.4.5.2 Influence of Cognitive Style on Information System Design

Cognitive style is based on the recognition that different decision makers process the same information differently, and can be more effective with different types of information. In other words, there are different effects resulting from similar informational input streams due to what might be termed "structural variables" in

⁹⁸ Mock, Theodore J., "A Longitudinal Study of Some Information Structure Alternatives", Database, Vol.5, (Winter, 1973), p.42

⁹⁹ Mason, Richard O. and Ian I. Mitroff, op. cit., p.485

the mental organisation of the decision maker.

The role of the structural variables is that they "provide a metric for measuring the way a person combines information perceived from the outside world, as well as internally generated information, for adaptive purposes ... like a program or set of rules which combines these items of information in specific ways ... For example, two persons may reach the same conclusion in a situation ... but if the conclusion or judgement was reached by different thought processes ... then very different adaptive consequences would be expected to follow".¹⁰⁰

As a result, cognitive characteristics have been shown as an important variable in information systems design. For instance, in the study of Dickson, Senn and Chervany¹⁰¹ a framework has been presented (see Table 3.3 on page 171) where the design variables are related to the quality of decision making. Since the goal of designing and implementing a management information system is to provide decision makers with useful information which improves decision making, it was suggested that the variables of interest and their interrelations should be investigated to find out how they affect decision effectiveness. Apart from this point, the framework has included the decision maker's attributes as an independent variable influencing information systems design.

On the other hand, Mason and Mitroff presented the components of an information system. Although the components which they dis-

¹⁰⁰ Schroeder, Harold M., Michael J. Driver and Siegfried Streufert, op. cit., pp.4-5

¹⁰¹ Dickson, Gary W., James A. Senn and Norman L. Chervany, op. cit., p.914

TABLE (3.3)

Independent and Dependent Variables Influencing Information System Design*

Independent Variables		Dependent Variables
The Decision Maker	The Decision Environment	Decision Effectiveness
Indirectly Acquired	Function	Quality
Attributes	Finance	Cost
Aptitudes	Production	Profit
Attitudes	Marketing	Time
	Personal	etc.
	R & D	
	etc.	
Directly Acquired	Level	
Attributes	Time Availability	
Training		
Experience		
	Strategic	
	Tactical	
	Operational	
	Environmental	
	Decision Aids	
	Stability	
	Competitiveness	
	Time Pressure	

* Source: Ibid

cussed did not seem to contribute to either the current practice or the literature, the significance of their framework is that they stressed the psychological type of the user of information. Mason and Mitroff stated that:

An information system consists of at least one PERSON of a certain PSYCHOLOGICAL TYPE who faces a PROBLEM within some ORGANISATIONAL CONTEXT for which he needs EVIDENCE to arrive at a solution (i.e. to select some course of action) and that the evidence is made available to him through some MODE OF PRESENTATION".¹⁰² (Emphasis added)

It is clear that there are differences between the framework presented in the study of Dickson, et al., and Mason's and Mitroff's framework regarding some items of interest, as one would expect, but there are also similarities between the two frameworks such as looking at the organisational context, and mode of presentation. The most important thing is that both frameworks have included the psychological type of the decision maker as a variable influencing information system design.

Lucas¹⁰³ also has designed a field study to investigate the relationships among the use of an accounting information system, action, and organisational performance. The organisation involved in his study was a bank. The variables used in his study were decision style, use of reports, performance, personal factors, situational factors, action and attitudes. The goals of this study

¹⁰² Mason, Richard and I. Mitroff, op. cit., p.485

¹⁰³ Lucas, Henry, C., Jr., "The Use of an Accounting Information System, Action and Organisational Performance", The Accounting Review, (October, 1975), pp.735-746.

A similar study has also been conducted by Lucas in the same year. The study focussed on sales force performance and the use of a sales information system. The results of both studies confirm each other. See: Lucas, Henry C., Jr., "Performance and the Use of An Information System", Management Science, Vol.21, No.8, (April, 1975), pp.908-919.

were to (1) determine what variables are associated with branch performance (especially action based on the accounting information system) and (2) specify what variables are associated with action and the use of the accounting information system.

The results of this study indicated, among other things, that managers and assistant managers who were active in restructuring a client's loan application, and who were willing to exceed authorised limits of loan were associated with higher performance. However, the same group appeared less likely to use information from the computer based accounting information system. In Lucas's opinion, possibly these personnel were more intuitive and preferred to rely on their own judgement instead of the quantitative data provided by an information system. It was probable that this group of managers and assistant managers had more experience. However, a challenge for those designing accounting and other information systems is to determine how to provide the data to support this type of decision maker.

Based on the results of this study, some recommendations have been offered. The most important one was as follows: "Provide as much flexibility in the design of information systems as possible so a manager can store and retrieve information which suits his decision style",¹⁰⁴ (emphseis added).

Another field study has been conducted by Rahman to empirically investigate the use of accounting onformation for operational control and performance's subordinate evaluation, and the influence of selected job related traits and organisational factors on the styles

¹⁰⁴ Lucas, Henry C., Jr., "The Use of An Accounting Information System, Action and Organisational Performance", op. cit., p.745

using accounting information.¹⁰⁵ The findings of this study suggested that in order to produce effective accounting controls, accountants and accounting system designers should consciously consider the relevant social and psychological aspects of the users (decision makers) of the accounting information. The findings also proposed that the system must take account of the cognitive and emotional needs of managers. The system should build upon the traits of the managers. Finally, accountants should measure the managers' characteristics, the functional environment, and the organisational context as well as the economic factors in designing measurement and reporting systems, if they want the system to be used effectively.

In fact, the role of the information systems designer is to satisfy users' wants and preferences for information needed for making decisions. This role should be accomplished in the light of two basic issues concerning information processing by decision makers. First, there is the manner in which different information stimuli are perceived to have value in decision making by users. Second, if different decision makers or groups of decision makers react differently to the same information stimuli, then an argument can be made for decision maker differences in information processing. The diversity of users' background, objectives and psychological characteristics may lead to different wants and preferences for information.¹⁰⁶

¹⁰⁵ Rahman, Mawdudur, "The Influence of Organisational and Personal Factors on The Use of Accounting Information: An Empirical Study", Accounting, Organisation and Society, Vol.1, No.4, (1976), pp.339-355

¹⁰⁶ San Miguel, Joseph G., "Information Processing in Managerial Decision Making: A Preliminary Study", OMEGA, Vol.4, No.5, (1976), p.577

3.4.5.3 Use of Psychological Tests In Information Systems Design

As previously stated, the cognitive style of the decision makers (users of information) has become a factor which should be considered in information systems design in addition to the organisational level and the functional specialisation of the decision makers.

If the cognitive style is to be taken into account in the design of an information system, some researchers have proposed that it is necessary to use psychological tests with recognised validity and reliability to determine the cognitive style of information users (the decision makers) in order to facilitate the complex process of the system design.¹⁰⁷ For example, the following psychological tests were suggested: (a) the Witkin Embedded Figures Test which measures one's analytic ability; (b) the modified Bieri Cognitive Complexity Test was suggested to measure the number of ways in which an individual differentiates a set of concepts; and (c) Category Width Test which elicits an individual's estimation of maximum and minimum values which surround a given mean value. The implication of this test is that narrow categorisers, sensitive to small differences, make finer discriminations, and may better assimilate data with greater precision than width categorisers who may prefer dichotomous type data.¹⁰⁸

Psychological tests solely, of course, do not provide all the information needed to design the reports required. They indicate only the decision maker's preferences for the amount of detailed

¹⁰⁷ Bariff, M.L. and E.J. Lusk, "Cognitive And Personality Tests For the Design of Management Information Systems", Management Science, Vol.23, No.8, (April, 1977), pp.820-829

¹⁰⁸ Ibid., p.824

information, but they do not reveal the relevant information for a decision or problem facing the decision maker in a specific functional specialisation at specific organisational level. Obviously, other techniques should be used to obtain such information. In brief, psychological tests are not a substitute for the other techniques, such as interviews, both should be integrated. Figure (3.11) on page 177, illustrates how psychological tests and other techniques, such as interviews, are to be used in reports design.

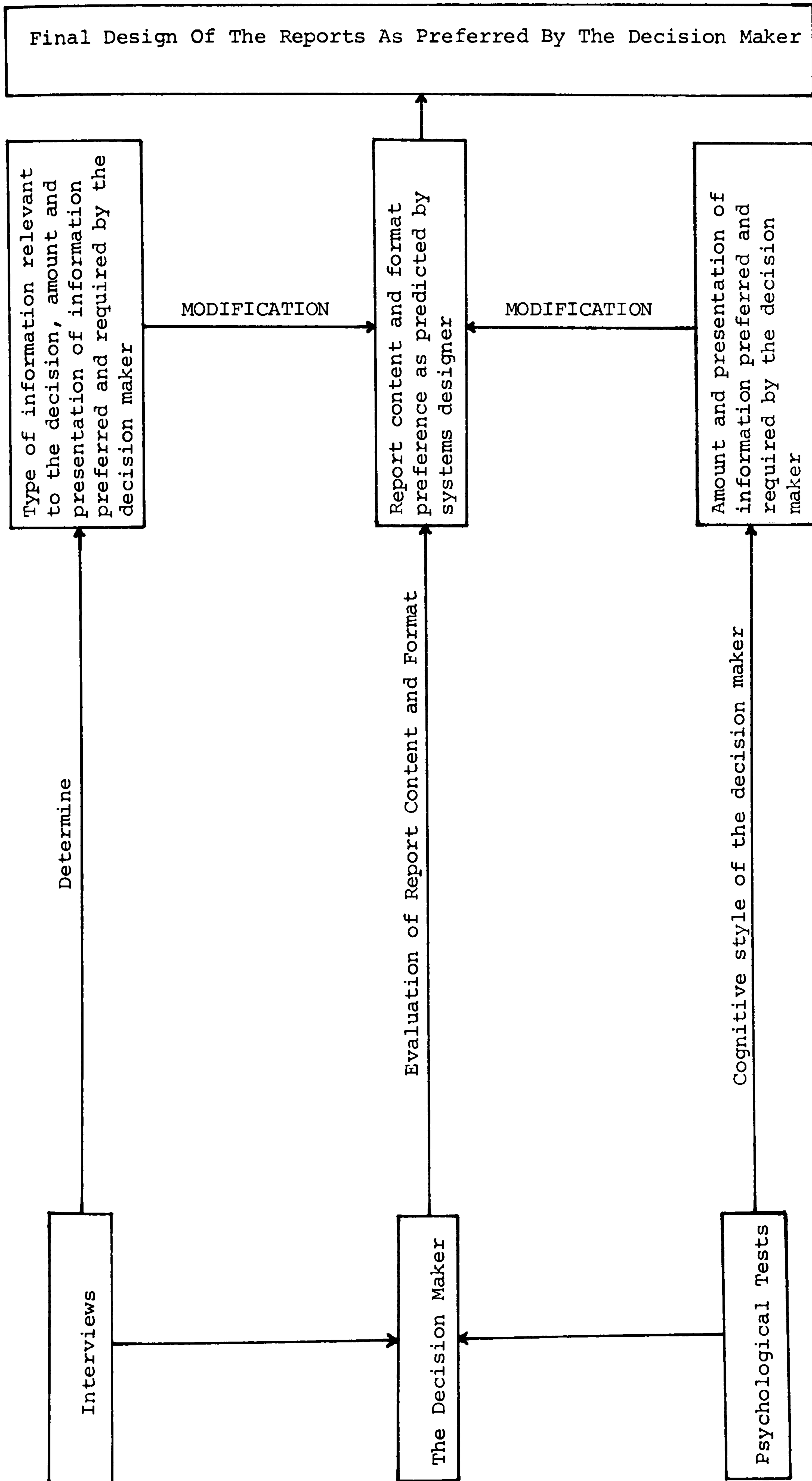
3.4.5.4 Summary

The effective utilisation of an information system means that the decision maker includes the information provided by the system in his human information processing system. This system is defined as the cognitive system which has the capacity to organise, manipulate and integrate information for decision making.

The human information processing system has been described in three approaches. Each approach takes a distinctly different way to explain how a human being processes information. These approaches are: (1) the level of information processing; (2) the structure of the human information processor; and (3) the cognitive style. However, these approaches do possess several commonalities. Each explains how a human being structures and organises information. In addition, each acknowledges the physical limitations of the human information processing system. Finally, each notes that differences in processing occur between individuals.

The third approach, i.e. the cognitive style, describes the way taken by an individual in solving a problem or reaching a decision. This approach, in fact, is concerned with understanding

FIGURE (3.11)
Use Of Psychological Tests and Interviews In Reports Design



how people process information and make decisions. The cognitive style approach is a popular and common way of looking at human information processing. It is an intuitively agreeable concept when considering individual decision making differences. Furthermore, this approach is applicable in both experiments and the business environment. Finally, cognitive style appears to be capable of measurement without too much difficulty.

Three models of cognitive style were identified. They were: (1) flexible/integrative and decisive/hierarchic model; (2) field independent/dependent model; and (3) heuristic/analytic model. The heuristic/analytic cognitive style model is adopted for use in this study since the results of the studies based on this model are more consistent than the results of the studies based on the other approaches mentioned above. Moreover, the studies of heuristic/analytic model indicated that this model appears satisfactory in application in management information systems domain.

The heuristic/analytic model differentiates individuals on the basis of their "way of reasoning" in solving a problem or reaching a decision. An Analytic decision maker is one who reduces a problem to a set of causal relationships and tries to find a solution by using formulæ and models; while a Heuristic is one who emphasises workable solutions to solve problems. He solves problems through intuition and relies more heavily on feedback. In fact, decision makers are not expected to be pure analytics or pure heuristics. Rather, accepting cognitive style as a relative phenomenon, decision makers are classified as they tend towards one style or the other.

In fact, the purpose of classifying cognitive styles in this fashion, i.e. analytic and heuristic, is not to force decision makers into very specific categories and argue that such a style is more suited for this or that kind of a job, or better than the other. The question is rather: given that we find different styles, how are the cognitive styles of the decision makers different, and what are the implications for the design of information systems. The point is that information is presented to a decision maker at a given organisational level. A given characteristics of the information system, such as the reports format; or the amount of information, or the frequency of receiving, may be more effective for a certain cognitive style of decision maker, than for others.

Research in this field has revealed a number of relationships. Previous studies have indicated that there is a relationship between the effectiveness of decisions and the form in which information was presented. Furthermore, there is another relationship between the effectiveness of decisions and the quantity of the information provided. However, the report format and the amount of detail preferred depend on the cognitive style of the user of information (the decision maker).

The effects of cognitive structure and information structures on the quality of decisions and the actual perception and use of information have been attracting the attention of accountants and management systems designers. Their efforts are devoted to designing information systems best suited to the individual style of decision makers. For example, some of the studies reviewed in this section indicated that analytic decision makers prefer detailed reports and use more information; while the heuristic

style prefers aggregated summary reports and uses less information.

Accordingly, the cognitive style of the decision makers (users of information) should be taken into account in the design of information systems. This, however, does not mean tailoring information systems for each user; obviously this may not be practicable or economical. Rather, by identifying the group of decision makers possessing a few common characteristics, such as analytic style versus heuristic style, as opposed to the many differences possessed by individuals, information systems can be constructed to support these common traits. Designing information systems to support traits of the decision makers should reduce the amount of design features necessary to provide an information system that can support differences among decision makers. Although this practice would be a compromise to building systems tailored to individual needs, designing a system to support groups of decision makers (users of information) is perhaps the more practical and economical approach to constructing more effective systems.

To take the cognitive style of the decision makers into account in the design of information systems, some psychological tests may be used to determine the styles of users of information in order to facilitate the complex process of systems design. This approach, however, is not a substitute for the other techniques applied in information systems design, and cannot be used solely. Rather, this approach and the others should be integrated.

From the preceding discussion, it may be possible to conclude that the key variables which affect the content and format of an information system's reports are:

- (1) The organisational level of the decision maker (top, middle, and direct management).
- (2) The provider of information.
- (3) The cognitive style of the decision maker (heuristic or analytic).

Each variable of the three mentioned above is considered a key factor regarding certain dimensions of a report (i.e. relevance, sufficiency, reliability, understandability and timeliness). However, this does not mean that the variable which affects some report's dimensions do not affect the others. In fact, there is an interactive effect of the three variables on the report's dimensions, but each variable has salient effects on some dimensions rather than on others as illustrated in Figure (3.12) on page 182.

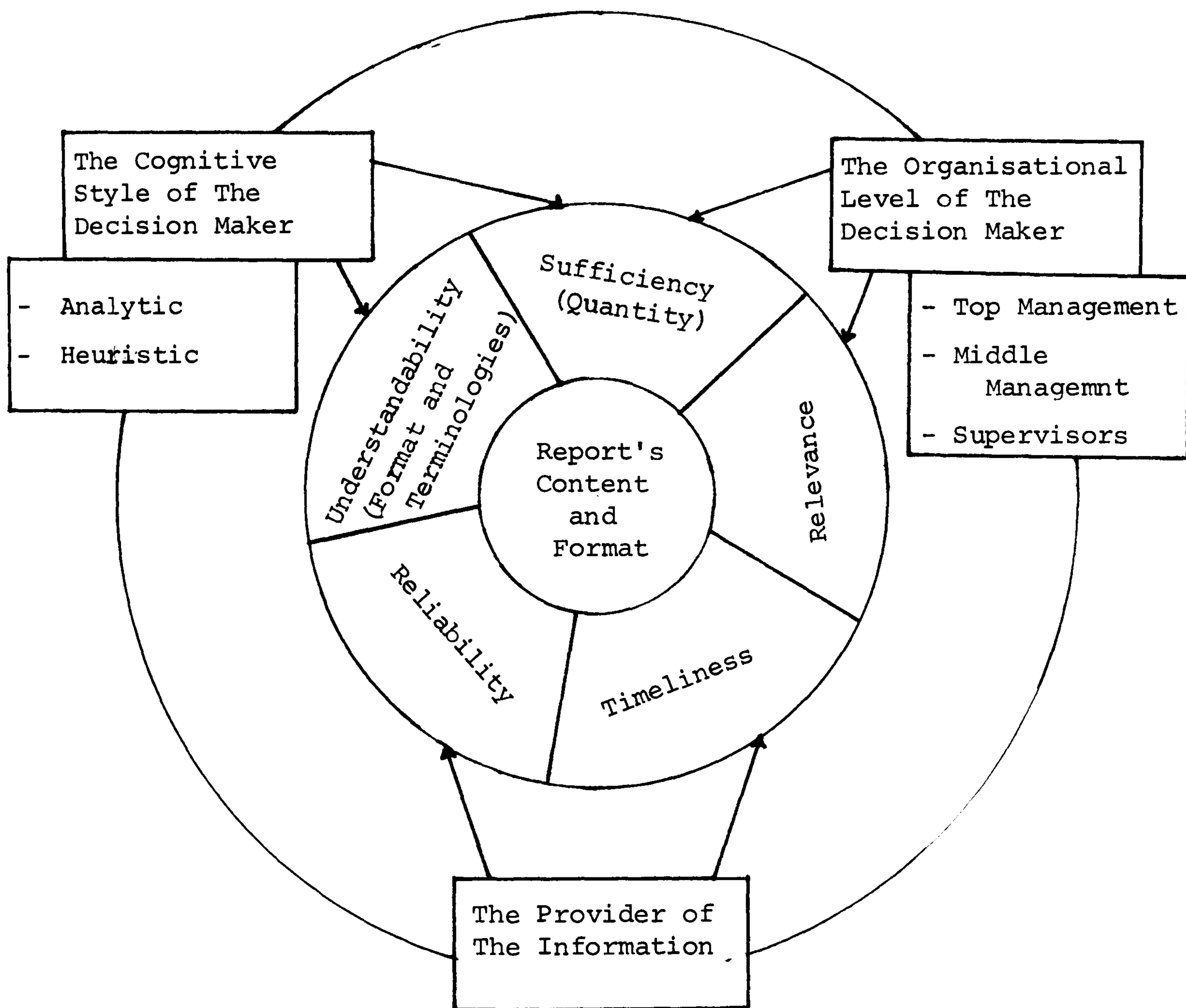
To sum up, the cognitive style of the decision maker and its effect on information systems design have been areas of interest in research studies only recently. The research studies have reported differences in the information uses of the different types of decision makers. The emphasis given to the decision maker style was to point out its importance as a variable affecting, or which should affect, information system design to improve and increase a system's utilisation by the users of the information, i.e. the decision makers.

SECTION 3.5 - SUMMARY

The purpose of this chapter was to discuss the behavioural aspects of management information reporting. Four psychological concepts were presented and discussed in this chapter. They were: (1) satisfaction; (2) perception; (3) motivation; and (4) the cognitive styles of the human information processor. Each was discussed from the perspectives of psychology and management information reporting.

FIGURE (3.12)

The Variables Affecting Content And Format Of Reports



Satisfaction was defined as the feeling state in a person who has gratified an appetite or motive. In the psychological sense, satisfaction occurs when frustration is reduced or avoided. From the standpoint of management information reporting, if the information system supplies the information needed by the decision maker as and when required, he will be satisfied with the system, and accordingly frustration will not occur. Therefore, satisfaction with the information provided indicates that the information is useful and the system is effective.

However, management information reports would not satisfy the decision makers and influence their behaviour, i.e. actions, as intended by the information providers, if the information were not perceived and comprehended as the latter actually intended. In other words, the information contained in the reports may not be perceived by the decision makers because of some barriers, or it may be perceived and interpreted as something other than was intended by the providers. In fact, the problem is that perception is influenced by the person's needs, motives, experiences, and other factors. Five factors were studied in this chapter. They were: (1) personal values and needs; (2) capacity to perceive; (3) the interpersonal relationships and the organisational setting; (4) functional fixation; and (5) illusions.

Motivation was the third concept which was discussed in this chapter. As most human behaviour is motivated by the desire to satisfy certain needs, it was believed that the information provided by an information system could be used as a stimulus to intended behaviour. This is achieved by affecting, among other things, the individual's aspiration levels and satisfying his self-esteem. By monitoring the individual progress and telling him how close he has

already come to his goal (proximity of the goal), his aspiration level is affected and his need for self-esteem is satisfied, and consequently his performance may be enhanced. In other words, the motivational effect of the information provided by an information system may influence the decision maker's satisfaction with the system.

The decision maker's satisfaction is influenced also by his cognitive style and how his information systems are compatible with his style. The cognitive style was defined in this study as the way taken by an individual in solving a problem or reaching a decision. Different models of the cognitive style were identified in the literature. However, the model adopted for use in this study was the heuristic/analytic model. The analytic decision maker is one who reduces a problem to a set of causal relationships and tries to find a solution by using formulae and models. In comparison, the heuristic decision maker solves problems through intuition and relies more heavily on feedback. Based on the characteristics of the two styles, the analytics use more information, and prefer detailed reports, while the heuristics use less information and like aggregated summary reports.

As the decision makers differ in their cognitive styles, it was believed that these styles should be taken into account in the design of information systems. This, however, does not mean tailoring information systems for each user; obviously this may not be practical or economical. Rather, by identifying the group of decision makers possessing a few common characteristics, such as analytic style versus heuristic style, as opposed to the many differences possessed by individuals, information systems can be

constructed to support these common traits. To identify the cognitive styles of the decision makers and to take them into account in the design of information systems, some psychological tests were suggested to be used. It is clear that psychological tests are not substitutes for the other techniques applied in information systems design, and cannot be used solely. Rather, both should be integrated.

CHAPTER IV

INEFFECTIVENESS OF MANAGEMENT INFORMATION SYSTEMS:

DIMENSIONS, CAUSES AND EFFECT ON MANAGERS'

ATTITUDES AND SYSTEMS USAGE

A management information system in an organisation may not be as effective as it was intended and as management expected. The system may fail to prove its expectation in providing management with useful information as and when required. However, it should not be assumed that when a management information system relatively fails to achieve its objective, the fault lies solely with the system's personnel. The final responsibility possibly lies with management. In other words, the system may be effective, but management does not utilise the information provided by the system in an effective way. That is, there is a "poor management with a good information system".¹ In fact, an ineffective management information system may be attributed to poor design and/or poor implementation. Ineffectiveness impacts managers' attitudes towards a management information system and accordingly the system usage may be affected.

The purpose of this chapter is to discuss the possible dimensions and causes of ineffectiveness of management information systems, and to study its effect on managers' attitudes towards these systems and the systems usage. To achieve the purpose of this chapter, it is divided into three sections:

¹ MacVeagh, Charles, "Evaluating An Information System", AMS Professional Management Bulletins, (July, 1970), pp.5-6.

- (1) Dimensions and causes of ineffectiveness of management information systems.
- (2) Information systems effectiveness, managers' attitudes, and systems usage.
- (3) Summary.

SECTION 4.1 - DIMENSIONS AND CAUSES OF INEFFECTIVENESS OF
MANAGEMENT INFORMATION SYSTEMS

4.1.1 Dimensions Of Ineffectiveness

Ineffectiveness of a management information system may be indicated by one or more of the following deficiencies:

- (1) Overabundance of irrelevant information.
- (2) The lack of relevant information.
- (3) Incompatibility of information with managers' capabilities.

4.1.1.1 Overabundance Of Irrelevant Information

An effective information system is one which provides managers with their actual informational requirements. Poor design and/or poor implementation of a system may lead to providing managers either with insufficient relevant information, or overabundance of irrelevant information.

In fact, the problem of providing an overabundance of information can be partially attributed to the fact that it is easy to get too much information from the computer files. This may facilitate providing more information than managers' need.² Ackoff explains that the cause of this problem is that management information systems are designed on the assumption that the critical

² Reynolds, P.D., "Practical Improvement of Computer-Generated Management Information - 1 The Problem And Some Easy Remedies", The Accountant's Magazine, (January, 1979), p.23

deficiency under which managers carrying out their responsibilities and operate is the lack of relevant information.³

As previously stated in Chapter III, there is an implicit assumption behind providing too much information which is "more is preferable to less". The theme is that the more information a decision-maker has, the better his decision will be. In fact, such an idea is not quite correct. The overabundance relates to information that is irrelevant to the decision-maker's needs and they must spend a great deal of time and effort separating the relevant from the irrelevant.

For an example of an aspect of the problem of overabundance of information, the number of reports and copies which have been distributed in an organisation was 560 and 2,800, respectively. Managers have suffered from information overload. To solve this problem, the recurring reports have been reduced from 560 to 140, and the number of copies of reports being distributed from 2,800 to 460.⁴

On the other hand, Paretta explains another dimension of the problem of overabundance of information; he focuses on the information frequency:

... increasing the frequency of reporting can cause problems where the time necessary to evaluate information received is longer than the reporting cycle. A situation could develop where the manager is supplied new information before he has had the opportunity to fully evaluate information received in the prior period. Receiving the new information would make his analysis-in-process obsolete and he

³ Ackoff, Russell L., "Management Misinformation Systems", Management Science, Vol.14, No.4, (December, 1967), B-P.147

⁴ Neuschel, Richard F., "Strengthening Management Information Systems", The McKinsey Quarterly, (Winter, 1976), p.57

would very likely postpone a decision until the most recent information was evaluated.⁵

Although Paretta has not explicitly referred to the overabundance of irrelevant information, he has discussed the frequency of information when it is too high, which has the same impact as overabundance on managers.

To sum up, the overabundance of information could be caused by providing managers with irrelevant information, and/or making the reporting cycle shorter than the time necessary to evaluate the information received for the prior period.

4.1.1.2 The Lack Of Relevant Information

The second possible dimension of the ineffectiveness of a management information system is that the system does not provide sufficient relevant information because of the difficulty in determining what information each manager needs.⁶ The problem is that information may not be tailored to managers' needs, presumably because system designers may have a vague conception of what the job of a manager may entail.⁷ Therefore, managers may not be

⁵ Paretta, Robert L., "The Frequency Of Information Flows: A Misunderstood Management Variable", Management Adviser, (July-August, 1974), p.47

⁶ See for example:

Bentley, Trevor J., "Defining Management's Information Needs", Management Services, (March, 1979), p.4;

Munro, Malcolm C., "Determining The Manager's Information Needs", Journal of Systems Management, (June, 1978), p.34;

Dew, R. Beresford and Kenneth P. Gee, "Control Information Needs Of Middle Management", Management Accounting (U.K.), (April, 1972), p.89;

Dearden, John, "MIS IS A Mirage", Harvard Business Review, (January-February, 1972), pp.94-95

⁷ Grindlay, Andrew, "The Deadly Sins of M.I.S.", The Business Quarterly, (Winter, 1973), p.13

provided with their exact needs, but rather what systems designers think managers need. Bentley has pointed this out:

An information system must be designed to meet the manager's needs. This apparently obvious criterion seems to be ignored by system designers who attempt to provide the manager with the information they think he needs.⁸

On the other hand, inadequate knowledge of managers' informational needs may be attributed to managers who are sometimes not sure of the information they need. In such a case, managers call for more information than they would use.

For a manager to know what information he wants, he must be aware of each type of decision he would take and have an adequate model of each. On one hand, managers, in some cases, perhaps cannot identify the important variables involved in decision-making and cannot reduce the decision process to quantifiable expressions. On the other hand, management scientists, in some cases, perhaps cannot present much help in this regard, especially at the top management level.⁹

4.1.1.3 Incompatibility Of Information With Managers' Capabilities

A management information system in an organisation may produce

⁸ Bentley, Trevor J., "Designing An Information System That Meets Needs Of Management", Management Accounting (U.K.), (November, 1974), p.299

⁹ See for example:

Weinwurm, George F., "Managing Management Information", Management International Review, Vol.10, No.1, (1970), p.43;

Schoderbek, Peter P. and Stephen E. Schoderbek, "Integrated Information Systems - Shadow or Substance?", Management Adviser, (November-December, 1971), p.28;

Simon, Leonard, Charles Lamar, and George H. Haines, Jr., "Managers' Uses of Models", OMEGA, Vol.4, No.3, (1976), p.254

highly sophisticated information which, in some cases, is difficult for managers to understand.¹⁰ In fact, the application of modern information technology makes use of management science techniques feasible in managerial decision-making. However, decision models may not be applied in some organisations; this may be partially attributed to the tendency of managers to reject what they do not understand. Gorry explains this behaviour in detail:

People tend to reject what they do not understand. The manager carries responsibility for outcomes. We should not be surprised if he prefers a simple analysis that he can grasp, even though it may have a qualitative structure, broad assumptions, and only a little relevant data, to a complex model whose assumptions may be partially hidden or couched in jargon and whose parameters may be the result of obscure statistical manipulation.¹¹

However, managers may undergo some educational programmes in the application of these models. "This does not mean that the manager must become a mathematician. He must, however, learn what the various quantitative tools are designed to do and what the limits of their capabilities are. He must be able to understand what the staff specialist is attempting to achieve by a particular analysis and to discuss the appropriateness of alternative procedures sensibly".¹² On the other hand, system designers should achieve a balance between the advantages of designing a highly sophisticated system and managers' capabilities.

¹⁰ Argyris, Chris, "Organisational Learning And Management Information Systems", Accounting, Organisations And Society, Vol.2, No.2, (1977), p.113, p.121

¹¹ Gorry, G. Anthony, "Development Of Managerial Models", Sloan Management Review, (Winter, 1971), p.4;

See also:

Higgins, J.C. and R. Finn, "Managerial Attitudes Towards Computer Models For Planning And Control", Long Range Planning, (December, 1976), p.108

¹² Vandell, Robert F., "Management Evaluation In The Quantitative World", Harvard Business Review, (January-February, 1970), p.92

4.1.2 Causes Of Ineffectiveness

Ineffectiveness of a management information system may be attributed to one or more of the following causes:

- (1) The assumptions adopted by some systems' personnel.
- (2) The lack of management involvement in systems design.
- (3) Inflexibility of management information systems.

4.1.2.1 The assumptions adopted by some systems' personnel

System designers should seek to know what the managers need, and they should also analyse the current decision models in relation to the objectives of the organisation, suggest types of information they might find useful as well as guide managers in specifying their informational needs precisely. However, some system designers may adopt the assumption that managers should know what information they need. Wallace has pointed this out:

The systems analyst is tempted to let the user specify his information needs in isolation rather than attempt to discuss the problems and assist in generating options for the user on the assumption that the user should know what information he needs.¹³

Moreover, some systems' personnel in an organisation may not have sufficient interest in how the information is used by the managers. For example, Ross has stated that:

... We have the technician or analyst who has little concept of the process of management or the problems of managers. Operation of the machine is their 'thing' and their objective is frequently seen in terms of processing speed or pages of output ... They have little knowledge of, or interest in, how the information is used to improve operations.¹⁴

¹³ Wallace, John B., "Improving Communication Between Systems Analyst And User", Data Management, (June, 1972), p.21

¹⁴ Ross, Joel E., "Computers: Their Use And Misuses", Business Horizons, (April, 1972), pp.56-57

The second assumption which may be adopted by systems' personnel is that managers do not need to understand how their information systems work, only how to use it.¹⁵ This assumption may not be acceptable in all cases. The development of time-sharing systems and the advanced telecommunications have facilitated the design of interactive systems, in which managers have access to computers from a terminal, enter their requests or commands directly, and receive feedback which is virtually immediate. Interactive systems facilitate the use of a computer's analytic power and data retrieval capabilities by managers as part of their ongoing decision-making.¹⁶ Managers who use this type of system cannot adequately evaluate the system if they do not understand its working. Without this basic knowledge, managers cannot also exercise control over it.

4.1.2.2 The Lack Of Management Involvement In Systems Design

One of the major causes of the ineffectiveness of management information systems is the lack of management involvement in the systems design.¹⁷ If managers want a system they can use, they must participate in its design, otherwise the system will be the system of the designers rather than a system for managers.

¹⁵ See for example:

Swanson, E. Burton, "Management Information Systems: Appreciation And Involvement", Management Science, Vol.21, No.2, (October, 1974), p.178;

Ackoff, Russell L., "Management Misinformation Systems", op. cit., B - pp.152-153

¹⁶ Keen, Peter G.W., "Interactive Computer Systems For Managers: A Modest Proposal", Sloan Management Review, (Fall, 1976), pp.1-2

¹⁷ See for example:

Cerullo, Michael J., "MIS: What Can Go Wrong?", Management Accounting (USA), (April, 1979), pp.43-44;

Ein-Dor, Phillip and Eli Segev, "Information-System Responsibility", MSU Business Topics, (Autumn, 1977), p.37;
(footnote 17 continued on p. 194)

4.1.2.3 Inflexibility Of Management Information Systems

Management information systems should be designed to have a degree of flexibility. Flexibility applies to two different aspects of information systems: "first, there is flexibility in designing the system so it provides the user with exactly the information he needs. The second type of flexibility relates to incorporating change into the system as new needs arise".¹⁸

A management information system in an organisation will be a source of frustration if it cannot cope with change or keep pace with user originated developments. In fact, the problem is that the more sophisticated the systems are, the less easy to change them. However, this is a general phenomenon which is inherent in most sophisticated systems.

In fact, the modification of a modern management information system may be "an exceedingly difficult, painful, and costly process. To be sure, increasing the degree of flexibility

(footnote 17 continued from p. 193)

Gibson, Harry L., "Determining User Involvement", Journal of Systems Management, (August, 1977), pp.20-22

King, William R. and David I. Cleland, "The Design of Management Information Systems: An Information Analysis Approach", Management Science, Vol.22, No.3, (November, 1975), p.287

Powers, Richard F. and Gary W. Dickson, "MisProject Management: Myths, Opinions, and Reality", California Management Review, Vol.XV, No.3, (Spring, 1973), p.149

¹⁸ Elam, Philip G., "User-Defined Information System Quality", Journal of Systems Management, (August, 1979), p.33;

see also:

Gifford-Gifford, M.B. and D. James, "Providing Management With Information: A Methodology", Management Accounting (U.K.), (February, 1976), p.58

typically carries a price that we may not be willing to pay".¹⁹

To sum up, if a management information system is to be effective, it should be responsive to change with the changing in the informational needs of management. In a sense, the system should be planned with the necessity for future output changes in mind.

4.1.3 Summary

An ineffective management information system is one which does not achieve its purpose in providing managers with useful information. The most likely and salient dimensions of the ineffectiveness are as follows: (1) overabundance of irrelevant information; (2) the lack of relevant information; and (3) incompatibility of information with managers' capabilities. Although the ineffectiveness may be attributed to various reasons, the following appear to be the basic causes: (1) the assumptions adopted by some systems' personnel; (2) the lack of management involvement in systems design; and (3) inflexibility of management information systems.

SECTION 4.2- INFORMATION SYSTEMS EFFECTIVENESS, MANAGERS'

ATTITUDES AND SYSTEMS USAGE

An ineffective information system affects managers' satisfaction with the information provided by the system; managers' satisfaction, in turn, affects managers' attitudes (evaluation) towards the system and consequently the system usage may be impacted.

This section discusses the relationships between the three variables mentioned above, namely, effectiveness, managers' attitudes, and systems usage.

¹⁹ Emery, James C., "An Overview Of Management Information Systems", Management Review, (July, 1974), p.47

4.2.1 Introduction - Attitudes: Concepts And Attributes

As the concept of attitude has played an extremely important role in social psychology for several decades, it is not surprising that attitudes have been defined in several different ways. However, no attempt is made in this study to review the entire field of attitude theory. Rather, a brief summary of it is presented to provide a background for studying the relationship between information users' attitudes towards the source of information and the perception of it by these users. The material presented in fact, is not an evaluation or critique of attitude theory, but is a description of elements common to most attitude studies.

Despite a plenitude of definitions of attitude in contemporary social science, it may be possible to identify two salient concepts; unidimensional and multidimensional.

4.2.1.1 The unidimensional concept

Some social psychologists restrict the concept of attitude to a single response tendency towards an object, the tendency to evaluate the object in positive or negative terms.²⁰ In other words, a person's attitude towards some object or issue is the favourableness or unfavourableness of his feelings towards it. That is, an attitude is an evaluation or feeling reaction. According to this concept, an attitude is comprised of a single component called affective or evaluative.

²⁰ See for example:

Berkowitz, Leonard, A Survey of Social Psychology, (Hinsdale, Illinois: The Dryden Press, 1975), p.289;

Insko, C.A. and J. Schopler, Experimental Social Psychology, (New York: Academic Press, 1972), p.1;

Collins, B.E., Social Psychology, (Reading, Massachusetts: Addison-Wesley Publishing Company, 1970), p.71

4.2.1.2 The multidimensional concept

Almost all definitions of attitude include the affective or evaluative response tendency component. Many definitions, however, include propositions relevant to the foundations of the affective response tendency and the person's actions which are thought to reflect his affective response towards a particular object. Thus, cognition and the notion of behavioural dispositions regarding objects have been added as other components in the definition of attitude.

Accordingly, attitude is a multidimensional concept consisting of three components: cognitive, affective and behavioural. In other words, attitude is viewed as disposing the individual to think, feel and act in certain ways. Among other definitions, Wolman's definition includes the central ideas used by attitude theorists who adopted the multidimensional view. "Attitude is a learned predisposition to react consistently in a given manner (either positively or negatively) to certain persons, objects or concepts. Attitudes have cognitive, affective and behavioural components".²¹

The cognitive component refers to the various beliefs an individual has about the attitude object, its characteristics and

²¹ Wolman, Benjamin B., (Ed.), Dictionary of Behavioural Science, (London: The Macmillan Press Ltd., 1974), p.34;

See also for example:

Ehrlich, H.J., The Social Psychology of Prejudice, (New York: John Wiley & Sons, 1973), p.4;

Zimbardo, P. and E.B. Ebbesen, Influencing Attitude and Changing Behaviour, (Reading: Massachusetts: Addison-Wesley Publishing Company, 1970), p.7

its relations to other objects. The affective part, which could vary in direction and intensity, is the central aspect of the attitude. It refers to the feeling core of liking or disliking some attitude object. In other words, it provides the evaluation of the object. By the behavioural component it means a predisposition to action regarding the object.

To sum up, the unidimensional definition of attitude involves only affective responses, it recognises that an individual also has cognitions and behavioural tendencies which are likely to be consistent with the affective reactions, but it does not consider these to be part of the attitude itself. On the contrary, the multidimensional definition stresses the components of an attitude, namely, the cognitive, the affective and the behavioural. It views these parts as being so closely related that one must consider all of them together.

In fact, the unidimensional concept of attitude seems preferable for a number of reasons. First, it includes the affective response component, which is stressed in substantially all other attitude conceptions. Second, the unidimensional definition corresponds more closely to the most widely used operational definition of attitudes. That is, the most frequently used measures of attitudes involve attempts to assess only positive and negative evaluations of attitude objects. Most attitude measurement techniques do not systematically assess the cognitive and/or the behavioural components included in the multidimensional definition. Finally, the unidimensional definition is preferred because no a priori assumptions regarding the inter-relationships among affect, cognition and behaviour are included. That is, it is not assumed that affective,

cognitive and behavioural responses to objects are necessarily highly related to one another.

However, the unidimensional and the multidimensional concepts of attitudes "are the two traditions of conceptual definition that remain strongest today. Many of the instruments designed to measure attitudes rely on one or more of these conceptual approaches to infer the existence and change of attitude".²²

Regardless of the approach adopted in defining attitudes, five attributes, however, seem to be appropriate to describe attitudes.

These are:

- (1) Attitudes have objects or focus.
- (2) They have an evaluative dimension, or it may be that they have this dimension only.
- (3) They are learned. That is, we are not born with them, rather, they develop from our experiences.
- (4) Attitudes are not enduring. Since they are learned, it follows that they can be relearned and that they can be changed.
- (5) They are likely to result in consistent behaviour. Having an attitude towards an object gives one a reason to behave towards that object in a certain way. And, in the absence of contrary information, or strong situational pressures, individuals behave in ways that reflect their attitudes.

4.2.2 Attitudes and Beliefs (Cognitions) Relationship

The meaning of the beliefs concept is distinct from the meaning of other two related concepts; attitude and opinion. As previously

²² Himmelfarb, Samuel and Alice H. Eagly, "Orientations To The Study of Attitudes And Their Change", in: Samuel Himmelfarb and Alice H. Eagly, Readings In Attitude Change, (New York: John Wiley & Sons, Inc., 1974), p.6

stated, the concept of attitude refers to an individual's affective response tendencies regarding a particular object. Opinions, on the other hand, are the verbal expressions of underlying attitudes.²³

In contrast, the notion of belief usually refers to thoughts and knowledge about an object. Beliefs refer to "the subjective probability of a relation between the object of the belief and some other object, value, concept, or attribute".²⁴ In fact, a distinction can be made between beliefs in the existence of an object (e.g. belief in God) and beliefs in the existence of a relationship linking the object to some attribute (e.g. a belief about God, such as God is omnipotent). However, beliefs in the existence of an object can also be viewed as beliefs about the object, that is, as beliefs linking the object to the concept of existence (e.g. God exists). Thus, without any loss in generality, beliefs in an object may be viewed as a special case of beliefs about the object.²⁵

4.2.2.1 Belief Formation

The above mentioned definition of beliefs implies that belief formation involves the establishment of a link between one object and another, or between an object and an attribute of it. Three different processes may underlie belief formation. First, a link between an object and an attribute (or another object) may be

²³ Thurston, L.L. "Attitudes Can Be Measured", in: Gene F. Summers (Ed.), Attitude Measurement, (Chicago, Rand McNally & Company, 1970), p.128

²⁴ Fishbein, Martin and Icek Ajzen, Belief, Attitude, Intention And Behaviour: An Introduction To Theory And Research, (Reading, Massachusetts: Addison-Wesley Publishing Company, 1975), p.131

See also: Bem, Daryl J., Beliefs, Attitudes And Human Affairs, (Belmont, California: Brooks/Cole Publishing Company, 1970), p.4

²⁵ Fishbein, Martin and Icek Ajzen, op. cit., p.131 (footnote).

actively established on the basis of direct observation (descriptive belief). Second, the link may be actively established through a process of inference from some other belief about the object (inferential belief). Finally, the link may be established by some outside sources, and this link may be accepted (informational belief).²⁶

Beliefs about an object then, may be constituted from three types of belief, they are:

(1) Descriptive belief. One obvious way to establish belief about an object is direct observation; that is, an individual may perceive that a given object has a certain attribute. This direct experience with a given object results in the formation of the descriptive beliefs about that object.

(2) Inferential belief. It is the belief about an object formed by going beyond directly observable relationships. The inferential beliefs may be based on prior descriptive beliefs and/or formed on the basis of prior inferences. Although an inferential belief can be based on a prior inference, in the final analysis most inferences can be traced to descriptive beliefs.

(3) Informational belief. Some of our beliefs are formed neither on the basis of direct experience with the object of the belief nor by way of some inference process. Instead, we often accept information about some object provided by an outside source. Beliefs formed by accepting the information provided by an outside source may be termed informational beliefs. Although direct observations of an object-attribute relation will usually lead to the formation

²⁶ Ibid., pp.131-134

of a descriptive belief, outside information that links an object to an attribute may or may not lead to the formation of an informational belief. Many factors determine the degree to which information provided by an outside source will be accepted such as the characteristics of the communicator or the receiver of information.

4.2.2.2 Attitudes As A Function Of Beliefs

As stated previously, attitude may refer solely to an individual's affective or evaluative response tendencies regarding any given object. In other words, an attitude represents an individual's feeling of favourableness or unfavourableness towards some stimulus object. In contrast, beliefs about any given object are seen as lacking such affective component of attitudes since they, i.e. beliefs, refer to thoughts and knowledge about an object which are relatively free of affective or evaluative elements. Accordingly, as an individual forms beliefs about an object, he supposedly acquires an attitude towards that object. Each belief links the object to some attribute, the individual's attitude towards the object is a function of his evaluations of these attributes. The studies conducted by some social psychologists have supported such notions, that is, an individual's attitude towards any given object can be seen as a function of his beliefs about the object.²⁷

²⁷ Fishbein has presented some of these studies in his research into attitude and behaviour, see:

Fishbein, Martin, "Attitude And Prediction Of Behaviour", in: Kery Thomas (Ed.), Attitudes And Behaviour, (Harmondsworth, Middlesex: Penguin Books Ltd., 1971), pp.56-57

The relationship between beliefs and attitudes may be based on the assumption that an object is felt to be good insofar as it facilitates the goals of the individual and bad to the extent that it blocks these goals.²⁸ Facilitating purposes, however, is not the only variable which affects evaluation. It is possible that some of the attitudes an individual feels towards objects or classes of objects are based on familiarity or their association with other positive things or situations.

On the other hand, although an individual may hold a large number of beliefs about any given object, it appears that only a relatively small number of beliefs, called salient beliefs, serve as determinants of his attitude at any given moment. Furthermore, some beliefs are more important than others in determining an individual's attitude.²⁹ It is quite probable that an individual will have some beliefs that appear inconsistent with his attitudes. That is because attitude per se can only be reliably abstracted by considering the many beliefs an individual holds whether these beliefs are salient or non-salient, important or unimportant. Thus, while an individual's attitude will be highly correlated with an estimate based on a consideration of many of his beliefs, it may be uncorrelated or even negatively correlated with a single belief considered in isolation.

4.2.3 Relationship Between Attitude And Behaviour

Social psychologists have used the concept of attitude because

²⁸ Schneider, David J., Social Psychology, (Menlo Park, California: Addison-Wesley Publishing Company, 1976), p.262

²⁹ See for example: Fishbein, Martin and Icek Ajzen, Belief, Attitude, and Behaviour, op. cit., pp.218-222;

Fishbein, Martin, "Attitude and Prediction of Behaviour", op. cit., p.58

it offers a theoretical explanation and assumed it provides useful predictions of socially significant behaviours. In contrast to the definitions and theoretical discussions, the most common empirical measure of attitudes is a pencil and paper instrument or verbal report technique. An attitude response (whether verbal or written) is itself a kind of behaviour. Accordingly, the appropriate statement for the relationship between attitude and behaviour should be as Kiesler, et al. have suggested "the relationship between certain kinds of behaviour, arbitrarily designated by most social scientists as measures of attitude, and other kinds of behaviour which, according to theory, should be influenced by the attitude in question".³⁰ However, Kiesler, et al. have not denied that there is distinction between the two terms, "attitude" and "behaviour" but have suggested the terms "some kinds of behaviour" and "other kinds of behaviour" instead.

4.2.3.1 Attitude - Behaviour Inconsistency

It is commonly assumed that attitudes and behaviours are closely related in natural settings. Nonetheless, several studies have reported inconsistent relationship between attitudes and behaviour.³¹ In fact, although it is true that attitudes always produce pressure to behave consistently with them, there are factors other than attitudes that determine behaviour, and these factors are sometimes

³⁰ Kiesler, C.A., B.E. Collins, and N. Miller, Attitude Change, (New York: John Wiley & Sons, Inc., 1969), p.23

³¹ For a comprehensive review of the studies of attitude-behaviour consistency and inconsistency, see for example:

Ajzen, Icek and Martin Fishbein, "Attitude - Behaviour: A Theoretical Analysis And Review of Empirical Research", Psychological Bulletin, Vol.84, No.5, (September, 1977), pp.888-918;

Kiesler, C.A., B.E. Collins and N. Miller, op. cit., pp.23-27

dominant. Attitudes can be considered as one set of an individual's characteristics. They interact with other personal characteristics (such as motives, values, personality traits), which in turn, interact with environmental factors to determine behaviour.

On the basis of the preceding consideration, the prediction of behaviour from attitudes may not always be accurate, since behaviour is affected by more than attitudes alone. Prediction is most accurate when other aspects of the individual and environments are consistent with each other and with the attitude.

4.2.3.2 Attitude Is Determinant Of Behaviour

As stated previously, commonly attitude is assumed to be an important determinant of behaviour. This assumption has been supported in several empirical studies.³² The notion behind this assumption is that having an attitude towards an object gives an individual a reason to behave towards the object in a certain way. And in the absence of strong situational pressures, individuals behave in ways that represent their attitudes. In other words, the assumption is that attitude is based on beliefs about an object, that is, it is generated upon perceiving and acknowledging the existence and characteristics of that object. After cognitive and effective data are processed, the individual's disposition emerges in terms of favourable or unfavourable response directed towards the object. Generally, the response is characterised as overt behaviour. To put it differently, attitudes always produce pressure to behave consistently with them. Briefly, it is usually considered to be logical or consistent for an individual who holds a favourable

³² Ibid.

attitude towards an object to behave favourably, and not to behave unfavourably regarding that object. Similarly, an individual with an unfavourable attitude is expected to behave unfavourably towards the object.

4.2.3.3 Attitude And Behavioural Intention

It has usually been assumed that a person's attitude towards an object (e.g. attitude, towards the church) can be used to predict his behaviour with respect to the object (e.g. attending church once a week). Some social scientists,³³ however, argue that the performance or non-performance of a specific behaviour with respect to some object usually may not be predicted from knowledge of the person's attitude towards the object (e.g. a person's favourable attitude towards the church cannot be used to predict his attending the church). Instead, a specific behaviour is viewed as determined by the person's intention to perform that behaviour. According to this view, attitudes towards acts (behavioural intentions) are more effective predictors of behaviour than attitudes towards objects.

4.2.4 Beliefs - Attitude - Behavioural Intention - Behaviour Relationship: A Conceptual Framework

The preceding discussions have distinguished between beliefs,

³³ See for example:

Jaccard, James, G. William King, and Richard Pomazal, "Attitudes And Behaviour: An Analysis of Specificity of Attitudinal Predictors", Human Relations, Vol.30, No.9, (September, 1977), pp.817-824;

Fishbein, M. and Icek Ajzen, Belief, Attitude, Intention and Behaviour, op. cit., pp.15-16;

Ajzen, I. and M. Fishbein, "Attitudinal And Normative Variables As Predictors of Specific Behaviours", Journal of Personality And Social Psychology, Vol.27, No.1, (1973), pp.41-57

Schwartz, S.H. and R.C. Tessler, "A Test of A Model For Reducing Measured Attitude - Behaviour Discrepancies", Journal of Personality And Social Psychology, Vol.24, No.2, (1972), pp.225-236

attitude, intention and behaviour. Whereas beliefs represent the information an individual has about an object, attitude refers to the individual's favourable or unfavourable evaluation of the object. Another distinction has been provided between an individual's intentions to perform various behaviours which are called behavioural intentions and overt acts which are called behaviour.

The relationships between beliefs, attitude, intention and behaviour can be discussed as follows: beliefs are the fundamental variable in such relationships. On the basis of direct observation or information received from outside sources or by way of various inference processes, an individual learns or forms a number of beliefs about an object. That is, he associates the object with various attributes. The individual's attitude towards some object is determined by his beliefs that the object has certain attributes and by his evaluations of those attributes. As the individual may hold both positive and negative beliefs about an object, attitude is viewed as corresponding to the total affect associated with these beliefs. In other words, the individual's attitude towards some object is related to the set of his beliefs about the object but not necessarily to any specific belief. In a similar fashion, attitude towards an object is viewed as related to the individual's intentions to perform a variety of behaviours with respect to that object. Such relation is between attitude and the set of intentions as a whole, and attitude towards an object is not related to any specific intentions with respect to the object. Each intention is viewed as being related to the corresponding behaviour the individual will perform and the behaviour he intends to perform. It follows that attitude towards an object will again be related only to the total

behavioural pattern rather than to any specific behaviour with respect to the attitude object.

The relationships between beliefs, attitude and behaviour, however, may be influenced by a feedback loop. In a sense, once an attitude is established, it may influence the formation of new beliefs. Similarly, performance of a particular behaviour may lead to new beliefs about the object, which may in turn influence the attitude.³⁴ These relations and the feedback loops are illustrated in Figure (4.1).³⁵

4.2.5 Attitude Towards Information Systems: Empirical Studies

An individual's attitude towards an object is based on his beliefs about that object. Accordingly, information users' attitudes towards information systems are based on their beliefs about these systems. Belief about an information system, in turn, is based, among other things, on the system's credibility; and credibility, in turn, is based on attributes the information system has. In fact, information systems credibility affects the impact of message on its receiver. In a sense, systems of low credibility are not as persuasive as highly credible systems.³⁶ One might argue or question the relationship between persuasive messages and reports generated by the information systems. First of all, such reports are a form of means of communication. Secondly, information by its very nature is persuasive or it would not be information.

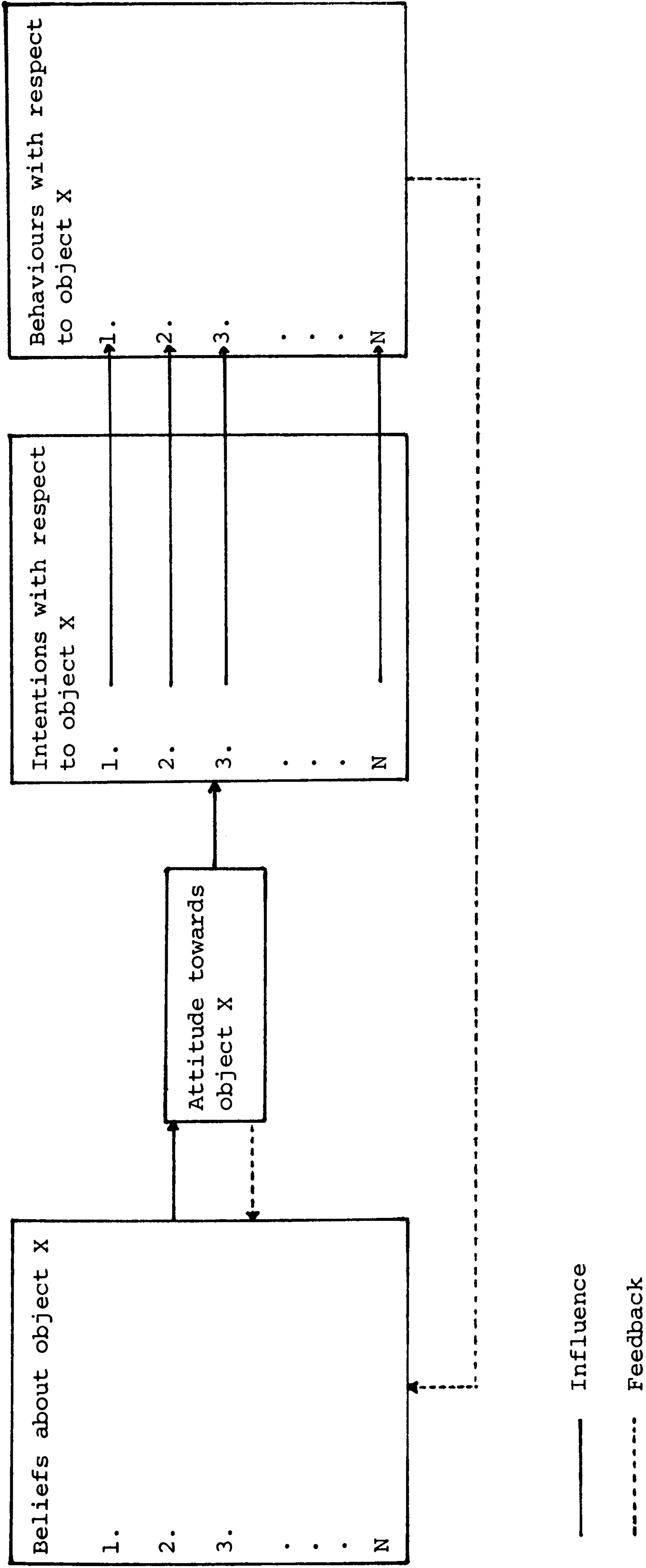
³⁴ Fishbein, M. and Icek Ajzen, Belief, Attitude, Intention and Behaviour, op. cit., pp.13-15

³⁵ Ibid., p.15

³⁶ Baron, Robert A. and Donn Byrne, Social Psychology, (Boston: Allyn and Bacon, Inc., 2nd Edition, 1977), pp.112-115

FIGURE (4.1)*

Schematic Presentation Of The Relationships Between Beliefs, Attitude, Intentions And Behaviours



*Source: Ibid

If one accepts either argument , i.e., that management reports are a means of communication or that information is persuasive, then one should be concerned with source credibility.

The importance of the credibility of the source of the information can be attributed to its effect on information users' attitudes which in turn do influence the effectiveness of the communication process. A favourable attitude towards the information source will increase the effectiveness of the communication process, whereas an unfavourable attitude set towards the source will decrease such effectiveness. In other words, information source credibility is an important determinant of the acceptance and use of the information by the recipient.³⁷

In the accounting field, in general, and in the field of management information systems in particular, it seems that researchers have not paid considerable attention to this aspect. They have not explicitly considered the effect of attitude towards information and formal information systems on the actual acceptance and usage of information generated by these systems. Relatively speaking, few empirical studies undertaken in these fields have used the notion of attitudes towards an information system or source. However,

³⁷ See for example:

Andreoli, Virginia and Stephen Worchel, "Effects of Media, Communicator, And Message Position On Attitude Change", Public Opinion Quarterly, Vol.42, No.1, (Spring, 1978), pp.59-70;

Severy, Lawrence J., John C. Brigham, and Barry R. Schlenker, A Contemporary Introduction To Social Psychology, (New York: McGraw-Hill Book Company, 1976), pp.65-67

Greenberg, Bradley S. and Gerald R. Miller, "The Effects of Low Credible Sources on Message Acceptance", in: Thomas D. Beisecker and Donn W. Parson (Eds.), The Process of Social Influence, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972), p.248

recently, a number of studies have been conducted. For example, Lucas³⁸ has conducted a study to measure users reactions to computer systems. A random sample has been selected of users who had some contact with an information services department or its computer applications; 616 users in seven companies were surveyed. The purpose of his study was to answer two questions dealing with user reactions to computer systems. What is the relationship between user attitudes and user perceptions of computer activities? What is the relationship between different company computer practices and both user attitudes and user perceptions? User attitudes were measured by two scales: attitudes towards the electronic data processing (EDP) staff, and ratings of computer potential.

The results indicated that users who had favourable attitudes towards computer services tended to respond with high ratings of the reports produced by the computer. Attitudes towards the electronic data processing staff and ratings of computer potential were positively correlated with the perceived quality of output. In other words, there were significant relations among user attitudes towards computer services and user perceptions of the service. However these results must be considered tentative since the sample included only seven companies and all of these were in the manufacturing industry.

Another study into behavioural reactions to the introduction of a management information system at the "United States Post Office"

³⁸ Lucas, Henry C., Jr., "User Reactions And The Management of Information Services", Management Informatics, Vol.2, No.4, (1973), pp.165-172

has been undertaken by Anderson, Dickson and Simmons.³⁹ The researchers conducted depth interviews to find out how people reacted to the introduction of the system and to attempt to explain why certain types of reactions may have occurred. Two interview schedules were used, one for clerks and mail handlers, and another for operating managers and top management. The perceptions of the members of the various groups concerning their own reaction to the system, the reaction of others in their membership group, and the reaction of the members of other groups were revealed. The number of persons interviewed was fifty-three who had been working at the Post Office at the time the system was introduced.

The results of this study have indicated that the reaction of the clerks, mail handlers and operating managers to the system can be concluded as being not positive as shown in the following table:

Respondents	Attitude of	Feeling about system		
		Positive	Neutral & Negative	Uncertain
Clerks & mail handlers N = 25	Self	6	19	-
	Peers	-	24	1
	Supervisors	3	9	13
Operating Managers N = 21	Self	8	12	1
	Peers	5	13	3
	Clerks & mail handlers	-	21	-
Top Management N = 7	Self	5	2	-
	Supervisors	3	4	-
	Clerks & mail handlers	2	5	-

³⁹ Anderson, John C., Gary W. Dickson, and John Simmons, "Behavioural Reaction To The Introduction of A Management Information System At The U.S. Post Office: Some Empirical Observations" Working Paper No.72-05, Management Information Systems Research Centre, University of Minnesota, (March, 1973).

The research team has pointed out that evidence such as error rates, mention of sabotage, and perceptions of the interview subjects indicated that the introduction of the system was met with hostility and "supervisors found the information provided to be of limited usefulness and generally disliked the new system".⁴⁰

Lucas⁴¹ also conducted another study into systems quality, user reactions and the use of information systems. The data in this study were collected in a major university; the sample included administrative users of 26 separately identifiable batch computer systems. These systems were concerned with accounting, student record keeping, purchasing, fund raising, etc. The administrative computer staff has also developed an on-line system for university processing and several applications had been converted to this system at the time of the study. Users were able to process certain employee data and student records on-line. The on-line system features special purpose programmes along with a general enquiry facility. User attitudes towards information services department activities and perceptions of the quality of information systems service were measured by a questionnaire which was returned by 117 users on the university administrative staff (rate of responses was 70%). Two hypotheses in this study were tested:

(1) favourable user attitudes are associated with favourable user perceptions of systems quality and independent ratings of systems quality; and

⁴⁰ Ibid., p.1

⁴¹ Lucas, Henry C., Jr., "Systems Quality, User Reactions And The Use of Information Systems", Management Informatics, Vol.3, No.4, (1974), pp.207-212

(2) the use of an information system is positively associated with favourable user attitudes, favourable user perceptions of systems and favourable independent ratings of systems quality. The results of the study for batch use have generally supported the two hypotheses mentioned above. In contrast, the perceptions of users of the on-line system were much less favourable than for users of the batch system. However, the results indicated that even for the relatively poorly rated on-line system, use was positively associated with user perception of systems quality. In brief, the quality of systems rated independently and as perceived by users was associated with favourable user attitudes. Favourable attitudes and ratings of systems quality were also associated with the use of systems.

Guthrie,⁴² on the other hand has conducted a survey of approximately 2,000 Canadian managers concerning their attitudes towards management information systems. Specifically, the focus was upon the importance user-managers placed upon management information systems development and upon their perceptions of the effect these systems have upon them. Although Guthrie has not directly examined the relation between managers' attitudes towards management information systems and the systems usage, his investigation of attitudes may be considered an important aid in predicting and influencing the systems usage.

Three hypotheses in this survey have been tested. The first predicted that managers do not perceive a strong need for information systems development; a need which would prompt their active participation in the development. The second hypothesis stated that

⁴² Guthrie, Art, A Survey of Canadian Middle Manager's Attitudes Towards Management Information Systems, (Ottawa, Ontario: Carlton University, December, 1972).

middle managers feel that management information systems development will reduce the need satisfaction. The last hypothesis predicted that middle managers who have familiarity or successful experience with management information systems have more favourable perceptions regarding the need for and the effects of management information systems than middle managers who have little or no familiarity or experience.

The result of Guthrie's survey indicated that middle managers do perceive a need for information systems development. However, the magnitude of this need is interpreted to be low, confirming the research prediction that, in general, the user managers cannot be expected to give information systems development significant time and effort. On the positive side, managers perceive that management information systems development will have somewhat positive effects on their job satisfaction. The results of this survey indicated also that generally, experience and familiarity with management information systems are attitude determinants.

Attitudes towards information systems have been examined also in another study undertaken by Lucas.⁴³ The study had been conducted in a company of manufacturing ready-to-wear clothing. The purposes of this study were to determine the variables influencing sales force performance and the use of a sales information system

⁴³ Lucas, Henry C., Jr., "Performance And The Use Of An Information System", Management Science, Vol.21, No.8, (April, 1975), pp.908-919;

Lucas has conducted a similar study in a bank. A part of the results of this study was presented and discussed in Chapter III pp.172-173. Although the two studies were conducted in two different organisations, the results of both confirmed each other. See:

Lucas, Henry C., Jr., "The Use Of An Accounting Information System, Action And Organisational Performance", The Accounting Review, (October, 1975), pp.735-746

and to determine if a relationship exists between the use of the system and the performance of the sales force. A questionnaire was distributed to 439 members of the sales force; 398 respondents returned usable questionnaires (response rate 91%). Attitude towards the system was one of the variables affecting the system usage. Regarding attitudes towards the system, the results of this study indicated that positive attitudes towards the system were consistent with a high level of system usage. If attitudes are highly negative, on the other hand, users will minimise the contribution of the system and question the validity of output reports. Attitudes and perceptions of systems should be influenced in turn by the quality of the system as perceived by users.

Schewe also has conducted a study to examine the relationship between attitudes and usage of an information system.⁴⁴ The purpose of his study was to explore some of the major determinants of managers' requests for information from their information systems. The study assumed that through the use of a relevant data bank, decisions would be based more on facts and less on management intuition and should thus be improved. Management information system users' attitudes were analysed as a key determinant of system usage behaviour.

Ten food processing firms co-operated in the study. Seventy nine managers were selected to participate in the project. Each system user/respondent indicated his level of agreement or disagreement with statements reflecting his attitudes towards the system. System usage in this study was measured by the number of monthly

⁴⁴ Schewe, Charles D., "The Management Information System User: An Exploratory Behavioural Analysis", Academy of Management Journal, Vol.19, No.4, (December, 1976), pp.577-590

requests that a manager/system user made for additional information. The major finding of this study indicated, on the contrary to the previous studies, no significant relationship between attitudes and system usage behaviour. However, this does not mean that the hypothetical relationship between attitudes and system usage behaviour should be rejected. The study, as Shewe stated,⁴⁵ was an exploratory one, and the attitude variables examined were not completely comprehensive of the system user's attitude and usage of the management information system. Further, the sample used in the study consisted of marketing managers who, for the most part, had been in their respective positions for less than three years. A sample, in such form, may well be idiosyncratic in its perceptions, attitudes, and system usage.

The preceding studies are summarised in Table (4.1) on page 218. The analysis of their results indicates that, in all but one, favourable attitudes towards management information systems are expected to be consistent with a high level of use of these systems. If attitudes are unfavourable, on the other hand, users will minimise the contribution of the system and question the validity of output reports. Attitudes towards management information systems, in turn, are influenced by the quality, i.e. effectiveness, of the systems as perceived by users.

4.2.6 Changing Attitudes Towards Information Systems

The previous studies indicated that there is a relationship between attitudes towards information systems, as a source of information, and the usage behaviour of these systems. This relationship, in turn, reflects the effectiveness of the communi-

⁴⁵ Ibid., p.589

TABLE (4.1)

Summary Of The Studies Into Attitudes Towards Information Systems

Study	Purpose	Results
Guthrie (1972)	Determine managers attitudes towards their management information systems, specifically, the importance user-managers placed upon their perceptions of the effect these systems have upon them	Middle managers do perceive a need for information systems development. They perceive, also, that the systems development will have somewhat positive effects on their job satisfaction. Managers attitudes are influenced by their experience and familiarity with management information systems
Lucas (1973)	Measure user reactions to computer systems	Users who have favourable attitudes towards computer services tend to respond with high ratings of the reports produced by the computer
Anderson, Dickson and Simmons (1973)	Examine the behavioural reactions to the introduction of a management information system and their effects on the system usage	Unfavourable attitudes affect the usefulness of the information generated by the system from users' perspective
Lucas (1974)	Investigate the relationship between information system quality, user reactions, and the system usage	Favourable user attitudes are associated with favourable user perceptions of systems quality. On the other hand, usage of an information system is positively associated with favourable user attitudes
Lucas (1975)	Explore the relationship between the use of an information system, and action and managerial performance	Positive attitudes towards the system is consistent with a high level of system usage
Schewe (1976)	Investigate the relationship between attitudes towards an information system and the system usage	There is no significant relationship between attitudes and system usage behaviour

cation between the information department staff and the user of the information provided by the information system. In fact, relationship between attitudes and systems usage can be attributed to the users' beliefs about the source of information and the provider of it. In other words, it is expected that managers' attitudes towards usefulness of the messages contained in reports generated by information systems and towards the credibility of its preparers influence the effectiveness of the communication, and consequently the utilisation of information systems.

Effectiveness of information systems then, can be reflected in their credibility from managers' perspectives. That is, the emphasis put on these systems by managers; how highly management information and providers of it are valued by managers; and the extent to which managers regard it as important to communicate within the organisation. In addition, the extent to which this information is used will depend, among other things, on whether decision-makers like it, have confidence in it, and find it useful.⁴⁶ For instance, if a user has an unfavourable attitude towards an information system, it may make little difference what the message is in reports or how it is reported. In a sense, attitude may influence the usefulness of reports even before they are received because of previous experiences. In the same manner, if a user has an unfavourable attitude towards the providers of reports, the reports may not be accepted by the user. Clearly, favourable attitudes have the opposite effect. If the user has a favourable attitude towards an information system based on previous experience, it is most likely that the reports generated by the system are to be evaluated as being useful even if

⁴⁶ Lee, T.A., "Psychological Aspects of Accounting", Accounting and Business Research, (Summer, 1972), p.227

they are not received. Also, if the providers of information are perceived to be sources of high credibility, the reports are apt to be evaluated favourably.

4.2.6.1 Formation Of Attitudes Towards Information Systems

In the conceptual framework of the relation beliefs - attitude - behaviour discussed previously, it was pointed out that as an individual forms beliefs about an object, he automatically and simultaneously acquires an attitude towards that object. Each belief links the object to some attribute, and the individual's attitude towards the object is a function of his evaluation of these attributes. Following this notion, managers' attitudes towards information systems are a function of their beliefs about these systems. Beliefs about the systems mean beliefs about their credibility and effectiveness as a source of information. That is, credibility and effectiveness are dependent on the attributes of the information provided by the systems, whether it is relevant, adequate, reliable, understandable and timely.

Beliefs about the quality of the information provided by the systems are evaluated by managers. Evaluated beliefs result in a set of attitudes towards the systems. These attitudes are feelings of favourableness or unfavourableness. The development of attitudes, in turn, is expected to result in systems usage consistent with the managers' attitudes. But systems usage may not always appear to be consistent with managers' attitudes. Situational constraints may intervene between attitudes and usage behaviour. For instance, a manager could negatively evaluate the effectiveness of an information system based on past experience and still use the reports generated by the system because it is the only or best available source of

information. In other words, "voluntary use is expected to be predicted by favourable attitudes. On the other hand, if use of a system is mandatory, the use of a poor quality system could lead to the development of unfavourable user attitudes".⁴⁷

To sum up, system usage, in some cases, does not indicate that managers are satisfied with their information systems since situational constraints, intervening between managers' predisposition and actual behaviour, may over-ride the influence of attitudes. However, these constraints seem not to have an influence on managers' evaluation of the effectiveness of the systems. In short, the evaluation expressed by managers' observed behaviour, is expected to be consistent with their attitudes towards the systems.

4.2.6.2 Effectiveness And Credibility Of Information Systems As Factors Affecting Attitude Change

Since attitudes form as a result of various learning experiences, they obviously are capable of change as a result of new and different learning experiences. In general, changes in attitudes can be classified as one of two types: (1) congruent, and (2) incongruent.⁴⁸ Similarly, changes in attitudes towards information systems can be one of the two following types:

(1) Congruent change: refers to changes in the degree of the already established direction of managers' attitudes towards their information systems. When a manager is for (or against) the information system, it is not difficult to change the degree of the attitudes held. Thus the degree can become more than before, or

⁴⁷ Lucas, Henry C., Jr., "Systems Quality, User Reactions and the Use of Information Systems", op. cit., pp.211-212

⁴⁸ Krech, David, Richard S. Crutchfield, and Egerton L. Ballachey, Individual In Society, (New York: McGraw-Hill Book Company, Inc., 1962), pp.215-216

less, but still remains in the same direction that is either pro or con.

(2) Incongruent change: refers to changes in managers' attitudes towards their information systems from negative to positive. This may be more difficult to achieve but is entirely within the realm of predictable possibility.

Managers may change their attitudes towards the information systems, especially the direction of attitudes, for a major reason that is to obtain some kind of internal satisfaction. For instance, if a manager is dissatisfied with his information system and still uses it for some situational constraints, such manager, obviously, is in a counter-attitudinal behaviour situation. Such inconsistency produces cognitive dissonance, i.e. a state of internal dissatisfaction.

According to the cognitive dissonance theory,⁴⁹ a manager, to reduce such dissonance, may overlook his formal information system and rely heavily on the informal information system.⁵⁰ In other

⁴⁹ The dissonance theory was proposed by Leon Festinger. This theory is concerned with how a person resolves inconsistencies between his attitudes and his overt behaviour. When attitudes and overt behaviour are in a dissonant relationship, psychological tension, or discomfort, motivates the person to reduce the dissonance. According to Festinger, to reduce dissonance the person may change the attitudes or change the dissonant behaviour.

See: Festinger, Leon A., A Theory of Cognitive Dissonance, (Stanford, California: Stanford University Press, 1957).

⁵⁰ The formal information system refers to the system constructed as part of the formal organisation. This is contrasted to informal information systems that are not part of the formal organisational design. The informal information system defined by Alexander as "the ubiquitous information network established and maintained through informal interpersonal contacts among the firm's employees".

See: Alexander, M.J., Information Systems Analysis, (The United States of America: Science Research Associates, Inc., 1974), p.88

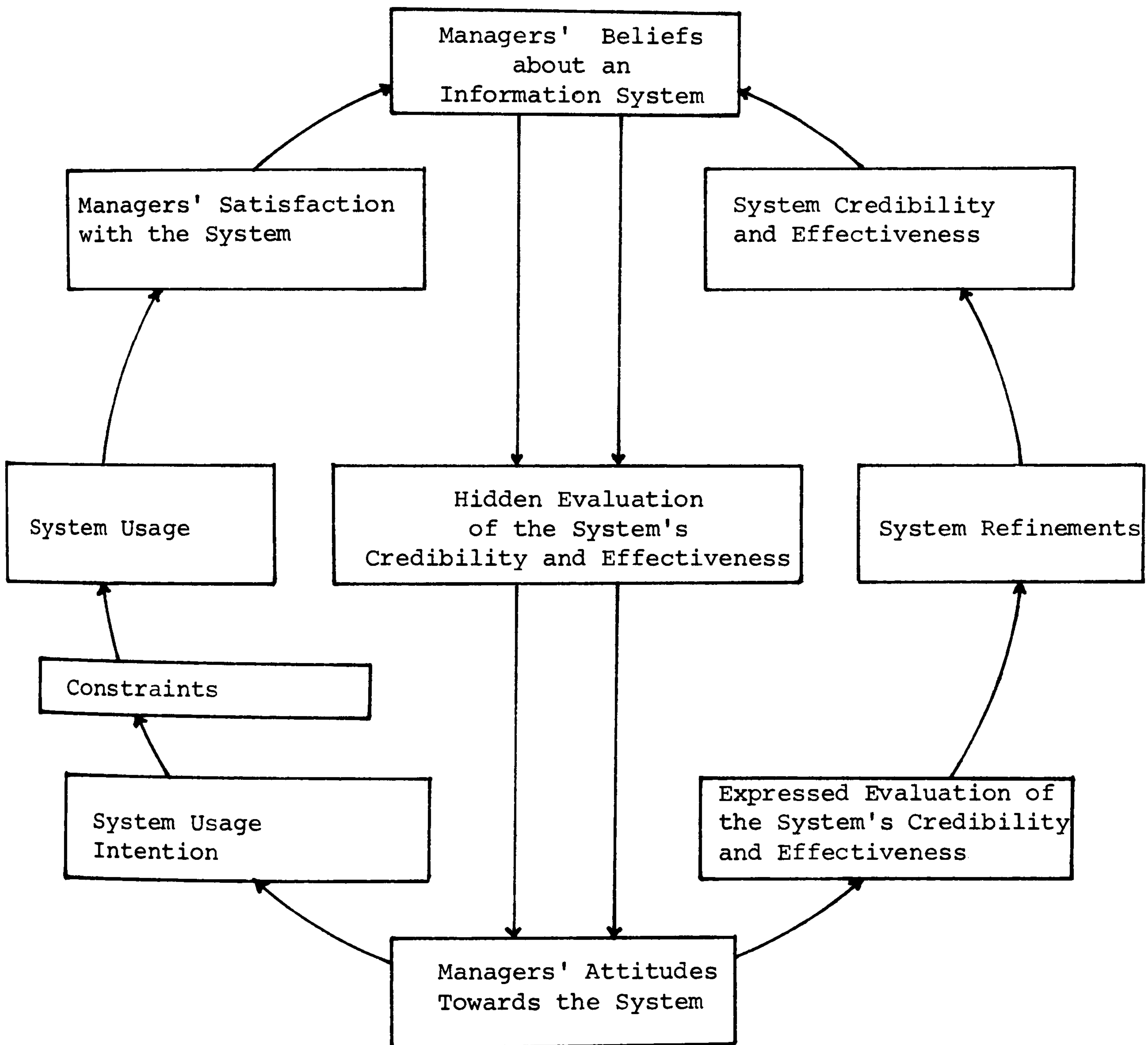
See also: Emery, J.C., Organisational Planning And Control Systems: Theory And Technology, (Toronto: MacMillan & Company, 1969), pp.34-35

words, he changes the dissonant behaviour. This is a major way of dissonance reduction. The other mode is to change his attitude towards the system as mentioned previously. Clearly this may be more difficult to achieve, except when the situation changes, that is the system is enhanced and becomes more credible and effective.

Obviously the major aim of the information department staff is to keep managers relying heavily on the formal information system in operation and change their attitudes towards the system's credibility to reduce the dissonance. In fact, from the practical standpoint, managers' attitudes are less under the control of the information department staff than the quality of the information system. However, managers' attitudes towards the system can be changed if their beliefs about the system change. As attitudes towards the system are determined by a manager's salient beliefs that the system possesses certain attributes and by his evaluations of those attributes, attitudes then can be changed by one or more of the existing salient beliefs about the attributes of the system, by introducing new salient beliefs such as the information being available when needed, since a computer is used, or by changing the manager's evaluation of the system attributes. Beliefs about the information system, and attributes evaluation can, therefore, be viewed as two different determinants of managers' attitudes at which an influence attempt can be directed. Clearly, managers' beliefs about the system and/or attributes evaluation are influenced by improving the system's credibility and effectiveness which may require to enhance or redesign the system in operation. These relations, i.e. managers' beliefs about the system - attitudes towards it - system usage, are illustrated in Figure (4.2).

FIGURE (4.2)

Relationships Between Managers' Beliefs About An Information System,
Attitudes And System Usage



As shown in Figure (4.2) managers' beliefs about an information system are evaluated. According to theory, evaluated beliefs would result in a set of attitudes towards the system, that is, the feelings of favourableness or unfavourableness towards it. On the one hand, managers' attitudes influence system usage intentions which should influence managers' usage of the system. However, some constraints may restrict this influence, such as the existence of another better source of information or the fact that the system is the only or best available source. Accordingly, system usage may not appear to be consistent with managers' attitudes towards it. Nevertheless, system usage affects managers' satisfaction with the system whether or not there are some constraints which intervene between usage intention and the over behaviour, i.e. system usage. Managers' satisfaction affects managers' beliefs about the system which, in turn, influence managers' attitudes towards the system, and so on.

On the other hand, managers' attitudes influence their expressed evaluation of the system's credibility. In contrast to the system usage, the expressed evaluation is expected to be consistent with managers' attitudes since it is assumed that constraints have insignificant influence on system evaluation. System evaluation will lead to more system refinements and, hence, improvements of the system's credibility and effectiveness from managers' perspectives. Improvements in the system's credibility and effectiveness, in turn, change managers' beliefs about the system which influences managers' attitudes towards it, and so forth.

The information department staff then, should consider managers' beliefs about the information system. In other words, they should

focus on how managers' reactions to the information system can be improved. More specifically, they should seek to answer two questions: (1) what variables are associated with managers' beliefs about the system's credibility and effectiveness? (2) How can those variables be altered to change these beliefs and, hence, change attitudes?

Managers' beliefs about their information systems, in fact, are not enduring, instead they are open to change, due to changes in the system's attributes. However, beliefs about the systems are not only based on the system's attributes; the psychological climate within an organisation is another factor. In fact, every organisation develops its own psychological climate regarding the information system. This climate is set by the dominant view of the information system held by members of the organisation. It is expressed in the expectations from the information system and preconceptions of the system.⁵¹ In brief, managers' beliefs about the information system are a function of the system's quality and managers' expectations from and preconceptions of, the system.

Excessive expectations can be both self-induced and encouraged by the information department staff, leading managers to expect much more of the information system than is reasonable. On the other hand, reverse errors are sometimes made. This occurs when the information department staff, fearful of creating magnified expectations, play down the possibilities of the information system. In fact, the task of creating realistic expectations regarding the information system can be affected by the state of preconceptions

⁵¹ Ein-Dor, Philip and Eli Segev, "Organisational Context And The Success of Management Information Systems", Management Science, Vol.24, No.10, (June, 1978), pp.1072-1073

in the organisation concerning such system. In some cases, managers may develop strong preconceptions about what the information system should be like. The existence of such preconceptions can clearly distort the expectations held in the organisation about the information system. If one can weaken the preconceptions held, the better the chances of creating realistic expectations.

In fact, expectations and preconceptions play a predominant role in establishing the psychological climate in an organisation with respect to the information system. Once the system has been installed, the psychological climate is affected by the experience with it which has considerable effect on beliefs about the quality of the system and, in turn, influences managers' attitudes towards it. Undoubtedly, good experience generates favourable attitudes and encourages widespread use of the system, and vice versa.

To sum up, in order to change managers' attitudes towards an information system, the information department staff should enhance or redesign the existing system. This will improve the attributes of the reports generated by the system which lead to changes in managers' beliefs about the system and, hence, change attitudes towards it. Changing managers' attitudes, in turn, is expected to result in effective usage of the system and hence lead to greater manager satisfaction with it. Manager's satisfaction influences beliefs about the systems, beliefs in turn, influence attitudes, and so on.

On the other hand, managers' education also, especially with respect to computerised information systems, should be considered, since it may affect their attitudes. "User education refers to the

user's knowledge of how to use the system, of the capabilities as well as limitations of the MIS, and of the effect of the MIS on the user's job efficiency and decision-making effectiveness".⁵² Clearly, managers' education influences attitudes towards the information system by affecting the psychological climate in the organisation, that is, expectation from, and preconceptions of, the system. The psychological climate influences attitudes which, in turn, affects the system usage. The system usage influences manager's satisfaction with the system which affects beliefs and, hence, attitudes are influenced and so forth. In short, managers' attitudes towards an information system can be affected by two variables, namely, the psychological climate in the organisation with respect to the system, and the effectiveness of the system. Accordingly, regular evaluation of the effectiveness of management information systems is necessary in order to enhance users' favourable attitudes towards the systems or to change their unfavourable attitudes.

SECTION 4.3 - SUMMARY

Three dimensions of the ineffectiveness of a management information system can be identified, these are: (1) overabundance of irrelevant information; (2) the lack of relevant information; and (3) incompatibility of information with managers' capabilities. These deficiencies may be attributed to the following three basic causes: (1) the assumptions adopted by some systems' personnel; (2) the lack of management involvement in systems design; and (3) inflexibility of management information systems.

The effectiveness (ineffectiveness) of a management information

⁵² Schewe, Charles D., op. cit., p.583

system affects managers' attitudes towards the system and consequently their usage of the system may be affected. However, managers' attitudes towards an information system can be enhanced or changed if their beliefs about the system change. As attitude towards the system is determined by the manager's salient beliefs that the system possesses certain attributes, attitude then can be changed by one or more of the existing salient beliefs about the attributes of the system by introducing new salient beliefs such as the information being available when needed, since a computer is used.

Therefore the information department staff should consider managers' beliefs about the information system in operation. In other words, they should focus on how managers' reactions to the information system can be improved. Thus, regular evaluation of the effectiveness of the system from the managers' perspective is necessary to highlight the effective aspects of the system, so that they can be stressed and those aspects which may need to be improved.

CHAPTER V

AN APPROACH SUGGESTED FOR EVALUATING THE EFFECTIVENESS OF
MANAGEMENT INFORMATION SYSTEMS

The concepts of effectiveness and efficiency are distinct. In general, efficiency deals with how to perform tasks in a better way, whereas effectiveness deals with what to do. In more specific terms, effectiveness refers to success in accomplishment of objectives, whereas efficiency is minimisation of resources used in the achievement of these objectives. This chapter is concerned with the effectiveness of management information systems.

It is first necessary to distinguish between the problem with which this study is concerned, i.e. measurement of information system effectiveness, and other measurements, i.e. the economics of information, the economics of computers, and the economics of management information systems.

The economics of information deal with the evaluation of the value of information. Information can be used as a means of reducing uncertainty about the states of the organisation and its environment. It is therefore possible to link the value of information with the expected increase in the probabilistic outcomes of decisions made under reduced uncertainty.

The economics of computers are concerned with selection, financing, and use of computers. Although a computer is an essential component of modern management information systems, computer economics considerations are only a part of the total subject of information system economics.

The economics of a management information system deal with measurement of efficiency of the system. That is, do the benefits of the information system justify their costs? The costs of the information system are the costs of human effort, the materials used for recording, and all other costs involved in acquiring, processing data, and delivering the information to the users. The benefits, on the other hand, are the value of information generated by the system. Conceptually, the value of information generated by the system should be measured in terms of its effect on the decisions outcome.

In fact, the evaluation of a management information system to determine its effectiveness is distinct from the three evaluations mentioned above. The measurement of information system effectiveness is a process of comparing the system's objective with its actual accomplishment to determine how well the system actually achieves the purpose for which it was designed. In other words, assessing the success of the system in providing management with its informational needs.

In brief, economics of information usually tackle the problem of non-programmed decisions and deal with the economic value of having or not having some information. Economics of computers are concerned only with the computer itself as a component in a management information system. In fact, a management information system works on a continuous basis and consists of many elements; a computer can be one of them. Consequently, the economics of a management information system (the measurement of the system's efficiency) deal with the costs and the benefits of the system as a whole. Whereas the measurement of the system's efficiency is concerned with

the economic relationship between input and output of the system, the measurement of the system's effectiveness focuses on the relationship between output of the system (information) and the system's objective.

The purpose of this chapter is neither to study the economics of information nor to suggest an approach for evaluating the economics of the computer, as a part in a modern management information system, or the economics of the system itself as a whole. The problem with which this chapter is concerned is to develop a practical approach for determining the effectiveness of management information systems periodically and in quantitative terms with less effort, in short time, and consequently at a reasonable cost.

Prior to discussing the conceptual and operational frameworks of the suggested approach, a review of current literature of management information systems should be performed to determine the approaches of evaluation which have been used. They provide a point of departure for designing the suggested approach.

In fact, the design of the suggested approach is influenced by the appropriate answer to two groups of questions. First, whose point of view is to be adopted and how? Is the system's effectiveness evaluated only from the viewpoint of the users of information, or should the effectiveness be evaluated from the viewpoints of both the user of information, as decision maker, and the person affected by the decisions taken, which are based, among other things, on the information provided to the user? Are the views of providers of information, the system's personnel, (which could be helpful in evaluating the system's effectiveness) to be taken into consideration?

Second, what criteria are appropriate for assessing the information system's effectiveness? Should these criteria be extrinsic or intrinsic? That is, are the criteria derived from the literature or from the individuals whose points of view are being taken?

This chapter will answer these questions and consequently it is divided into three sections. They are as follows:

- (1) Measuring the attitudes of the users of information, the providers, and the persons affected by the decisions taken.
- (2) Use of modified semantic differential to evaluate the effectiveness of management information systems.
- (3) Summary.

SECTION 5.1 - MEASURING THE ATTITUDES OF THE USERS OF INFORMATION,
THE PROVIDERS AND THE PERSONS AFFECTED
BY THE DECISIONS TAKEN

5.1.1 Introduction

Ideally, management information systems should be evaluated continually in order to keep them effective. However, a review of the current literature of management information systems indicates that in evaluating the performance of management information systems much attention has been paid to efficiency and more specifically computer efficiency, while relatively less attention has been paid to effectiveness. On the other hand, the current literature indicates also that information systems design/redesign and an overall evaluation of the effectiveness of information systems have not been considered separately. The effectiveness of the systems are usually evaluated in two cases: (1) after the installation of a new system for making sure that the system achieved the purpose for which it was designed; (2) when operations and activities change and/or when

management decides to use a more sophisticated system. In other words, an overall evaluation of the effectiveness of management information systems is usually accomplished as a sub-objective of systems analysis and by the same techniques such as analysis of data processing operation and flow, review of the content and design of documents and reports, review of the capabilities of personnel in the performance of the functions for which they are responsible. Obviously, these need much effort, long time and consequently are accomplished at a considerable cost.¹

From the analysis of the current literature of management information systems, four observations can be drawn. They are:

- (1) The effectiveness of the systems is expressed in qualitative terms rather than in quantitative terms.
- (2) By applying qualitative techniques, different evaluators, when confronted with the same facts, may interpret them differently. Consequently, the evaluation is likely to be highly subjective.
- (3) Evaluating the effectiveness of the systems cannot be easily replicated in the same manner from period to period.
- (4) If the evaluation is performed on a periodical basis, it is likely that the results may not be comparable from period to period.

¹ For example see:

Sutton, Richard H. and Robert L. Mathis, "Performance Appraisal - Part 2", Journal of Systems Management, (July 1979), p.9;

Donald, Archie, Management Information And Systems, (Oxford: Pergamon Press, Second Edition, 1979), pp.180-184;

Clifton, H.D., Business Data Systems, (London: Prentice-Hall International, Inc., 1978), pp.286-287;

Cushing, Barry E., Accounting Information Systems And Business Organisations, (Menlo Park, California: Addison-Wesley Publishing Company, 1974), pp.217-221;

Forkner, Irvine and Raymond McLeod, Jr., Computerised Business Systems, (New York: John Wiley & Sons, 1973), pp.160-185, pp.193-194

5.1.2 The Problem Of Constructing An Approach For Evaluating The Effectiveness Of The Systems

In order to measure the effectiveness of the information systems periodically and in quantitative terms, so that it can be compared from one period to the next, a systematic and an inexpensive approach is needed. In fact, the construction of such an approach encounters two problems: first, information systems have no physical end products; second, there is no agreement on the aspects which should be appraised and the criteria to be used in evaluating the effectiveness of the systems.

5.1.2.1 Information Systems Have No Physical End Product

The purpose of management information systems is to provide useful information for managers at all managerial levels. The point is that "useful information" is an intangible product. On the other hand, an information system's effectiveness is related to the degree "usefulness" is fulfilled, but this is no measure unless usefulness can be quantified.²

5.1.2.2 There Is Disagreement On The Aspects Which Should Be Evaluated And The Criteria To Be Used

A review of the current literature of management information systems indicated that an agreement among the researchers in this field has not been found regarding the aspects which should be appraised or the criteria to be used in evaluating the effectiveness of information systems. For example, Sutton and Mathis believe that measurement of effectiveness should include user satisfaction, quality of programmer output, operational quality and plans to recover from disaster. The authors suggested EDP managerial audit (Electronic Data Processing) and user surveys as methods of apprai-

² See, for example:

Edstrom, Anders, "User Influence And The Success of MIS Projects: A Contingency Approach", Human Relations, Vol.30, No.7, (July, 1977), pp.589-590;

Dewhurst, R.F.J., "Evaluating An Industrial Accountant's Department: 1-Line and Service Functions", The Accountant, (February 21st 1974), p.233

sal of the effectiveness.³ Mehra, on the other hand, has focused on presentation of information and its effectiveness and pointed out that the results of cost/benefits analysis and user satisfaction are indicators of effectiveness.⁴

Rolefson, however, thought that the measurement of effectiveness should cover the following four areas:

"(1) Financial contribution. Measure of value/benefits received from the data processing products (reports, displays, documents).

(2) Management involvement. The degree top management directs control of the data processing function.

(3) User-data processing relationship. Measures how effectively user and data processing personnel work together.

(4) User understanding of data processing. Measures level of understanding managers and supervisors (outside data processing department) have concerning data processing tools, techniques and applications".⁵

Rolefson suggested interviews, questionnaires as major techniques in gathering the data needed for the evaluation of the systems. Furthermore, Rolefson suggested "monetary estimation" as an indicator of a report value from the user's perspective. More specifically he asked the user to "estimate yearly value of report to your organisation in terms of its contribution to a reduction in assets employed, increased sales or services, improved productivity or other fundamental benefits".⁶ In fact, this measure of a report

³ Sutton, Richard H. and Robert L. Mathis, op. cit., pp.9-12

⁴ Mehra, Basant K., "Improvement of MIS Credibility", Journal of Systems Management, (September, 1979), pp.40-41

⁵ Rolefson, Jerome F., "The DP Check-Up", Journal of Systems Management, (November, 1978), p.42

⁶ Ibid., p.44

value is questionable. Differences in values of a report given by different users may not be due to the differences in its actual usefulness (effectiveness), but to variation in the utility for money among users.

The current literature also indicates differences among researchers about the criteria which should be used in evaluating the effectiveness of information systems. For example, in a survey conducted by Higgins and Finn on a sample of fifty-six British companies drawn randomly from "The Times 1000" to evaluate the effectiveness of information systems from the chief executives' perspectives, the authors used three criteria. They were: (1) ease of comprehension of routine computer reports; (2) usefulness of routine computer reports; and (3) satisfaction with volume and format of routine computer reports.⁷

In another survey conducted by Melrose and funded by the British Institute of Management on a sample of 265 directors in 258 British companies, the researcher asked directors their views on the quantity, quality (relevance) and frequency of information.⁸

Adams conducted a study on "how management users view information systems". Ten large American companies (sales over five hundred million dollars per year) participated in the study. Seventy-five managers at top and middle management level were interviewed. The author used eight information characteristics to measure the effectiveness of the information systems from managers'

⁷ Higgins, J.C. and R. Finn, "The Chief Executive And His Information System", OMEGA, Vol.5, No.5, (1977), pp.557-566

⁸ Melrose, J.E., Reporting Management Information, Management Survey Report No. 25, (London: British Institute of Management, 1975).

viewpoints. They were: (1) accuracy; (2) precision; (3) age; (4) repetitiveness; (5) summarisation; (6) descriptive; (7) relevance; and (8) source.⁹

Finally, Swanson conducted a case study in an international manufacturing company of electronic equipment to evaluate the effectiveness of the management information system of a department within the company. The system utilised a computer programme system to make its data accessible to generalised enquiry from remote terminals. Of the 46 questionnaires distributed to the system users, 37 usable questionnaires were returned. Swanson used 16 items (criteria) in his questionnaire. The first eight of them were actually related to the outputs of the system, the following seven items (criteria) focused on the system itself, while the last item measured users' attitudes towards the system group. The criteria used were as follows: (1) timely/untimely; (2) relevant/irrelevant; (3) unique/redundant; (4) accurate/inaccurate; (5) instructive/misinstructive; (6) concise, to the point/diffuse, not to the point; (7) unambiguous, clear/ambiguous, unclear; (8) readable/unreadable; (9) efficient/inefficient; (10) convenient/inconvenient; (11) reliable/unreliable; (12) untroublesome/troublesome; (13) adequate/inadequate; (14) prompt/unprompt; (15) valuable/valueless; and (16) co-operative/unco-operative. Swanson used a 5-point scale. The index of the effectiveness of the information system was defined as the simple average of the 16 individual items (criteria).¹⁰

⁹ Adams, Carl R., "How Management Users View Information Systems", Decision Sciences, (April, 1975), pp.337-345

¹⁰ Swanson, E. Burton, "Management Information Systems: Appreciation And Involvement", Management Science, Vol.21, No.2, (October, 1974), pp.178-188

Four observations can be drawn from the studies reviewed in this section. They are as follows:

First, although the effectiveness of management information systems ideally, should be evaluated continually, the current literature indicates that information systems design/redesign and overall evaluation of the effectiveness of the information systems, usually have not been considered separately.

Second, an agreement among researchers in the field of management information systems has not been found concerning the areas representing the effectiveness of the systems. User satisfaction, however, was the most important aspect. This, in fact, was not unexpected.

Third, in the studies and surveys which concentrated on measuring the effectiveness of the systems from users' perspectives (users' attitudes or appreciation), different sets of criteria have been used.

Finally, from examining the studies and surveys reviewed, it seemed that these research projects, in evaluating the effectiveness of the systems, have not paid enough attention to the views of the systems' personnel; did they really know the actual informational requirements of the users? The views of the persons affected by the decisions taken were also neglected: did they agree that the users of information (the decision makers) appeared to have all useful information?

5.1.3 A Suggested Approach For Evaluating The Effectiveness Of Management Information Systems: The Conceptual Framework

5.1.3.1 The Views Of The Information Systems' Personnel, The Users Of Information, And The Persons Affected By The Decisions Taken

It was stated in Chapter III that user satisfaction with the information provided by management information systems has been recognised as the major purpose of these systems. On the other hand, an effective information system was defined in Chapter I as one which achieved the purpose for which it was designed. Therefore, measuring user satisfaction with the information provided is a feasible substitute for measuring the effectiveness of an information system. Other areas were mentioned in the studies reviewed, such as quality of programmer output, operational quality, the level of understanding managers have concerning the data processing tools, and how effectively managers and information systems personnel work together. These, in fact, are related to the efficiency of the system or to the determinants of user satisfaction.

However, user satisfaction cannot be considered the sole determinant of the effectiveness of management information systems although it has been recognised as the key factor. The problem, as described by Mathis and Sutton is that:

If a user expresses dissatisfaction, it is difficult for management to determine if the dissatisfaction is due to: (1) the failure of EDP [Electronic Data Processing] to provide a good system based on user needs; (2) user failure to provide a good specification of needs; or (3) the user trying to shift attention away from his or her failings toward the computer by blaming the computer for his/her problems.¹¹

¹¹ Mathis, Robert L. and Richard H. Sutton, "Performance Appraisal - Part I", Journal of Systems Management, (June, 1979), p.16

Therefore, the views of both management information system's team and the persons affected by the decisions taken, which are based, among other things, on the information provided by the system, should be taken into consideration when the effectiveness of the system is evaluated. Do the systems' team know the actual informational requirements of the users? Do the persons affected by the decisions taken agree that the users of information, i.e. the decision makers, appeared to have all useful information?

5.1.3.2 Problems Inherent In Measuring User Satisfaction

It was stated previously that user satisfaction is the key factor in evaluating the effectiveness of an information system. However two problems are inherent in measuring user satisfaction: (1) does the stated satisfaction really indicate the actual satisfaction? (2) what if user is satisfied and his decisions are extremely poor?

5.1.3.2.1 Stated Satisfaction As A Measure Of Actual Satisfaction

Actual satisfaction was established as an indicator of the effectiveness of management information systems. There is, however, a problem in measuring actual satisfaction. Actual satisfaction is an internal feeling. User of information may or may not adequately express his feeling. What is expressed by user of information, in fact, is stated satisfaction.

Generally, in attitudinal enquiries, a problem arises when a participant knows his true attitude towards an object, but for some reason falsely states another opinion. Another case when he does not know his true attitude and expresses a false attitude. However, the problem can be overcome, to a great extent, through the content of the questions asked and question wording.

As the enquiry in this study is concerned with the effectiveness of management information systems, it is believed that personal motives of user of information will not be involved and accordingly it is most likely that the stated attitude or satisfaction will be congruent with the actual attitude or satisfaction. Furthermore, with the exception of managers who have a very short service period in their organisations, it is not possible that the user of information has no clear opinion concerning the effectiveness of his information system. However, a set of different questions can be asked to obtain the same information. This, in fact, gives confidence in the stated attitude of the user if a cross-check leads to the same conclusion.

5.1.3.2.2 User Is Satisfied And His Decisions Are Extremely Poor

There is a possibility that the user of information expresses satisfaction with the information provided by his management information system but his decisions are extremely poor. In such a case, a question arises: is the system still considered effective? As the stated attitude towards the management information system is assumed to be congruent with the actual attitude, it is believed that the stated satisfaction of the user indicates his actual satisfaction. This means that the system is effective although the user's decisions are extremely poor. Two likely explanations for this situation can be given:

First, the user does not utilise the information provided by the system in the effective way. In other words, there is a poor management with a good information system.

Second, the information provided for the user is actually useful and he utilises it effectively, but in carrying out the decisions has encountered unexpected factors such as unpredictable changes

in the market condition.

The overall effectiveness of a management information system, in fact, is determined from the viewpoints of all users as a whole. If the majority of users are satisfied with the information provided by the system, the system is considered effective, and vice versa. It can rely on the attitudes of the majority of users in evaluating the effectiveness of the system, since it is difficult to assume that the majority have not enough experience and competence to evaluate the usefulness of the information provided by the system. However, if a minority of users are dissatisfied, this may indicate that the system is actually ineffective in providing the informational needs of this group of users and some improvements in the system may be needed. On the other hand, the dissatisfaction expressed by a minority of users may be due to their way of using the information, not to the system.

5.1.4 How Satisfaction Is To Be Measured

As previously stated, the approach suggested for evaluating the effectiveness of management information systems is mainly based on the satisfaction of users with the information provided by the systems. The approach also takes into consideration the views of both the systems' personnel, i.e. the providers of information and the persons affected by the decisions taken which are based, among other things, on the information provided by the systems. Direct questions will be used to measure user satisfaction and to reveal the views of both the providers of information and the persons affected by the decisions taken. The questions will be presented and discussed later in the following chapter (Chapter VI) when the operational framework of the suggested approach is discussed.

A modified semantic differential technique, which will be discussed later in this section, will be used also in this study to measure user satisfaction and to reveal the views of both the providers of information and the persons affected by the decisions taken. The purpose of using two different techniques to gather the same data is to check the results produced by the suggested approach. Correlation among the results produced by two measures gives confidence in the conclusions drawn from these results if a cross-check leads to similar results.

5.1.5 Criteria And Procedures For Measuring The Effectiveness Of The Systems

5.1.5.1 Criteria For Measurement

The major purpose of a management information system is to satisfy its users by providing them with their informational requirements. If the users are to be satisfied, the information provided should be useful. In fact, "useful information" is not a unidimensional concept, but rather a multi-dimensional one. Five dimensions of useful information can be identified: (1) the association with the purpose intended; (2) the quantity; (3) the dependability; (4) the time; and (5) the comprehensibility. Accordingly, usefulness as an inclusive criterion is divided, as it was suggested in Chapter II, into five criteria which are used in this study to measure user satisfaction. They are as follows:¹²

- (1) Relevance. If information is to be relevant, it should be associated with the action it is prepared to facilitate or the result desired to be produced.
- (2) Sufficiency. A certain amount of detailed information should be available.

¹² The criteria were discussed in detail in Chapter II; see pp. 68-85

- (3) Reliability. Confidence in the information received.
- (4) Timeliness. If information is to be useful, it should be available as and when required.
- (5) Understandability. To be understandable, information should be presented in organised form, in a simple language, and the terminologies used should not be in difficult technical terms.

5.1.5.2 Procedures For Measuring The Effectiveness

There are four basic steps which should be followed in order to measure the overall effectiveness of an information system. They are as follows:

Step I - The first step is to determine the users of the information provided by the system, their organisational levels, their functions, and the reports which they receive from the system. It should specify also the persons in charge of, or participating in, the preparation of the reports received by the users. Furthermore, the persons affected by the decisions which are taken by the users, i.e. decisions makers, should be determined.

Step II - A point scoring model is used to express user satisfaction in quantitative terms rather than in qualitative terms. Users are asked to rate relevance, sufficiency, reliability, timeliness, and understandability of the information contained in each report received using, for example, a 1-7 point scale. The five scores given to the attributes are summed (or averaged) to yield a score for satisfaction of each user with each report which he receives.¹³

¹³ For more detail about the scoring approach, see for example: Carter, Deane M., "Determining Systems Success", Journal of Systems Management, (July, 1976), pp.24-27;

Lucas, Henry C., Jr., and John R. Moore, "A Multiple-Criterion Scoring Approach to Information System Project Selection", INFOR, Vol.14, No.1, (February, 1976), pp.1-12;
(footnote continued on p.246)

In fact, satisfaction with the reports is not necessarily the total (or the average) of the five scores given to each information attribute. As stated in Chapter II, the attributes of the information provided could not be equally important in a particular use (i.e. planning, control) and to a particular user or group of users. In such a case, the five scores are each multiplied by their respective importance weights. As the relative importance of each information attribute may differ from one user to another, the importance weights given by each user are used in weighting his satisfaction scores. The scoring model used in this study is illustrated in Table (5.1).

TABLE (5.1)

Hypothetical Example Of The Application Of The Scoring Model Used In Measuring User's Satisfaction With a Report

Information Attributes	Satisfaction Score (a 1-7 scale) (A)	Importance Weights (B)	Weighted Satisfaction Score (A) × (B)
Relevance	6	.25	6 × .25 = 1.50
Sufficiency	3	.15	3 × .15 = 0.45
Reliability	5	.20	5 × .20 = 1.00
Timeliness	5	.15	5 × .15 = 0.75
Understand-ability	6	.25	6 × .25 = 1.50
Total	25 (71%)	1.00	
Mean	5 (71%)		5.20* (74%)

* Weighted Arithmetic Mean

(Footnote 13 continued from p.245)

Carlson, Eric D., "Evaluating The Impact Of Information Systems", Management Informatics, Vol.3, No.2 (April, 1974), p.60;

Souder, William E., "A Scoring Methodology For Assessing The Suitability of Management Science Models", Management Science, Vol.18, No.10, (June, 1972), B - pp.526-543;

Sharpe, William F., The Economics of Computers, (New York: Columbia University Press, 1969), pp.284-292

The procedure mentioned above is applied also to obtain the satisfaction scores of the persons affected by the decisions which are taken by the users. The persons who are in charge of, or participating in the preparation of the reports produced by the information system which is to be evaluated are asked also to rate users' specifications of their informational needs. However, this procedure will be illustrated in detail in the empirical study presented in Chapter VIII.

Step III - Determine the effectiveness of the information system in providing the information needed for planning. It is the total (or average) satisfaction scores given by users to the reports used in planning. Likewise, the effectiveness of the system in providing the information needed for control is calculated. The same procedure is applied to quantify the effectiveness of the system from the viewpoints of the persons affected by the decisions taken.

Step IV - Determine the overall effectiveness of the system which is the sum (or average) of the effectiveness score of the system in providing the information needed for planning and control. However, the reports produced by the system may not be equally important for planning and control from the viewpoint of user or group of users. Thus, the effectiveness score for each managerial function is multiplied by the function weight, as given by each user, and summed to obtain a score representing the overall effectiveness score of the system. This procedure is illustrated in Table (5.2) on page 248. Likewise, the overall effectiveness of the system from the viewpoints of the persons affected by the decisions taken is determined.

TABLE (5.2)

Hypothetical Example Of The Calculation Of The Overall
Effectiveness Of An Information System
From A User's Perspective

Managerial Function	Effectiveness Score	Importance	Weighted Effectiv-	
	Minimum = 1 Maximum = 7 (A)	Weights (B)	ness Score (A)	(B)
Planning	4.0	.4	4.0	.4 = 1.6
Control	6.5	.6	6.5	.6 = 3.9
Total	10.50 (75%)	1.0		
Mean	5.25 (75%)			5.50* (79%)

* Weighted Arithmetic Mean

The four previous steps are summarised in Figure (5.1) which illustrates how the overall effectiveness of an information system is measured at a specific management level.

5.1.5.3 The Tool Used

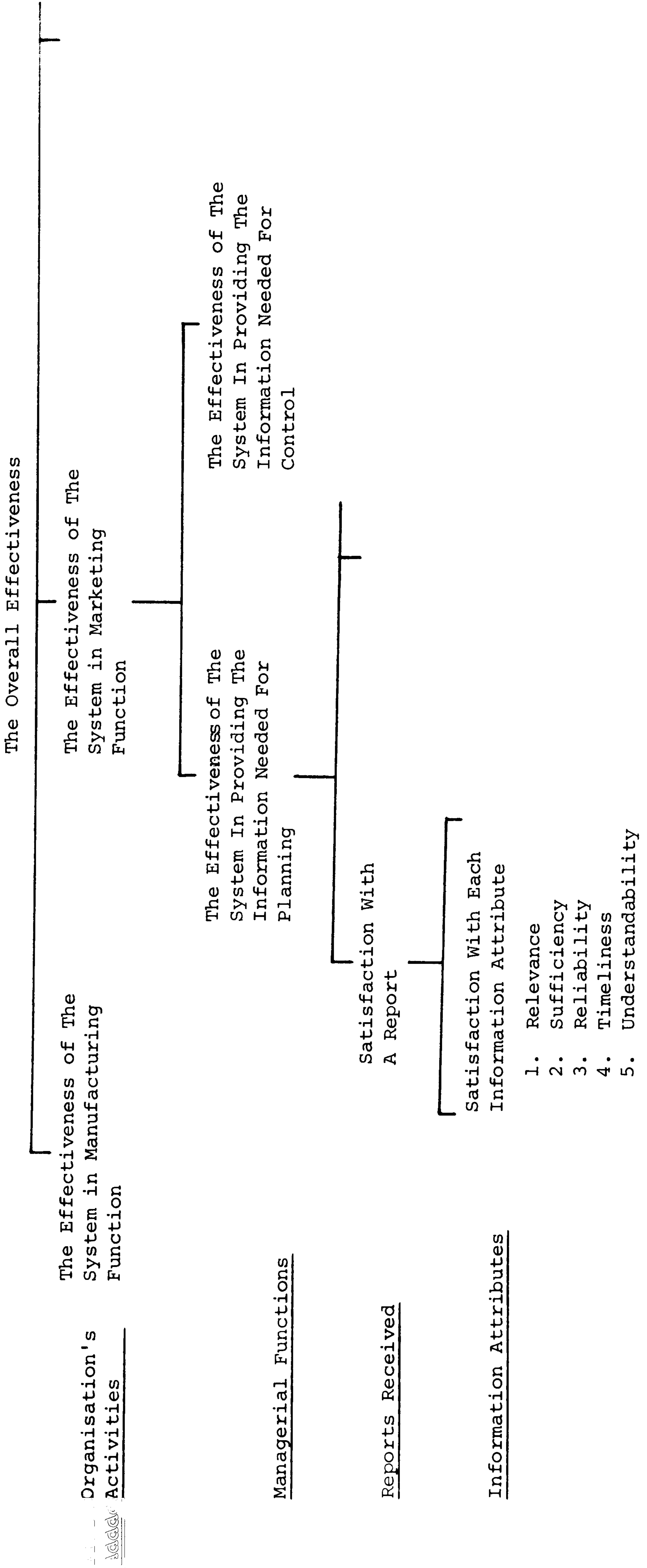
As the purpose of the suggested approach is to evaluate the overall effectiveness of management information systems periodically, annually if it is possible, and in quantitative terms, the approach should be relatively simple, does not need a long time to accomplish, and accordingly can be carried out at a reasonable cost. Because of this, it is believed that the most appropriate tool could be a questionnaire. Such a tool significantly reduces the time and cost of evaluating the effectiveness of the systems. The advantages and disadvantages of this tool will be discussed later in detail in Chapter VI.

5.1.5.4 The Suggested Approach As An Aid Method To The Systems Analysts

The suggested approach is designed to determine the location and nature of problems of an information system, but it is not

FIGURE (5.1)

The Overall Effectiveness Of An Information System
At The Middle Management Level



designed to specify a cure for these problems. To redesign the information system and/or to perform some improvements, the information system analysts and organisational personnel who are in charge of maintaining the information system should perform additional detailed examinations. In fact, the suggested approach aims to simplify the analyst's task by ascertaining the locations of relative system ineffectiveness as well as delineating the unsatisfactory information attributes. If redesign is not necessary, this approach makes it apparent with minimum effort, time and consequently cost.

More specifically, the advantages of the suggested approach are as follows:

- (1) The approach measures, periodically and in quantitative terms, the overall effectiveness of an information system as a whole, the effectiveness of the system at each management level, and in each organisation's activity (e.g. manufacturing function, marketing function, etc.). The effectiveness of the system in providing information needed for the basic managerial functions (i.e. planning and control) is also determined. By measuring the effectiveness of the system in quantitative terms, the results can be compared from one period to the next and accordingly the trends of the effectiveness can be identified.
- (2) The analysis of the effectiveness score reveals the organisational location (i.e. management level and organisation's activity) of dissatisfaction with the information system. It indicates also the managerial function (i.e. planning and control) for which the dissatisfaction is evident, the reports which do not gain user satisfaction, as well as the information attributes with which the dissatisfaction is associated.

(3) Although user satisfaction is the key factor in evaluating the effectiveness of an information system, the suggested approach takes into consideration the views of the system's personnel: do they really know the actual informational requirements of the users? Also the views of the persons affected by the decisions taken are to be taken into account: do they agree that the users of information (the decision makers) appeared to have all useful information? The analysis of the views of the three groups indicates the actual effectiveness of the system and highlights the problems in management information reporting.

(4) Finally, the suggested approach, as stated earlier, can be carried out in a short time, without great effort and accordingly at a reasonable cost.

SECTION 5.2 - USE OF MODIFIED SEMANTIC DIFFERENTIAL TO EVALUATE THE EFFECTIVENESS OF MANAGEMENT INFORMATION SYSTEMS

5.2.1 Introduction

As previously stated, a modified semantic differential is used in this study as a check or evaluative device of the results produced by the suggested approach. The semantic differential measures in quantifiable terms what meaning a concept may have to an individual or a group of individuals. The term "concept" is taken to mean overall possible objects of judgement. As stated in Chapter III, it can distinguish between two facets of meaning: (1) denotative; and (2) connotative. Denotative meaning refers to the explicit meaning or the physical characteristics of an object which is represented by a word. Connotative meaning is what implications the word or the object has for a particular person.¹⁴

¹⁴ See Chapter III, pp.109-110

See also: Nunnally, Jum C., Jr., Introduction to Psychological Measurement, (London: McGraw-Hill Book Company, Inc., 1970), p.443

The semantic differential measures mainly connotative aspects of meaning, particularly the evaluative connotations of objects. Furthermore, this technique can also be used as a measure of attitudes (affects). It can be applied in exploring attitudes towards a variety of things such as organisation products, corporate images, and political candidates. The general validity of the semantic differential for measuring attitudes (affects) is supported by different studies.¹⁵ In this study, the semantic differential is used to measure the attitudes of users of information and the persons affected by the decisions taken towards the information provided by an information system. It is to be used also to measure the system's personnel (the providers of information) towards the information as specified by the users.

5.2.2 Conceptual Background Of The Semantic Differential

The semantic differential technique measures what meaning a concept may have for an individual or a group of individuals in terms of dimensions which have been empirically defined and factor-analysed. In this technique, persons are provided with a concept, such as "the information provided by a management information system" to be differentiated and a set of bipolar adjectival scales (e.g., adequate - inadequate). Their only task is to express the direction and intensity of their feelings about the concept. The subjects record their responses on a seven-point scale of adjectives.

5.2.2.1 Semantic Space

As stated previously, each semantic scale, is defined by a pair

¹⁵ For comprehensive examples of these studies, see:

Snider, James G. and Charles E. Osgood (Eds.), Semantic Differential Technique. A Source Book, (Chicago: Aldine Publishing Company, Third Printing, 1977).

of polar (opposite in meaning) adjectives. A sample of such scales represents a multidimensional space. The larger or more representative the sample, the better defined is the space as a whole.

The concept of "semantic space" is the basis of the operational definition of meaning. The meaning of a sign is operationally defined as that point in semantic space specified by a series of differentiating judgements obtained on a representative set of semantic scales.¹⁶

5.2.2.2 Differentiating The Meaning Of A Concept

The differentiating process of the meaning of a concept may be described as follows:

The concept "the information provided" is presented for semantic differentiation on some of such scales as these:

Essential	<u>X</u> : ___ : ___ : ___ : ___ : ___ : ___	Non-essential
Well-timed	___ : <u>X</u> : ___ : ___ : ___ : ___ : ___	Ill-timed
Simple	<u>X</u> : ___ : ___ : ___ : ___ : ___ : ___	Complex
Adequate	___ : ___ : <u>X</u> : ___ : ___ : ___ : ___	Inadequate
Accurate	___ : ___ : ___ : <u>X</u> : ___ : ___ : ___	Inaccurate

That is, the subject is asked to judge the concept in terms of whether it is more associated with essential or non essential, well-timed or ill-timed etc..

To put it another way, each judgement represents a selection among a set of given alternatives and serves to localise the concept as a point in the semantic space. The more representative

¹⁶ Osgood, Charles E., George J. Suci, and Percy H. Tannenbaum, The Measurement of Meaning, (Urbana, Illinois: University of Illinois Press, 1957), p.26

the selection of these scales, the more validly does this point in the space represent the operational meaning of the concept, and vice versa. The semantic differential, then, means the successive allocation of a concept to a point in the multidimensional semantic space. Hence, difference in the meaning between two concepts is then merely a function of the difference in their respective allocations within the same space, i.e. it is a function of the multidimensional distance between the two points.¹⁷

The main purpose of the semantic scales, then, is to measure the two essential properties of meaning:

1. The quality of meaning: it is the direction of the specific point representing meaning in the semantic space from the origin. Such direction depends on the alternative polar terms selected.
2. The intensity of meaning: it can be measured by the distance of the point from the origin. This distance depends on the extremeness of the scale positions checked.

5.2.2.3 Dimensions Of The Semantic Space

The semantic space has a number of different dimensions. Based on the results of factor analysis, Osgood and his associates have identified three major dimensions of the semantic space which have been labelled Evaluation, Potency, and Activity (EPA). They have also concluded that the meaning of most concepts could be reliably measured along these three independent dimensions or factors.¹⁸ In fact, one of the distinctive features of the semantic differential is its reduction of ratings to three basic dimensions of variation.

¹⁷ Ibid., p.26

¹⁸ Ibid., pp.31-75

The Evaluation dimension is represented by such scales as: good-bad, valuable-worthless and fair-unfair. The Potency dimension is concerned with power and related notions like size, weight and toughness. It is represented by: large-small, strong-weak, heavy-light, and thick-thin. The third dimension - Activity is exemplified by scales like: fast-slow, active-passive and hot-cold.

The relative importance of these dimensions (factors) are different. The evaluative dimension usually being the most powerful or salient. This factor alone is approximately twice as important as the potency factor which is about twice as important as the activity factor. Thus, the evaluative factor allows the semantic differential to be used as an excellent evaluative research tool.

5.2.3 Semantic Differential As A Measurement Instrument Of Attitudes (Affects)

Measurement on the semantic differential scales has been found to have three major independent dimensions (factors). They are labelled: evaluative, potency, and activity. The most powerful ones are the evaluative factor. This factor implies an appraisal of a concept (stimuli) which could result in a favourable or unfavourable disposition towards the concept. Because the evaluative factor is an appraisal emanating from an individual's feelings, the evaluative factor can be used to measure an individual's attitude (affect). To put it another way, it seems reasonable to identify attitude (affect) with the evaluative dimension of the total semantic space, as this is isolated in the factorisation of meaningful judgements. In terms of the operations

of measurement with the semantic differential, attitude towards an object can be defined as the projection of a point onto the evaluative dimension of the semantic space.¹⁹

The semantic differential (the evaluative factor) is used to measure the two properties of affect (attitude), direction and intensity. Although the evaluative factor measures the direction of affect (favourable or unfavourable) and its intensity, the information derived from it alone does not allow us to predict actual behaviour in real-life situations. It indicates only a disposition towards certain classes of behaviours. To improve such a prediction, Osgood, et al., have suggested the use of the scales of potency and activity factors as well as the evaluative ones. However, they have treated them as distinct from affect (attitude).²⁰

In fact, the reason for using only the sets of scales which have high loadings on the evaluative factor in the measurement of affect is that the scales of other factors are non-evaluative in nature. Hence, they are less suitable in the measurement of affect which represents an evaluative response. On the other hand, the reliability and validity of the evaluative scales in measurement of affect have been confirmed. Furthermore, the evaluative factor of the semantic differential has been evaluated in the light

¹⁹ Ibid., p.190

²⁰ Ibid., p.191, p.198

Osgood, et al., have explained how the prediction is improved by the following example: one subject rated THE NEGRO as unfavourable strong, and active; another subject rated THE NEGRO as equally unfavourable, but also as weak and passive. It seems likely that the former subject would behave differently in a real-life situation (e.g. with fear and avoidance) than the latter.

of some previous writings on attitudes measurement. The findings of this evaluation have supported the notion that the evaluative factor is a valid measure of affect (attitude).²¹

5.2.4 Semantic Differential As A General Method

The evaluation standard scales such as good-bad, fair-unfair, valuable-worthless may be used as generalised scales for the measurement of affect in a sense that an individual's affect towards any object might be assessed by having the individual ratings on the same set of the semantic differential scales whatever the attitude-object. The advantages of use of the generalised evaluative scales are as follows:

- (1) Economy: the same bipolar scales can be used to measure affects towards any object, so the costs of preparing different scales for every object are eliminated.
- (2). Affects comparability: since affects towards various objects are all measured on the same scales, there is the potential for comparing different affects.

Despite these advantages, the major problem in using a single set of evaluative scales as generalised affect scales is the matter of scale relevancy or, more generally, of concept scale interactions. A single set of evaluative scales used for all objects would provide relatively insensitive measurements for some. In such a case, it is desirable to use evaluative scales developed for the particular content areas of interest.

In fact, the semantic differential can be made quite specific. If one is interested in affects of persons towards jobs, he can employ

²¹ Ibid., p.190, pp.192-195

a special evaluative scale that describes jobs. If one is interested in studying only social issues, another set of scales might be used. The more specific the set of scales the more comfortable are the subjects when they make their judgements, and the more relevant is the information for the particular problem in hand.²²

From the preceding discussions, the conclusions which can be drawn are:

- (1) The evaluative factor alone in the semantic differential is a reliable and valid measure of an individual's affect (attitude) towards an object.
- (2) The major criticism of using the evaluative scales alone is that the information derived from them is not sufficient to predict, to some extent, actual behaviour in real life situations. However, this shortcoming is common in the other attitude measures. On the other hand, it is not the purpose of this study to predict actual behaviour of managers towards management information systems, but rather, to measure affects (attitude) which are a function of their beliefs about these systems.
- (3) Although the evaluative scales in the original semantic differential are general, they can also be used as a special evaluative scales which are more relevant for the particular content areas of interest.

5.2.5 Modified Semantic Differential

In some applications of the semantic differential, researchers have used the original factors (evaluative, potency and activity) and their scales without alteration. For instance, Oliver has used

²²Triandis, Harry C., Attitude And Attitude Change, (New York: John Wiley & Sons, Inc., 1971), p.49

the basic semantic differential as a device for measuring the inter-professional communication of selected accounting concepts. He has directed his study towards the basic underlying accounting concepts utilised in formulating the message in financial reports. This author has explained the reason for adopting the basic semantic differential by saying "... I tentatively accepted the tenets of the 'basic' three dimensional semantic differential structure, employed it to 'key accounting concepts', and then tested whether the conventional structure could be verified for this particular study ... These correlations between the general domain results of Osgood and the more restricted domain results herein are evidence of the underlying validity of the set of scalar adjective pairs employed".²³ In fact, there are substantial reasons for adopting the three basic factors that is, these factors have ascertained their relevance and validity for the purpose of the study.

However, the relevance of the basic semantic differential for some specific domains is open to some question. The point is that the basic factors and their scales are very general. In some specific domains, they do not express sufficiently the different aspects of the particular problem in hand. Osgood and his associates have pointed this out: "... the three dominant factors we have isolated do not exhaust the semantic space, and therefore dimensions highly significant for differentiating the concepts in a particular study might be lost entirely if one stuck to only evaluative, potency, and activity scales".²⁴ Furthermore, they have

²³ Oliver, Bruce L., "The Semantic Differential: A Device For Measuring The Interprofessional Communication of Selected Accounting Concepts", Journal of Accounting Research, Vol.12, No.2, (Autumn 1974), p.301, p.303

²⁴ Osgood, C.E., G.J. Suci and P.H. Tannenbaum, The Measurement of Meaning, op. cit., p.79

called for adapting the instrument to the requirement of each problem: "... it is (the semantic differential) a very general way of getting at a certain type of information, a highly generalisable technique of measurement which must be adapted to the requirement of each research problem to which it is applied".²⁵

The necessity of adapting the semantic differential can be attributed to the concept-scale interactions since the meanings of scales and their relations to other scales vary considerably with the concept being judged. Obviously, if the factors and the scales used in a specific domain are not relevant to such domain, respondents may be forced to use unnatural bases of judgement and the validity and sensitivity of the instrument in analysing these judgements may be seriously reduced.

There are two approaches which can be applied to modify the semantic differential. In the first approach, researchers do not depend entirely on the original scales of the basic semantic differential, but rather they tend to use, to some extent, other scales which seem appropriate to the particular domain. In this view, the evaluative, activity and potency factors are still retained relevant factors.²⁶ In contrast, the second approach sees

²⁵ Ibid., p.76

²⁶ See for example:

Flamholtz, Eric and Ellen Cook, "Connotative Meaning And Its Role In Accounting Change: A Field Study", Accounting, Organisations and Society, Vol.3, No.2, (1978), pp.115-139;

Tull, Donald S. and Del L. Hawkins, Marketing Research, (London: Collier Macmillan Publishers, 1976), pp.351-352;

Mindek, William A., "Fitting The Semantic Differential To The Marketing Problem", Journal of Marketing, Vol.25, (April, 1961) pp.28-33

that both the scales and factors should be different from the original ones. However, this does not mean that in some studies one or more of the basic factors and their scales have been used in addition to the new factors and scales. For example, Dickson and Albaum have developed a modified semantic differential for exploring the factorial composition of consumers' image of retail stores. Also, Triands has applied a modified semantic differential to differentiate the meaning of the job.²⁷ These researchers have extracted and used other factors such as: "shopping environment", "product promotion-price", in the former study. In the latter study, the following factors have been used: "objective job evaluation", "subjective job evaluation", "dynamism", "white collar", "variety", and "job level". The researchers, of course, have used other scales than those representing the basic semantic differential.

In the accounting domain, Haried has also extracted and used seven factors in measurement of meaning in financial reports.²⁸

²⁷ Dickson, John and Gerald Albaum, "A Method For Developing Tailor-made Semantic Differentials For Specific Marketing Content Areas", Journal of Marketing Research, Vol.14, (February, 1977), pp.87-91

Triandis, Harry C., "A Comparative Factorial Analysis of Job Semantic Structures of Managers And Workers", Journal of Applied Psychology, Vol.44, No.5, (October, 1960), pp.297-302

²⁸ Haried, Andrew A., "Measurement of Meaning In Financial Reports", Journal of Accounting Research, (Spring, 1973), pp.117-145

For more details about the method applied to extract these factors and scales, see a previous article of the same author:

Haried, Andrew A., "The Semantic Dimensions of Financial Statements", Journal of Accounting Research, (Autumn, 1972), pp.380-389;

also, Sharpe and Anderson, Jr., have used new factors and scales beside the three basic factors, see:

Sharpe, Louis K. and Thomas Anderson, Jr., "Concept-Scale Interaction In The Semantic Differential", Journal of Marketing Research, Vol.9, (November, 1972), pp.432-434.

These factors are: "necessity", "time", "objectivity", "stability", "evaluation", "control", and "activity". It is clear that Haried has used five new factors and two of the original semantic differentials, i.e., evaluation and activity.

Although the preceding review of the literature is not exhaustive, the material presented does provide a sample of the modified semantic differential and its application in various fields. The purpose of the examples was to examine to what extent researchers divorce themselves from the original semantic differential. The examining of these examples has revealed that adaptations of the semantic differential to specific problems have ranged from the use of some new scales in addition to the original ones, to complete substitution of new factors and scales. Sources for these scales have included Osgood and his associates' list, past experience, experts' suggestions, previous studies in the subject area, preliminary depth interviews, and word reference texts.

Refinement procedures were generally judgemental. Researchers relied upon subjective evaluation to eliminate unnecessary scales from developed lists. Although the subjective evaluation process was based upon past research experience or intuitive familiarity with the subject area, no formal methods were employed to systematically refine new scales lists. However, in cases in which dimensions (factors) of the particular semantic space are unknown, factor analysis has been used to exhaust these dimensions.

The semantic differential used in this study is a modified one. The scales and the factors are different from the original semantic differential. The procedures used in constructing this technique and the set of scales and factors used will be discussed in detail

in the following chapter (Chapter VI).

5.2.6 Quantification Of The Individual Judgements: Factor Score And The Semantic Profile

The raw data obtained by the semantic differential are a collection of check-marks against bipolar adjectives. To quantify this data, each of the seven positions on the scale are arbitrarily assigned values. These values may be either from 1 to 7 or from +3 to -3. From the mathematical viewpoint, the choice between them makes no difference. In this study, the former set, i.e. from 1 to 7 is adopted.

5.2.6.1 Factor Score

Each set of scores of individual scales associated with each factor is averaged to obtain what is called factor score. Accordingly, the individual's feeling towards a concept is operationally defined as the set of factor scores representing that concept. This set is called the semantic profile.

5.2.6.2 The Semantic Profile

The semantic profile of a concept (e.g. the information provided) for a group of individuals (e.g. managers) is the set of the averages of the scores of the scales of each factor across all individuals in the group. In fact, the semantic profile can be more efficient and useful if it is represented by the averaged scores of all individuals on each scale. In this representation the similarity or difference of feeling towards a concept for different groups can be identified. This can be done by determining the degree of closeness of the averaged scores on all scales in the semantic space of each group of individuals.

5.2.6.3 Profiles Analysis: Similarity And Difference In Feeling (Attitude)

Profiles analysis is applied to reveal the similarity and difference in attitudes of different groups of individuals (e.g. users of information and the persons affected by the decisions taken). Two approaches for analysing profiles can be used: (1) the D statistic; and (2) separate treatment of each bipolar adjective (i.e. scale).

(1) The D Statistic. The D statistic is the device by which the relative similarity or difference between two semantic profiles can be measured. The D statistic is defined as the square root of the sum of the squared differences between scores of each factor (information attribute). The generalised distance formula is:²⁹

$$D_{ef} = \sqrt{\sum_J d_{ef}^2}$$

where:

D_{ef} = the linear distance between the points in semantic space representing the semantic profiles of feeling of groups e and f.

d_{ef} = the algebraic difference between the scores on the same factor J.

Summation is over the number of factors (information attributes) in the semantic profile. A large D score indicates a great difference between profiles, and vice versa.

Despite the simplicity and reliability of the D statistic, D scores should be employed conservatively. D scores completely hide

²⁹ Osgood, C.E., G.J. Suci, and P.H. Tannenbaum, The Measurement of Meaning, op. cit., p.91

the character of a difference, and a large D could be due to a relatively high score of one information attribute or a relatively low score of all of the information attributes, when only the D scores are presented, there is no way of determining which is the case. If such is the case, it should accompany other types of profile analysis.

(2) The second approach. This approach examines the differences on each information attribute separately. That is, one would compare the mean score for users of information versus the persons affected by the decisions taken on each of the five information attributes separately. In fact, this approach provides the most detailed results, and the classical statistical procedures for comparing means can be applied.

SECTION 5.3 - SUMMARY

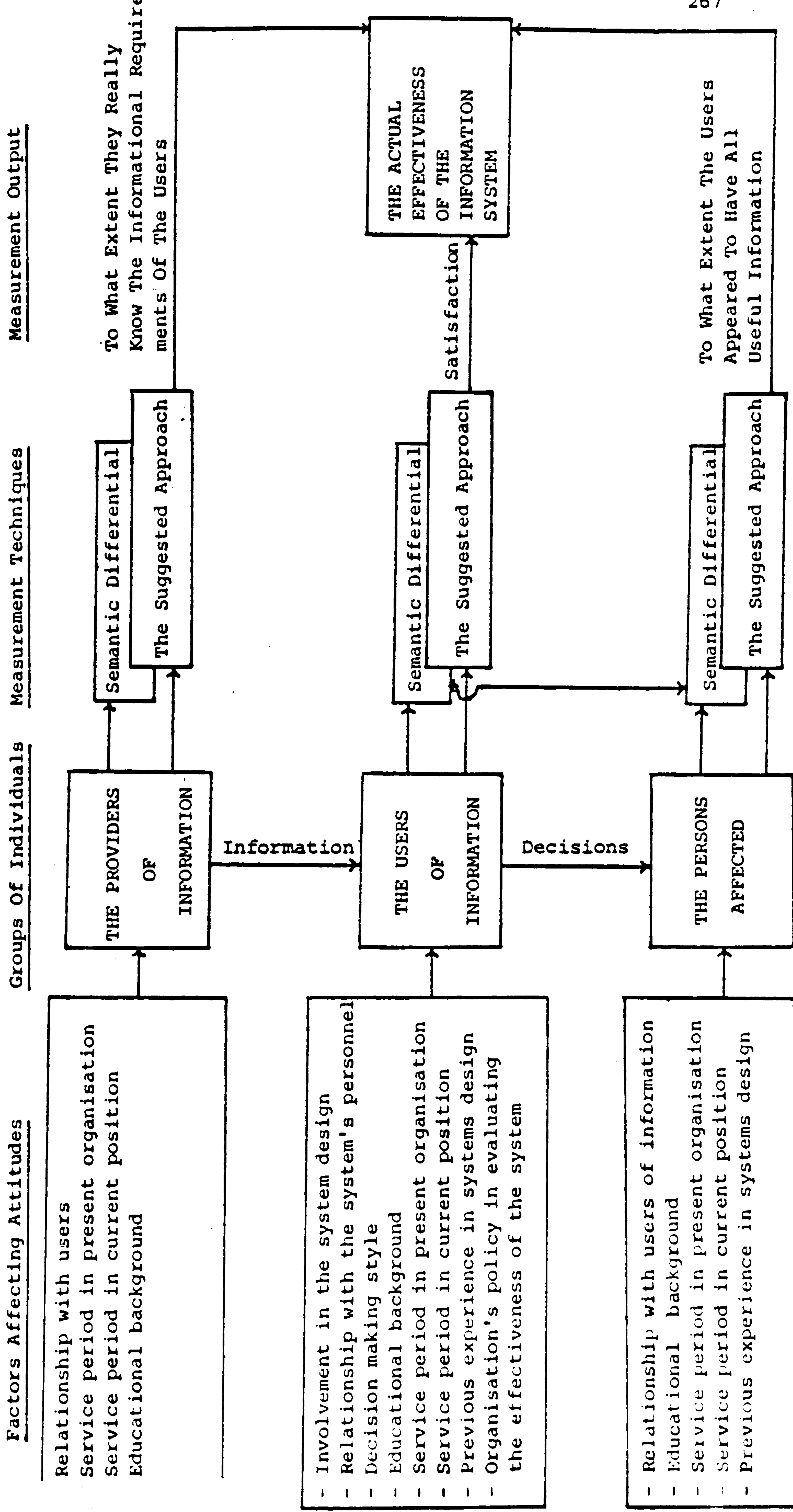
In order to measure the effectiveness of an information system periodically and in quantitative terms so that it can be compared from one period to the next, a systematic and an inexpensive approach is needed. As the major purpose of an information system is to satisfy its users by providing them with their informational needs, user satisfaction is considered a feasible substitute for measuring the effectiveness of the system. However, the suggested approach also takes into consideration the views of both the system's personnel, i.e. the providers of information, and the persons affected by the decisions taken. Do the providers of information know the actual informational requirements of the users? Do the persons affected by the decisions taken agree that the users, i.e. the decision makers, appeared to have all useful information? In order to express the views of the three groups mentioned above, a point scoring model is used.

A modified semantic differential is also used to gather the same data collected by the suggested approach. Using two different techniques to measure the same aspects allows a check on the results produced. Correlation between the results produced by the two measures gives confidence in the conclusions drawn from these results if a cross-check leads to similar results.

A descriptive model of the approach suggested for evaluating the effectiveness of management information systems is illustrated in Figure (5.2). The relationship between the three groups of individuals, the users - the providers - the persons affected, the concepts discussed in the previous chapters and in this one, as well as other factors which it was believed have influence on individual attitudes, all are combined in the suggested descriptive model. The model will be used to guide, to a great extent, the empirical study.

FIGURE (5.2)

A Descriptive Model Of The Approach Suggested For Evaluating The Effectiveness Of An Information System



CHAPTER VI

APPLICATION OF THE SUGGESTED APPROACH TO
NATIONALISED INDUSTRIES : RESEARCH METHODOLOGY

As described in the previous chapter, the suggested approach for evaluating the effectiveness of management information systems was based on the views of three groups of individuals: (1) the users of the information, i.e., the decision-makers (are they satisfied with the information provided?); (2) the persons affected by the decisions taken which are based, among other things, on the information provided (do they agree that the decision-makers appeared to have all useful information?); and (3) the providers of the information (do they really know the actual informational requirements of the decision-makers?). Basically, the approach measures the attitudes of the three groups towards the information required and used by the first group, and prepared and generated by the third one and their systems.

In order to test the practicability and validity of the suggested approach, an empirical research project was conducted. The approach was applied in evaluating the effectiveness of the management accounting systems of nationalised industries in the United Kingdom. The purpose of this empirical study, in addition to testing the suggested approach, was to reveal the effective aspects of the internal accounting reports used in nationalised industries, so that the strengths can be highlighted, and those aspects which may need to be improved.

The research methodology is described in this chapter. This includes discussion of the selection procedures employed to choose

the organisations participating in the research project and the respondents representing these organisations. The chapter also presents the techniques available for data collection and identifies the instrument selected for use in the current study which was a mailed questionnaire. The development of the questionnaires and their pilot test are described. Further, the procedures of checking and processing the data collected are presented in this chapter, and measurement considerations and analysis techniques are discussed. Accordingly, the chapter is divided into eight sections as follows:

- (1) Definition of terms used in the study.
- (2) The sample.
- (3) The research project technique.
- (4) Development of the questionnaires.
- (5) Pretesting the questionnaires.
- (6) Checking and processing the data collected.
- (7) Measurement considerations and the statistical techniques applied.
- (8) Summary.

SECTION 6.1 - DEFINITION OF TERMS USED IN THE STUDY

In order to avoid possible confusion, a number of terms used in this empirical study must be defined and explained. For the purpose of this study the following definitions are applicable:

Organisation: refers to a holding company, a subsidiary company, and a public utility and/or one of its regional units.

Management Accounting System: the internal accounting reports which provide managers with the accounting information needed for use in planning and control. The terms, the internal accounting reports, the accounting reports, and the information provided are used interchangeably in this study.

Manager: a senior executive at middle management level who is involved in tactical planning and management control and who makes operating and administrative decisions as part of his responsibilities. The terms, senior manager, manager, and user of information are used interchangeably in this study.

Assistant Manager: refers to a principal assistant of a senior manager. A principal subordinate, and a person affected by the decisions taken are used in this study to refer to the term assistant manager.

Management Accountant: is defined as an accountant concerned with responsibility for preparation of the internal accounting reports. The terms, management accountant, and provider of information, are used interchangeably in this study.

SECTION 6.2 - THE SAMPLE

6.2.1 The Approach Adopted For Selecting The Organisations

In order to produce results that can indicate the practicability and validity of the suggested approach, and, on the other hand, be generalised to the nationalised industries, it was necessary to select a representative and adequate sample. The researcher tried to fulfil these requirements. However, the nature and the purpose of the empirical study affected the selection of such a sample. As the purpose of the current study was to find the views of groups of individuals towards their management accounting systems, it was not easy to select a representative and adequate sample. Indeed, not every organisation was willing to open its doors to the researcher to evaluate its management accounting system, to provide him with names and job titles of different groups of its employees (i.e., managers, subordinates, and management accountants), and disclose their views towards the system now in operation.

As such problems were raised, it was difficult to restrict the empirical study to organisations of certain nationalised industries, certain size, and/or certain regions. Alternatively, it was decided to consider the organisations which were interested in the research project and were willing to participate, as the sample.

6.2.2 The Procedures Employed To Invite The Organisations

The overall population consisted of public utilities, state holding companies and the other organisations in nationalised industries and their subsidiaries within the United Kingdom. However, the term "nationalised industries", is used in this study to refer to the different types of the organisations mentioned above which were included in the population. In fact, a comprehensive directory of nationalised industries and their subsidiaries has not been found. Hence, in order to obtain the names and addresses of the organisations falling within this category, the following procedures were adopted:

First, "The Times 1000 (1977-78)"¹ was consulted to obtain the names and addresses of the nationalised industries. Nineteen names were found in this directory (Appendix 6.1). The list did not include two industries; British Aerospace and British Shipbuilders which were nationalised in March 1977, accordingly, they were added to the list. Hence, the number of the nationalised industries became twenty one.

Second, the names of the subsidiaries were obtained from the directory "Who Owns Whom, 1977-78".² Since this directory did not

¹ The Times 1000 - 1977/78, (London: Times Books, 1978).

² Who Owns Whom - 1977/78, Volume 1, (London: Publications Division, Dun & Bradstreet Ltd., 1978).

indicate the addresses of the subsidiaries, other directories were consulted.³

The procedures described above resulted in a list of 199 organisations whose names and addresses were available in the directories consulted (Appendix 6.1). The contact with these organisations commenced in September 1978. The managing director or the person of similar position in each organisation, was sent a letter asking for his co-operation in the research project. In order to explain the purpose of the study, the questionnaires concerned were attached to each letter.

The procedures of selecting the organisations participating in this study began with sending a batch of organisations the initial letter (Appendix 6.2) requesting the names and the business postal addresses of the following:

- (1) Head of the management accounting department, or the chief accountant with special responsibility for internal accounting reports, or any other person possessing this responsibility.
- (2) Four senior executives who were involved extensively in tactical planning and management control.
- (3) Four assistants of the same senior executives.
- (4) Four senior accountants concerned with responsibility for preparation of the internal accounting reports.

³ See:

Kompass. Company Information, (W. Sussex: Kompass Publishers Ltd., 1978);

Kelly's Manufacturers and Merchants Directory, (Surrey: Kelly's Directories Ltd., 1978);

Key British Enterprises - 1977/1978, Volume 1, (London: Publications Division, Dun & Bradstreet Ltd., 1978);

Samson Management Information Manual, (London: Croner Publications Ltd., 1978).

The rate of positive response from this batch was somewhat disappointing. Perhaps the number requested of the participants, which had been relatively large, was one of the causes of such a result. However, 29% of the organisations participating in this study were among the organisations of this batch.

In order to increase the rate of positive responses, the number requested was changed, the names of two senior executives, two assistant managers, and two senior accountants were requested, instead of four names of each group, in addition to the name of the head of the management accounting department. The altered letter (Appendix 6.3) was sent to the rest of the organisations. Three weeks after the initial letter was mailed, a reminder letter (Appendix 6.4) was sent to each of those not responding. No additional attempts were made to obtain replies. The non-respondent organisations were considered to have declined participation in the study.

Ninety-seven organisations (48.7%) sent their replies (positive and negative). However, only thirty-one organisations were willing to co-operate and participate in the research project. Taking into consideration the nationalised industries only (subsidiaries were not included) five organisations out of nineteen⁴ agreed to take part in the research project, representing 26.3% of the total number of the nationalised industries found in "The Times 1000 (1977-78)". However, the percentage of all the organisations participating in the study of the overall population (the nationalised industries and the subsidia-

⁴ The total number of the nationalised industries (subsidiaries were not included) was 21; two industries indicated that their management accounting systems were new and still at the experimental stage and accordingly they were excluded from the list.

ries) is 15.8%.⁵ The following were deemed to be major causes of such a low rate:

- (1) The purpose of the research project, as viewed by some of the organisations contacted, affected the rate of the positive responses. As the suggested approach was based on the views of individuals towards their management accounting systems, some organisations did not agree to allow the individuals to disclose their views towards their systems and/or to let the researcher reveal the aspects of the system's performance.
- (2) Some organisations had policies against the release of the names of their individuals.
- (3) Other organisations had policies against responding to all surveys.

As the nature and purposes of the research project and the other factors mentioned above affected the rate of positive responses, it was decided, as previously stated, to consider all the organisations which had shown an interest in the research project as constituting the sample. No restrictions were made in the acceptance of these organisations, neither the industrial classification nor the size.

6.2.3 Description Of The Organisations Participating In The Research Project

The industrial classification⁶ of the organisations participating is shown in Table (6.1). As can be seen from the figures in

⁵ Three organisations indicated that their management accounting systems were new and still at the experimental stage. Accordingly these organisations were excluded from the list and the population became 196 organisations.

⁶ Standard Industrial Classification (Revised 1968), Source: Central Statistical Office, Annual Abstract of Statistics 1977, (London: Her Majesty's Stationery Office, 1977), pp.481-484.

Table (6.1), the organisations participating came from quite a variety of nationalised industries. Indeed, a relatively large number of the organisations participating (48%) were in the field of transport and communication. However, each industry, with the exception of transport and communication, was represented in the sample by a relatively equal number of organisations.

TABLE (6.1)

The Industrial Classification Of The Participating Organisations

Order	Industry	Organisations	
		n	%
II	Mining and Quarrying	2	6.5
IV	Coal and Petroleum Products	1	3.2
VIII	Instrument Engineering	2	6.5
X	Shipbuilding and Marine Engineering	2	6.5
XI	Vehicles	2	6.5
XX	Construction	1	3.2
XXI	Gas, Electricity and Water	4	12.9
XXII	Transport and Communication	15	48.4
XXVI	Miscellaneous Services	2	6.5
		31	100*

* Total is not 100 due to rounding.

As the process of the information flow and communication within a firm is affected by the number of the various organisational levels; and the number of organisational levels, in turn, determined by the number of employees, it seemed appropriate to use such number as the criterion of size to classify the participating organisations.⁷

⁷ The number of employees used in this classification was extracted from the annual reports of the participating organisations, and from the directory "Kompas. Company Information" mentioned in the footnote on page 272. In a case where the annual reports were not available and/or this figure was not found in the directory, the organisations were contacted to provide this number. The figure used was the number of employees obtained during the period of the survey (September 1978-March 1979). However, it should be made clear that the classification of the organisations into large, medium and small was somewhat arbitrary.

TABLE (6.2)

Size of the Participating Organisations

Size of Organisation (Number of Employees)	% of Organisations (N = 31)
Large (10,000 and more)	41.9
Medium (5,000 - less than 10,000)	25.8
Small (450 - less than 5,000)	32.3
	100

According to Table (6.2), no organisations with total employees of less than 450 were included in the sample. About one-third of the sample were classified as small, one-quarter as medium, and 42% as large. As shown in this table, large organisations represented a considerable proportion of the total sample.

6.2.4 Number and Groups of Respondents Representing The Participating Organisations

As previously stated, each organisation was asked to provide the names and the postal business addresses of the head of the management accounting department, or the person in charge of this responsibility; four (two) senior managers; four (two) assistants of the same managers; and four (two) senior management accountants. The thirty-one participating organisations provided the names and addresses of 241 individuals. Eighty-three were senior managers, 63 assistant managers, 66 accountants, and 29 heads of the management accounting departments or chief accountants. A total of 207 respondents out of the 241 returned the questionnaires circulated, with a response rate of 85.9%. However, only a total of 198 respondents sent usable questionnaires, with a response rate of 82.2% of

the 241 respondents.⁸ The 198 respondents were as follows: 67 senior managers, 51 assistant managers, 54 senior management accountants, and 26 heads of the management accounting departments or chief accountants. Table (6.3) shows the groups of the respondents by the standard industrial classification.

TABLE (6.3)

Respondents' Groups By Standard Industrial Classification

	Respon-		Groups*							
	dents		MGR		ASM		ACC		HMAD	
	n	%	n	%	n	%	n	%	n	%
Mining & Quarrying	12	6.1	5	7.5	2	3.9	3	5.6	2	7.7
Coal and Petroleum Products	8	4.0	1	1.5	2	3.9	4	7.4	1	3.8
Instrument Engineering	10	5.1	4	6.0	2	3.9	2	3.7	2	7.7
Shipbuilding and Marine Engineering	10	5.1	4	6.0	4	7.8	1	1.9	1	3.8
Vehicles	18	9.1	9	13.4	3	5.9	5	9.3	1	3.8
Construction	4	2.0	1	1.5	1	2.0	1	1.9	1	3.8
Gas, Electricity and Water	34	17.2	11	16.4	7	13.7	12	22.2	4	15.4
Transport and Communications	80	40.4	25	37.3	22	43.1	21	38.9	12	46.2
Miscellaneous Services	22	11.1	7	10.4	8	15.7	5	9.3	2	7.7
	198	100 [†]	67	100	51	100 [†]	54	100 [†]	26	100 [†]

* MGR = Senior Managers, ASM = Assistant Managers, ACC = Management Accountants, HMAD = Heads of Management Accounting Departments.

[†] Total is not 100% due to rounding.

⁸ The response rate will be discussed in detail in Chapter VII, pp. 324-326

As can be seen from Table (6.3), the industries of "transport and communication" were over-represented (37.3%) in the sample of senior managers, almost four out of every 10 senior managers came from these industries. About one-third (29.8%) of the managers' sample represented managers of two industries; "gas, electricity and water" (16.4%), and "vehicles" (13.4%). Other industries were represented in the sample by small proportions, ranging from 1.5% to 10.4%. The table shows also that the assistant managers' sample was dominated by respondents representing the industries of "transport and communication" (43.1%). Further, a salient proportion (38.9%) of management accountants participating in the research project came from the same industries, whereas the other considerable proportion (22.2%) came from "gas, electricity and water" industries. Indeed, the two groups of industries mentioned above, i.e. "transport and telecommunication", and "gas, electricity and water" were over represented, 46.2% and 15.4% respectively, in the sample of heads of the management accounting departments. On the whole the industries of "transport and telecommunication" were over-represented (40.4%) in the respondents' sample, and, to a less extent "gas, electricity and water" (17.2%). Other industries were represented by proportions ranging from 2% to 11%.

Respondents can be reclassified according to the size of organisations participating in this study. Table (6.4) presents respondents and their groups by three sizes of organisation; large (10,000 +), medium (5,000, but less than 10,000) and small (450, but less than 5,000).

TABLE (6.4)

Respondents' Groups By Size of Organisation

Size	Respondents		Groups*		
	% of Total (N = 198)	MGR (N = 67)	ASM (N = 51)	ACC (N = 54)	HMAD (N = 26)
	%	%	%	%	%
Large	45.5	47.8	35.3	46.3	57.9
Medium	28.3	28.4	23.5	35.2	23.1
Small	26.3	23.9	41.2	18.5	19.2
	100 [†]	100 [†]	100	100	100

* MGR = Senior Managers, ASM = Assistant Managers,
ACC = Management Accountants,
HMAD = Heads of Management Accounting Departments

† Total is not 100% due to rounding.

As indicated in Table (6.4), large organisations, on the whole, were over-represented in the respondents' sample (45.5%), whereas medium and small were less; 28.3% and 26.3% respectively. Within each group of respondents, this ranking can be seen with the exception of the assistant managers' groups. The proportion of senior managers, accountants, and heads of management accounting departments who came from large organisations was higher than the proportion of the same groups of respondents representing medium organisations which, in turn, were higher than the proportion of respondents from small organisations. Indeed, these proportions are in harmony with the nature of this study. Large and medium organisations should be more represented in the sample than small ones, since formal information systems are relatively more needed in the former organisations than the latter.

6.2.5 Observations and Limitations

The purpose of the empirical study, of course, was mainly to represent the research findings of the sample. In addition, some statistical inferences could also be made of the population from the sample. However, the nature and purpose of the research project have imposed some restrictions. Accordingly, research findings should be interpreted in the light of the following observations and limitations:

- (1) The population of this study was confined to the nationalised industries and their subsidiaries.
- (2) The nature and the purpose of this study restricted the willingness of the organisations in the population to co-operate in the research project.
- (3) The sample used may not be described as fully representative, since some nationalised industries were not represented, and random selection procedures had not been employed, because the whole population had been invited to participate in the research project.
- (4) The sample organisations were not restricted by a certain industry, certain region, and/or certain size. Indeed, the sample organisations represented a variety of industries and sizes.
- (5) Not every participating organisation was represented in the sample of each group (i.e. senior managers, assistant managers, accountants, and heads of management accounting departments). This is attributed to two reasons; first, all individuals of a certain group did not return the questionnaires concerned and/or the questionnaires returned were not usable. Second, some organisations did not provide the names of individuals of the four groups, or provided the names under two titles; users of information and

providers of information. Indeed, as the research project basically aims to measure users' satisfaction with the information provided, this situation was accepted.

(6) Large organisations (10,000 employees and more) were over-represented in the respondents' sample. Also, the proportion of respondents from the industries of "transport and communication", and "gas, electricity and water" was relatively larger than the proportion of respondents representing the other industries.

(7) Respondents' views obtained were limited only to the internal accounting reports and their effectiveness. No other information systems had been evaluated.

(8) The conclusions and findings of this study would particularly represent a test of the approach suggested for evaluating the effectiveness of information systems, and the evaluation of the effectiveness of management accounting systems in those organisations included in the sample. Indeed, it may not be possible to safely generalise the results to the total population, however, the sample can be used to test the research hypothesis, even though the generality of the results is limited.

SECTION 6.3- THE RESEARCH PROJECT TECHNIQUE

Two techniques may be used to obtain data in the research project. These include: (1) the interview technique; and (2) the mailed questionnaire technique. The major benefit of employing the interview technique is flexibility. Interviewing allows the researcher to expand upon the questions asked where the respondent may be puzzled by a particular point. In other words, the researcher is able to tailor-make the discussion to fit the needs and understanding of the respondent. However, the interview technique

is not without disadvantages. Generally, the following problems are inherent in this technique: (1) respondents' answers can be distorted by the personal characteristics of the interviewer, or by the way he conducts the interview; (2) interviews usually take much more time to complete than as predetermined, this can create burden on the respondent's time; (3) an interview is relatively less economical than other techniques, especially when the respondents are spread over diverse and wide geographical locations.⁹

An alternative to the interview technique for collecting data is the mailed questionnaire. Some of the major benefits of using the mailed questionnaire technique include: (1) the ability to obtain the participation of individuals from diverse and widespread geographical locations at a relatively low cost; (2) the avoidance of differential treatment of the participants by the researcher. In other words, when mailed questionnaires are used, it is assumed that each respondent has answered exactly the same questions. Indeed, there are a number of problems inherent in using the mailed questionnaire technique, some of which include: (1) mailed questionnaires have been heavily criticized in the literature, primarily for their low response rate; (2) those responding to the questionnaire may be different from those not responding; (3) all respondents may not interpret the questions in the way intended by the researcher. However, these disadvantages can be overcome, or

⁹ See for example:

Hoinville, Gerald, Roger Jowell and Associates, Survey Research Practice, (London: Heinemann Educational Books Ltd., First Published, 1978), p.100;

Black, James A., and Dean J. Champion, Methods and Issues in Social Research, (London: John Wiley & Sons, Inc., 1976), pp. 371-374

at least their effects are minimized, as will be discussed later in this chapter and in the following one.

Indeed, the conditions under which a research project is conducted dictate the technique to be used. This study was conducted under the following conditions:

- (1) The purpose of the research project was to reveal the views of senior executives, their assistants, and management accountants on the effectiveness of their management accounting systems. In such case, not all organisations are willing to permit a researcher to have access to their employees, especially if the technique used will be interviews.
- (2) As the suggested approach for evaluating the system's effectiveness was based on the views of three groups of individuals, each organisation in the population was asked to provide names of a relatively large number of participants (ranging from seven to thirteen names).
- (3) The individuals who were invited to participate in the research project were seniors, and as it was known their time would be valuable, the time required to obtain their views was to be as short as possible.
- (4) As the population included the nationalised industries and their subsidiaries, there was a possibility that the individuals who were willing to participate in the research project would be scattered in diverse geographical locations. Indeed this was the case, as can be seen from Table (6.5).
- (5) The research project was conducted by a single researcher and the study had to be carried out at a reasonable cost.

TABLE (6.5)

Locations Of The Respondents

	n	%	n	%
<u>England and Wales</u>				
Bedford	1	0.5		
Birmingham	1	0.5		
Crewe	1	0.5		
Durham	1	0.5		
Enfield	1	0.5		
Hounslow	1	0.5		
Liversedge	1	0.5		
Oxford	1	0.5		
Rotherham	1	0.5		
Sheffield	1	0.5		
Crawley	2	1.0		
Darlington	2	1.0		
Mansfield	2	1.0		
Haleson	3	1.5		
Hayes	4	2.0		
Colchester	5	2.5		
Hull	5	2.5		
Manchester	5	2.5		
Brierley Hill	6	3.0		
Gainsborough	6	3.0		
Theale	6	3.0		
Harrow	7	3.5		
Nottingham	8	4.0		
Cardiff	9	4.5		
Derby	9	4.5		
Ipswich	9	4.5		
Bristol	12	6.1		
Chester	17	8.6		
London	<u>33</u>	<u>16.7</u>	160	80.4
<u>Scotland</u>				
Aberdeen	2	1.0		
Glasgow	3	1.5		
Fife	4	2.0		
Dundee	8	4.0		
Edinburgh	<u>21</u>	<u>10.6</u>	38	19.1
			<u>198</u>	<u>100</u>

As previously stated, two techniques were available for use in the data gathering for this study, i.e., interviews and mailed questionnaires. Although the interview technique was desirable for its major advantages, the mailed questionnaire appeared to be the appropriate technique under the conditions present.

SECTION 6.4 - DEVELOPMENT OF THE QUESTIONNAIRES

6.4.1 The Questionnaires Used

Four questionnaires were designed to collect data needed for this study. They were as follows:

- (1) Questionnaire for head of management accounting department or the person with special responsibility for internal accounting reports (Appendix 6.5). The purpose of this questionnaire was mainly to obtain information regarding the management accounting systems currently in operation in the participating organisations
- (2) Manager Questionnaire (Appendix 6.6). This questionnaire was addressed to senior managers. It was specifically designed to measure managers' satisfaction, as users of information, with their management accounting systems.
- (3) Assistant Manager Questionnaire (Appendix 6.7). This questionnaire was circulated among the assistants of the senior managers. As the assistant managers responsible for carrying out the decisions taken by the senior managers and affected by such decisions, the questionnaire was basically designed to obtain their views on the accounting information provided to their superiors.
- (4) Management Accountant Questionnaire (Appendix 6.8). This questionnaire was addressed to senior management accountants or

accountants concerned with responsibility for preparation of the internal accounting reports. The main purpose of the management accountant questionnaire was to reveal the accountants' views, as providers of information, on the information required by senior managers and to find out to what extent management accountants understand and assist in determining the informational requirements of managers.

The four questionnaires were connected to each other by some identical questions. This, however, will be discussed later in this chapter.

As the nationalised industries vary in their activities, which affect type and content of the internal accounting reports, it was decided to focus on the effectiveness of management accounting systems as a whole, rather than to concentrate on a particular set of reports generated by these systems. This consideration was taken into account when designing the four questionnaires mentioned above. Indeed, this generality gave the questionnaires the validity for application to different organisations involved in various activities.

The questionnaires used in this study were designed to be self explanatory and easily read. This was essential, since the questionnaires were to be mailed and completed by respondents without assistance by the researcher. All necessary definitions and instructions were included in the first sheet of each questionnaire. Due to the exploratory nature of the study, the questionnaires were produced in seven-nine pages on four-five sheets.

6.4.2 Types of Questions

Four types of questions were used in these questionnaires:

(1) open-ended questions; (2) closed questions; (3) a combination of closed and open-ended questions; (4) closed questions probing into the reason for the answer ticked (if yes; Why? - if no; Why not?). Mainly, the questions used were a combination of closed and open-ended types. With the questions which probed into reasons for ticking a particular answer, the type of a combination of closed and open-ended questions was used. Indeed, the questionnaires included only one question which was open-ended, that being the question asking for comments.

Several of the questions on the questionnaires used in this study were based on a seven-point scale. In all but two of these questions the scales used were in continuum pattern, that is low .. medium .. high. Obviously the scales did not include a point of "neutrality" or "undecided" and a positive response was placed instead. This means that respondents were forced to indicate their views on the matter examined. The criticism of such construction of the scales is that "if a choice is forced when, in fact, the person really has no opinion, it is easy to see how the researcher can end up with data that are questionable in terms of their theoretical and substantive import".¹⁰

As the research project was concerned with the effectiveness of the management accounting systems of the participating organisations, it was believed that using a seven-point scale which did not include a point of neutrality or undecided, did not lead to

¹⁰ Black, James A. and Dean J. Champion, op. cit., p.192

a respondent being forced to express an opinion when he really had no opinion. It was not believed that respondents, as providers of information, users of it, and persons affected by the decisions taken, had no clear opinion concerning their systems. However, a point of neutrality or undecided was included in some scales when the situation implied a possibility that a respondent did not have any views on the issue examined or was indifferent in his opinions.

In fact, "no hard and fast rules exist for deciding whether to include an 'undecided' category or whether there should be a forced-choice alternative. The researcher makes the final decision in the construction of his questionnaire based on the nature of the intended audience of respondents, their educational level, their familiarity with the information requested in the questionnaire, and a number of other equally relevant factors".¹¹

The questions included in the questionnaires used in this study can be divided also into two groups: (1) identical questions; and (2) not identical questions. Although each questionnaire had its own purpose and content, there was some conjunction among these questionnaires. For comparison purposes, some questions included in the questionnaires were designed to be identical, as will be discussed later in this chapter. The semantic differential question was the most important one among the other identical questions.¹² Indeed, considerable effort was expended in adapting the semantic differential technique to the purpose of this study and to formulate the question concerned. This is discussed on the following pages.

¹¹ Ibid., p.192

¹² See the questionnaires reproduced in Appendices (6.6), (6.7), (6.8): questions number 17, 19 and 10, respectively.

6.4.3 Development Of The Question Based On The Semantic Differential¹³

The basic semantic differential is a "highly generalisable technique of measurement". Its validity as a measurement instrument in some specific domains such as management information systems is open to some question. In fact, two major problems arose in applying this technique in the measurement of the executives' and their subordinates' affect (attitude) towards the information provided by management accounting systems, and management accountants' attitude towards the information required by the executives. These problems may be summarized as follows:

- (1) The basic evaluative factor does not express the different dimensions of "useful information" as a concept. Obviously, since this factor is general, it does not represent the basic dimensions of the information provided, i.e. its relevance, reliability, sufficiency, understandability, and timeliness.
- (2) The classic list of the fifty pairs of bipolar adjectives which have been identified in the original semantic differential¹⁴ lacks flexibility and appropriateness to this study. For example, this list does not include most of intuitive useful adjectives such as: timely, current, simple, reliable, adequate, which, among other things, express the information dimensions (attributes).

Accordingly, it may be possible to say that the construction of a modified semantic differential for use in this study faced two related problems:

¹³ The theoretical background of the semantic differential technique was discussed in Chapter V, pp.251-265

¹⁴ Osgood, Charles E., George J. Suci, and Percy H. Tannenbaum, The Measurement of Meaning, (Urbana, Illinois: University of Illinois Press, 1957), p.37

(1) Determining the evaluative factors (dimensions) which are relevant to management information systems domain.

(2) Identifying scales (pairs of bipolar adjectives) which express precisely these factors (dimensions).

6.4.3.1 Determining the evaluative factors

As previously stated, the basic evaluative factor is not appropriate to apply in this study. Accordingly, five different factors have been extracted from the accounting literature,¹⁵ which were assumed to be relevant to management information domain. The selection of these factors based on the assumption that a management information system, to be effective, should provide useful information; information provided, in turn, if it is to be useful, should contain the following five attributes:

1. **Relevance:** information is relevant if it is associated with the action it is designed to facilitate or the result desired to be produced.
2. **Reliability:** for managers to have confidence in information it must be reliable.
3. **Sufficiency:** for information to be sufficient, an adequate quantity of it must be available, relevant to the purpose.
4. **Understandability:** the manager is unable to comprehend the message or messages being communicated, if information is not understandable.
5. **Timeliness:** for information to be useful, it must be available as and when required.

¹⁵ See Chapter II, pp.52-86

Indeed, the five evaluative factors (attributes) previously mentioned were somewhat arbitrarily extracted. However, their roots were in the accounting literature.

6.4.3.2 Identifying The Scales

The second problem which had faced the construction of the modified semantic differential was to identify pairs of bipolar adjectives which expressed precisely the different dimensions of the semantic space. The scales which would be selected might be completely new. That is, they would not be among the scales which have been identified in the original semantic differential. This problem is discussed, in detail, in the following pages.

6.4.3.3 The Procedures Employed To Select The Scales Used

The primary question in constructing a modified semantic differential was what scales should be selected. Three basic criteria enter into scales selection; "relevance", "factorial composition", and "polarity".¹⁶

(1) Relevance. The scale selected must be relevant to the concept being judged. Subjects find it easier to use scales which relate meaningfully to the concepts and which make distinctions that are familiar. For example, in judging a concept such as "the information provided by an information system" a scale like fair-unfair may be comparatively irrelevant, while another like adequate-inadequate may be highly relevant. Since irrelevant concept-scale pairings usually yield neutral judgements, their inclusion reduces the amount of information gained with a given number of scales. Relevant scales provide more sensitive measurements.

¹⁶ Osgood, C.E., G.J. Suci, and P.H. Tannenbaum, op. cit., pp.78-79, p.187, p.327

(2) Factorial Composition. Each factor usually is represented by more than a single scale. These scales should be closely related and they must represent maximally such factor and minimally others. In the sense that the scales of each factor must be highly correlated with each other and have insignificant correlation with scales representing other factors. Since factors were defined in this study, intuition with a limited investigation among individuals involved in the preparation and use of management information, can be used as a guideline in selecting factorially pure scales.

(3) Polarity. The polar scales which are selected should be true psychological opposites, i.e., fall at equal distances from the origin of the semantic space and in opposite directions along a single straight line passing through the origin. In practice, however, it merely assumes that the scales defined by familiar and common opposites have these properties.

The above mentioned criteria did not solve the whole problem of selection of scales. Another problem arose: how many scales should be included in the final instrument? In fact, the original semantic differential has not determined a standard number of scales for each factor. On the other hand, there is disagreement on this point among the users of the semantic differential.

Ideally it should use one specific scale to represent each of the factors of the semantic space, this scale being both perfectly aligned with its factor and perfectly reliable. In practice, however, since specific scales are neither perfectly aligned with factors, nor perfectly reliable, it is desirable to use a small sample of closely related scales to represent each factor, deriving

a score from their average, which is assumed to be both more representative and more reliable than scores on individual scales.¹⁷ In brief, one scale may not be sufficient to represent a factor.

In various applications of the semantic differential, the number of scales used has varied from two to six scales. However, this does not mean that there is no exception. In some applications the scales used under a factor were more than six.¹⁸ In fact, the redundancy of scales which represent each factor may lead to unfavourable impact on factorial purity. "More than four scales can be - and often are - used to represent each factor, but redundancy and factorial purity decreases as the number of scales increases".¹⁹

¹⁷ Ibid., p.78; see also Nunnally, Jum C., Jr., Introduction to Psychological Measurement, (London: McGraw-Hill Book Company, 1970), p.445

¹⁸ See, for example:

Haried, Andrew A., "Measurement of Meaning in Financial Reports", Journal of Accounting Research, (Spring, 1973), p.119: he used from 2-3 scales;

Komorita, S.S., and Alan R. Bass, "Attitude Differentiation and Evaluative Scales of the Semantic Differential", Journal of Personality and Social Psychology, Vol.6, No.2, (1967), p.242; they used from 2-3 scales;

Clevenger Jr., Theodore, Gilbert A. Lazier, and Margaret Leitner Clark, "Measurement of Corporate Images By The Semantic Differential", Journal of Marketing Research, (February, 1965), p.80: they pointed out that the number of scales is usually from 2-6;

Oliver, Bruce L., "The Semantic Differential: A Device for Measuring The Interprofessional Communication of Selected Accounting Concepts", Journal of Accounting Research, Vol. 12, No.2, (Autumn, 1974), p.302: he used from 3-4 scales;

Flamholtz, Eric and Ellen Cook, "Connotative Meaning And Its Role In Accounting Change: A Field Study", Accounting, Organisations and Society, Vol.3, No.2, (1978), p.123: they used from 4-9 scales.

¹⁹ Osgood, Charles E., William H. May and Murray S. Miron, Cross-Cultural Universals of Affective Meaning, (Urbana, Illinois: University of Illinois Press, 1975), p.171

The scales used in this study were selected in the light of the above mentioned criteria. Two steps were taken to select these scales:

- (1) Preliminary selection of appropriate adjectives.
- (2) Final selection of the adjectives and their opposites.

The first step. To select relevant scales, the researcher had compiled a list of adjectives which were assumed to represent the information attributes (factors). This list was based on some adjectives of the classic list of the basic semantic differential such as, valuable, clear, active, and fair. To complete the adjective list, Roget's Thesaurus and Webster's Dictionary of Synonyms were consulted.²⁰ This procedure resulted in a list of seventy-six adjectives which are presented in Table (6.6) on page 295.

This list was circulated among different groups at the University of Stirling, prior to the design of the four main questionnaires. The forty-two respondents who participated in this preliminary step included the following groups: four of the staff of the Department of Accountancy and Business Law, twenty post-graduate students in the Departments of Accountancy, Management Science, and Economics, seven undergraduate students (honours degree in Accountancy and Economics), eleven other participants representing different specialisations (post-graduate students in

²⁰ a. Roget, Peter, Thesaurus of English Words and Phrases, (London: J.M. Dent & Sons Ltd., 1971)

b. Webster's New Dictionary of Synonyms, (Springfield, Massachusetts: G. & C. Merriam Company, Publishers, 1968).

TABLE (6.6)

A List Of Suggested Adjectives

Clear	Helpful	Precise	Appropriate
Explicit	Expressive	Opportune	Reliable
True	Correct	Immediate	Complete
Unbiased	Absorbing	Well-timed	Familiar
Relevant	Specific	Accurate	Applicable
Pertinent	Effective	Important	Pleasant
Simple	Favourable	Material	Fit
Useful	Confirmed	Up-to-date	Objective
Detailed	Recent	Essential	Competent
Required	Valuable	Quick	Fair
Exhaustive	Significant	Enough	Trustworthy
Desirable	Systematic	Prompt	Abundant
Obvious	Easy	Adequate	Orderly
Meaningful	Presently	Readable	Shortly
Sufficient	Factual	Safe	Suggestive
Timely	Necessary	Logical	Valid
Positive	Impartial	Dependable	Informative
Comprehensive	Active	Communicative	Organised
Interesting	Certain	Current	Plentiful

psychology and English departments, librarian, secretaries).²¹

The usable responses were only thirty-six out of forty-two.

The participants were asked to classify the seventy-six adjectives under the five information attributes, i.e. relevance, reliability, sufficiency, understandability, and timeliness. The purpose of this list was to indicate which adjectives had been more relevant and related to each information attribute. The results of this investigation are shown in Table (6.7).

²¹ It is not unusual to use students in accounting research as surrogates for real respondents, particularly in testing the research in a pilot run. However, the students and the non-businessmen were only used in this study for a very limited purpose, i.e. eliciting the adjectives to represent each information attribute. Obviously, the purpose of this part of the research project was a semantic one. Further, the findings of this part were retested and refined by conducting another limited study on a sample of real users and providers of the information (managers and management accountants) as will be explained later in this section.

For examples and more detail regarding this issue, see:

Collins, Frank, "The Interaction of Budget Characteristics and Personality Variables With Budgetary Response Attitudes", The Accounting Review, (April, 1978), p.327 (Footnote);

Tweedie, D.P., "The Psychological Background to Financial Reporting", The Accountant's Magazine, (December, 1976), p.472;

Abdel-Khalik, A Rashad, "On the Efficiency of Subject Surrogation in Accounting Research", The Accounting Review, (October, 1974), pp.743-750;

Cunningham, William H., W. Thomas Anderson, Jr., and John H. Murphy, "Are Students Real People?", Journal of Business, (July, 1974), pp.399-409;

Copeland, Ronald M., Arthur J. Francia and Robert H. Strawser, "Students as Subjects in Behavioural Business Research", The Accounting Review, (April, 1973), pp.365-372

Dickhaut, John W., John L. Livingstone and David J.H. Watson, "On the Use of Surrogates in Behavioural Experimentation", in: American Accounting Association, Committee On Research Methodology in Accounting, "The Report of The Committee On Research Methodology in Accounting", The Accounting Review, (Supplement to Vol. XLVII, 1972), pp.455-471

TABLE (6.7)

Investigation of Adjectives - Results*

Adjectives	Column 1	Column 2	Column 3	% of representation of the specific attribute**
	Frequencies under the specific attribute	Frequencies under other attributes	Unrelated	
A. Relevance				
(1) Relevant	36	8	-	82
(2) Necessary	33	6	3	79
(3) Required	31	5	3	79
(4) Appropriate	31	9	1	76
(5) Pertinent	33	8	3	75
(6) Essential	30	8	4	71
B. Reliability				
(1) Trustworthy	35	1	-	97
(2) Reliable	36	4	-	90
(3) Certain	33	3	1	89
(4) Unbiased	32	2	2	89
(5) True	34	3	2	87
(6) Correct	34	5	1	85
(7) Confirmed	30	-	6	83
(8) Valid	31	7	2	78
(9) Accurate	34	10	-	77
(10) Impartial	27	-	9	75
C. Sufficiency				
(1) Sufficient	35	1	-	97
(2) Enough	35	1	-	97
(3) Adequate	34	2	1	94
(4) Complete	33	4	1	87
(5) Plentiful	32	4	1	86
(6) Abundant	30	1	5	83
D. Understandability				
(1) Simple	36	-	-	100
(2) Readable	36	-	-	100
(3) Clear	35	2	-	95
(4) Communicative	33	3	2	85
(5) Orderly	30	2	4	83
(6) Easy	32	3	4	82
(7) Organised	31	5	4	78
(8) Familiar	28	2	7	76
(9) Explicit	29	6	5	73
E. Timeliness				
(1) Timely	36	-	-	100
(2) Well-timed	36	-	-	100
(3) Quick	35	-	1	97
(4) Current	34	2	-	94
(5) Immediate	34	-	2	94
(6) Opportune	33	-	3	92
(7) Recent	33	3	1	89
(8) Up-to-date	34	4	-	89
(9) Prompt	32	-	4	89

* This table includes the adjectives which their percentage of representation of a specific attribute is over 70%

** It is the % column 1 of the sum of columns 1 + 2 + 3

A preliminary set of adjectives was selected from the previous table. Selection of these adjectives was based on the following:

1. the adjective should represent precisely the attribute
2. the adjective should maximally represent the attribute and minimally others
3. more than one adjective was selected to represent the attribute. Each adjective selected expressed different aspects of the attribute.

Accordingly, the preliminary set of adjectives was as follows:

A. <u>Relevance</u>	Relevant, Required, Essential
B. <u>Reliability</u>	Accurate, Unbiased, Confirmed
C. <u>Sufficiency</u>	Enough, Complete
D. <u>Understandability</u>	Simple, Familiar, Orderly
E. <u>Timeliness</u>	Well-timed, Current

The second step. As previously stated, two steps were taken to select the scales of the modified semantic differential. The purpose of the first step was to select a preliminary set of adjectives. In the second step, very limited investigation was done among some individuals involved in the preparation and use of management information, to consult them and to guide the selection of the final scales. To accomplish this, two different questionnaires were designed.

The main purposes of the first questionnaire (Appendix 6.9) were as follows:

1. to investigate whether the preliminary set of adjectives selected, represented the information attributes (factors). This purpose is consistent with the criterion of relevance.

2. to identify the familiar and common opposites of these adjectives. This purpose is consistent with the polarity criterion.

The participants were asked to discard any adjectives which did not represent an information attribute and to add other different adjectives if they thought some needed to be added. They were also asked to give the familiar and common opposites of the adjectives.²²

The purposes of the second questionnaire (Appendix 6.10) were as follows:

1. to investigate whether the adjectives representing an information attribute (factor) were relevant to such attribute and to what extent they did not represent others (the relevance and factorial composition criteria);
2. to identify the familiar and common opposites of these adjectives (the polarity criterion).

The respondents were provided with five tables. Each table was titled by an information attribute and included the thirteen adjectives which had been selected in the first step. The respondents were asked to indicate which adjectives were more related to each information attribute and to give the familiar and common opposites of these adjectives.

²² This procedure, which was used in this study to elicit the opposites of adjectives, had been applied before by Osgood, et al., in one of their studies. They had submitted the adjectives to ten informants. The informants were instructed to respond with the best opposite word (or words) for each adjective, see: Osgood, C.E., W.H. May, and M.S. Miron, Cross-Cultural Universals of Affective Meaning, op. cit., p.101

The two questionnaires have been circulated among a very limited number of individuals involved in preparation and use of management information. They have been selected arbitrarily from the list of members of the Institute of Cost and Management Accountants, 1977-1978.²³ Indeed, it was not the purpose of the two questionnaires to conduct a comprehensive study on the scales which represented the information attributes (factors), but rather, to ask for views of some individuals involved in the management information domain. For this reason, the providers of information have included, for example: head of management accounting department, computer systems manager, cost and budgets officer, and financial director. On the other hand, the users of information have included: manufacturing director, sales director, personnel and communications director, and director of development and projects and planning. The two questionnaires have been circulated among 60 individuals. Only 26 respondents returned the questionnaires (a response rate of 43.3%), the usable responses were 24 (40% of the sample).

The selection of the final scales, however, has been based on the comments of respondents, the judgement of the researcher and the findings of the two questionnaires. Indeed, the results obtained did not restrict to some extent, the researcher in the final selection of the scales, since the purpose of these questionnaires were only to guide the selection process. On the other hand, the questionnaires had been circulated among a very limited number of individuals to consult them rather than to get generalised results.

²³ The Institute of Cost and Management Accountants - The United Kingdom, List of Members 1977/1978.

The results of the questionnaires are presented according to the criteria of scales selection: (1) relevance; (2) factorial composition; (3) polarity.

(1) Criterion of Relevance

A. Relevance

Adjectives	Agree (N = 24)	
	F*	%
1. Essential	17	71
2. Relevant	18	75
3. Required	16	67

* Frequencies

From the figures presented above, it appears that the three adjectives are appropriate to describe and represent the attribute (factor) of "relevance". However, some respondents suggested the addition of other adjectives.

1. "Germane", "pertinent", and "apposite". It is clear that these adjectives are synonymous with the adjective "relevant" which has already been included.

2. "Necessary". The adjective "essential" is more expressive than "necessary".

3. "Requested". It is synonymous with the adjective "required".

4. "Beneficial". The adjectives selected cover the implied meaning of this adjective.

B. Reliability

Adjectives	Agree (N = 24)	
	F	%
1. Accurate	21	88
2. Confirmed	14	58
3. Unbiased	17	71

The adjectives "accurate" and "unbiased" represent the attribute of "reliability" to a considerable extent; whereas the adjective "confirmed" is less representative of the attribute. Regarding this adjective, i.e. "confirmed", some respondents pointed out that the information provided, if it is to be reliable, should not necessarily be confirmed, otherwise it will be too late. In fact, the information provided for planning can be reliable even if it is not confirmed. On the other hand, if the information is accurate and unbiased, it will be reliable in control. Accordingly, the adjective "confirmed" was discarded.

In addition, some respondents added the following adjectives:

1. "Correct". This word is synonymous with the adjective "accurate".
2. "Consistent", "authoritative", and "substantiable". The adjectives used are more expressive and include the implied meaning of these adjectives.
3. "Reasonable". This word has a general meaning, it does not describe a specific dimension of the attribute of reliability and it may refer to other attributes in respondents' minds when the scales are applied in the empirical study. In fact, the point is

that the respondents were provided with these scales without any indication about the information attributes which were represented by the scales.

4. "Trustworthy". It gives the meaning of the attribute itself and does not describe a new dimension of the attribute of "reliability".

C. Sufficiency

Adjectives	Agree (N = 24)	
	F	%
1. Complete	16	67
2. Enough	21	88

Although 88% of the respondents agreed that the adjective "enough" had represented the attribute of sufficiency, some of them mentioned that they preferred to use the word "adequate". Indeed, this word was added by 55% of the respondents of the first questionnaire, and it gained the agreement of 86% of the respondents who added other adjectives. Accordingly, the adjective "adequate" was substituted for the adjective "enough".

Other adjectives were also added: "necessary" and "concise". However, these adjectives do not represent new dimensions of the attribute of sufficiency.

D. Understandability

Adjectives	Agree (N = 24)	
	F	%
1. Orderly	19	79
2. Familiar	14	58
3. Simple	23	96

Based on the figures shown above, it may be possible to say that two adjectives, i.e. "orderly", and "simple" are appropriate to represent the attribute of "understandability", whereas the adjective "familiar" seems less relevant. Accordingly, this adjective was discarded. The adjective "simple" can be used to cover the implied meaning of "familiar".

Among other comments of respondents, the adjective "logical" was mentioned as one which is frequently used in the context of "understandable". Information, if it is to be more understandable, should be logical from the readers' perspectives and be presented in logical sequence. Indeed, "orderly" gives, more or less, the same meaning of "logical" when it is put in an information presentation context.

Respondents had also added additional adjectives, they were:

1. "Well-arranged", "well-presented", and "organised". It is clear that these adjectives are synonymous with the adjective "orderly".

2. "Clearly defined", and "clear". The adjective "simple" covers the implied meaning of these words.

E. Timeliness

Adjectives	Agree (N = 24)	
	F	%
1. Current	17	71
2. Well-timed	21	88

It may be possible to say that the two adjectives; "current" and "well-timed" can be used to describe and represent the attribute of "timeliness". However, some respondents added the following adjectives:

1. "Punctual", and "opportune". These adjectives are synonymous with the adjective "well-timed".
2. "Up-to-date". This adjective is synonymous with "current".
3. "Speedily available". It is clear that the adjective "well-timed" is more expressive than this word.

To sum up, most of the preliminary adjectives can be used in the modified semantic differential. The limited number of individuals involved in the preparation and use of management information have not indicated objections on most of these adjectives. However, it appeared from the comments and the findings of this limited investigation that the adjectives "confirmed", and "familiar" were not acceptable. In addition, although the adjective "enough" was accepted, it was preferable to substitute "adequate" instead.

(2) Criterion of Factorial Composition

Table (6.8) shows the respondents' views on the extent to which a specific adjective represented a certain information attribute and at the same time may be used to describe others.

TABLE (6.8)

The Factorial Composition Of The Suggested Adjectives*

	Relevance		Reliability		Sufficiency		Understandability		Timeliness	
	F	%	F	%	F	%	F	%	F	%
1. Essential	9	<u>64</u>	1	7	4	29	0	0	0	0
2. Required	8	<u>73</u>	0	0	3	27	0	0	0	0
3. Relevant	8	<u>57</u>	1	7	2	14	1	7	2	14
4. Accurate	0	0	11	<u>100</u>	0	0	0	0	0	0
5. Unbiased	2	22	7	<u>78</u>	0	0	0	0	0	0
6. Complete	0	0	2	17	9	<u>75</u>	1	8	0	0
7. Enough**	2	13	0	0	12	<u>80</u>	1	7	0	0
8. Orderly	0	0	1	9	0	0	10	<u>91</u>	0	0
9. Simple	0	0	0	0	0	0	12	<u>100</u>	0	0
10. Current	3	25	0	0	0	0	0	0	9	<u>75</u>
11. Well-timed	1	7	0	0	0	0	0	0	13	<u>93</u>

* Based on results of the second questionnaire (Appendix 6.10) only since it was not the purpose of the first questionnaire to examine the factorial composition criterion.

** The adjective "adequate" was used instead of "enough" as had been suggested by the respondents.

The figures shown in Table (6.8) indicate that overlapping did not exist between the adjectives which represented an attribute and the adjectives which described another. For example, the adjectives "essential", "required", and "relevant" loaded more on the attribute of relevance, and less on the other attributes.

(3) Criterion of Polarity

The adjectives and their familiar and common opposites are presented in Table (6.9).

TABLE (6.9)

The Adjectives And Their Familiar And Common Opposites*

The Adjectives	The Familiar and Common Opposites and their Frequencies **	
	First Order	Second Order
<u>Relevance</u>		
1. Essential	Non essential (8), Inessential (7)	Superfluous (3)
2. Required	Not required (4), Unnecessary (4)	
3. Relevant	Irrelevant (21)	Inapplicable (5)
<u>Reliability</u>		
1. Accurate	Inaccurate (17)	Incorrect (3)
2. Unbiased	Biased (16)	Prejudiced (3)
<u>Sufficiency</u>		
1. Complete	Incomplete (17)	
2. Enough ***	Insufficient (20)	Inadequate (7)
<u>Understandability</u>		
1. Simple	Complex (14), Complicated (3)	Complicated (4)
2. Orderly	Disorderly (10), Untidy (3)	
<u>Timeliness</u>		
1. Well-timed	Late (9), Ill-timed (8)	
2. Current	Out of date (13), Historic (6)	Historic (3)

* Results of the first and second questionnaires (Appendices 6.9, 6.10).

** Opposites having frequencies less than three were not presented.

*** The adjective "adequate" was substituted for this adjective.

No problem was encountered in the selection of the familiar and common opposites of most of the adjectives. However, there were some adjectives which had more than one familiar and common opposite:

1. Essential. The opposites are "non essential" and "inessential". Non-essential was selected.
2. Required. The opposites are "not required" and "unnecessary". It seemed that the appropriate one was "not required".
3. Well-timed. The opposites are "late" and "ill-timed". The latter was selected.

In conclusion, eleven scales (pairs of bipolar adjectives) were selected to represent the five factors, i.e., information attributes. The scales were selected according to the criteria of scales selection, i.e., relevance, factorial composition, and polarity. Table (6.10) presents these scales, which were used in formulating the question of the semantic differential included in the main questionnaires used in this study.

Indeed, the question of the semantic differential was only a part of the questionnaires used in this study. The other questions are discussed in this section. As previously stated, some of these questions are somewhat, or completely, identical. In order to understand the purposes and relationships between such questions, the content of each questionnaire is briefly discussed below.

6.4.4 The Questionnaires' Content

6.4.4.1 Content Of The Questionnaire of Head of Management Accounting Department (Appendix 6.5)

As previously stated, the purpose of this questionnaire was mainly to obtain data regarding the management accounting system and to reveal whether or not the system was regularly evaluated to determine its effectiveness. The questionnaire included eight groups of questions, which are summarised in Table (6.11).

TABLE (6.10)

The Scales Of The Modified Semantic Differential

The preliminary set of the adjectives	The final set of the scales
(A) <u>Relevance</u>	(A) <u>Relevance</u>
1. Essential	1. Essential - Non essential
2. Required	2. Required - Not required
3. Relevant	3. Relevant - Irrelevant
(B) <u>Reliability</u>	(B) <u>Reliability</u>
4. Accurate	4. Accurate - Inaccurate
5. Unbiased	5. Unbiased - Biased
6. Confirmed	...
(C) <u>Sufficiency</u>	(C) <u>Sufficiency</u>
7. Complete	6. Complete - Incomplete
8. Enough	7. Adequate - Inadequate
(D) <u>Understandability</u>	(D) <u>Understandability</u>
9. Simple	8. Simple - Complex
10. Orderly	9. Ordered - Disordered
11. Familiar	...
(E) <u>Timeliness</u>	(E) <u>Timeliness</u>
12. Well-timed	10. Well-timed - Ill-timed
13. Current	11. Current - Out-dated

TABLE (6.11)

Head Of MAD* Questionnaire - Summary Of The Content

Purpose of Question(s)	Page	Question No.
1. Description of the system	1	1 - 3
2. The evaluation of the system's effectiveness: the method used, the criteria applied, and the person in charge of the evaluation	1-3	4 - 9
3. Methods used to make sure that the system meets the informational requirements of managers	3, 4	11
4. Role and influence of managers on system design	3, 5	10, 15, 16
5. The practical application of the suggested approach for evaluating the system's effectiveness	3, 4	10 - 13
6. The period suggested for evaluating the effectiveness of management accounting system	6	17
7. Some issues relating to the information systems design and the evaluation of their effectiveness	5	14
8. Comments	6	-

* MAD = Management Accounting Department

6.4.4.2 Content Of Manager's Questionnaire (Appendix 6.6)

The purpose of this questionnaire was basically to determine managers' satisfaction with the information provided by management accounting systems and to reveal the factors which influence their satisfaction. The questions included in this questionnaire were divided into eleven groups. Table (6.12) shows these groups.

TABLE (6.12)

Manager's Questionnaire-Summary Of The Content

Purpose of Question(s)	Page	Question No.
1. Managers' profile	3, 6	14, 23-25, 27
2. Managers' participation in system design and their usage of the systems	1	1, 3
3. The relative importance of reports generated by the system and their attributes from managers' perspective	5	18, 19
4. The relationship between managers, as users of information, and management accountants, as providers of information	2, 3, 7	9-13, 26
5. The relationship between managers, as decision-makers, and their principal subordinates, as persons affected by the decisions taken	3, 4	15, 16
6. Managers' satisfaction with the information provided by the system	1, 2	2, 4-8
7. Semantic differential	4	17
8. Managers' perception of evaluation of the system's effectiveness	6	21
9. The period suggested for evaluating the effectiveness of the system	6	22
10. Some issues relating to the information systems design and the evaluation of their effectiveness	5	20
11 Comments	7	-

6.4.4.3 Content of Assistant Manager's Questionnaire (Appendix 6.7)

The questionnaire was designed to elicit the views of assistant managers, as persons affected by decisions taken, on the accounting information provided to their superiors. In order to achieve this purpose, the questionnaire included nine groups of questions as shown in Table (6.13).

TABLE (6.13)

Assistant Manager's Questionnaire-Summary Of The Content

Purpose of Question(s)	Page	Question No.
1. Assistant managers' profile	5	13-15
2. Relationship between assistant managers, as persons affected by the decisions taken, and their superiors.	1,2 3	1, 7, 8
3. The relative importance of the reports generated by the system and their attributes from assistants' perspective	2	5, 6
4. Assistant managers' views on the information provided to their superiors	1, 2	2-4
5. Semantic differential	3	9
6. Assistant managers' perception of evaluation of the system's effectiveness	4	11
7. The period suggested for evaluating the effectiveness of the system	5	12
8. Some issues relating to the information systems design and the evaluation of their effectiveness	4	10
9. Comments	5	-

6.4.4.4 Content of Management Accountant's Questionnaire (Appendix 6.8)

The purpose of this questionnaire, as previously stated, was to find out to what extent management accountants understand and assist in determining the evolving informational requirements of executives. Nine groups of questions were included in this questionnaire, as presented in Table (6.14).

TABLE (6.14)

Management Accountant's Questionnaire-Summary Of The Content

Purpose of Question(s)	Page	Question No.
1. Management accountants' profile	5	16, 17
2. The relationship between management accountants, as providers of information, and managers, as users of it	2	4-9
3. The relative importance of the reports generated by the system and their attributes from accountant's perspective	3, 4	11, 12
4. Management accountants' views on the information required by managers	1	1-3
5. Semantic differential	3	10
6. Management accountants' perception of evaluation of the system's effectiveness	5	14
7. The period suggested for evaluating the effectiveness of the system	5	15
8. Some issues relating to the information systems' design and the evaluation of their effectiveness	4	13
9. Comments	6	-

As can be seen from the previous Tables (6.11, 12, 13, 14) and the questionnaires reproduced in Appendices (6.5, 6, 7, 8), some questions were designed to be somewhat, or completely, identical for comparison purposes. The identical questions, together with the others, connect the four questionnaires, as illustrated in Figure (6.1).

SECTION 6.5 - PRETESTING THE QUESTIONNAIRES

The questionnaires used in this study were pretested on a sample of one hundred individuals. The respondents were representative of four groups: (1) heads of management accounting departments; (2) managers; (3) assistant managers; and (4) management accountants. The respondents' names were arbitrarily extracted from the 1977-1978 ICMA list of members. Each respondent was sent a covering letter, a copy of the appropriate questionnaire, and a stamped addressed return envelope. In addition to filling in the questionnaire sent, each respondent was requested to comment on the questionnaire itself, indicating some important issues or factors which should be added, and/or the questions which should be redesigned. Further, the respondent was asked to write down the time spent in the completion of the questionnaire. Thirty-seven completed questionnaires were received (a response rate of 37%). The respondents in this trial run were as follows: 10 heads of management accounting departments; 11 management accountants; 4 assistant managers; and 12 executives. Indeed, the major purpose of this procedure was not to obtain answers to the questions, rather, the aim was to test the questionnaires themselves.

No major problems were uncovered in this test, but several improvements did result. Indeed, this test proved quite helpful in developing the final questionnaires.

SECTION 6.6 - CHECKING AND PROCESSING THE DATA COLLECTED

As each questionnaire was received, the data were coded according to the coding frames which were drawn up from the questions contained in the questionnaires and the answers of respondents (Appendices 6.11, 6.12, 6.13, 6.14). The data coded were entered onto eighty-column punching sheets. The punch cards were then punched from the punching sheets, the cards in turn being used for computer analysis of the data. The analysis of the data was accomplished at the University of Stirling's Computer Unit by using the programmes of the SPSS (the Statistical Package for the Social Sciences).²⁴

Every answer on the four questionnaires was quantifiable, either directly or via a code, with the sole exception of the open-ended question on the last page (comments). The four questionnaires used; manager's questionnaire, assistant manager's questionnaire, management accountant's questionnaire, and head of management accounting department questionnaire were encoded in one hundred and sixty-three, one hundred and nineteen, one hundred and twelve, and ninety-three data elements (variables), respectively. Each copy of a manager's questionnaire occupied four punch cards, while assistant manager's and management accountant's questionnaires were punched on three cards for each, and two cards only were needed for the questionnaire of head of management accounting department.

All but a few data elements (variables) were coded directly from each questionnaire. As each questionnaire was received and considered usable, it was assigned a questionnaire number. From that point on, all reference to the questionnaire was by number. In this way anonymity was assured. The second indirect element

²⁴ Nie, Norman H. and Hull, C. Hadlai, et al., Statistical Package For The Social Sciences, (New York: McGraw-Hill Book Company, Second edition, 1975).

(variable) was called "mailing". This variable was necessary to distinguish between the questionnaires received in the first mailing and those which were received in the second. Other variables such as the actual evaluation of the system's effectiveness, and the regularity of such evaluation were extracted from the questionnaire of head of management accounting department, coded, and added to the variables of manager's, assistant's, and accountant's questionnaires.

Incomplete or unacceptable answers are fairly common with mailed questionnaires. To cope with such situations, two rules were employed: (1) blanks were interpreted as "no answer" unless there was clear evidence for deducing an answer, and (2) invalid answers were interpreted as "no answer" unless there was clear evidence for deducing a valid answer.

There were three potential sources of error in the coding process. First, the data could be entered incorrectly on the punching sheets. Second, the punch cards could be punched incorrectly from the punching sheets. Third, the cards could be incorrect, due to keypunch machine error. To check for errors in entering data onto the punching sheets, a sample representing 15 percent of each group of questionnaires (i.e. head of department, manager, assistant, and accountant) was selected at random and fully re-coded. However, the semantic differential scores on each questionnaire were re-coded to check for error. To check on the other sources of error, a computer printout of all raw data (list cases), and frequencies of all variables were obtained. All variables were then checked against the punching sheets and coding frames, thus verifying the process of keypunching and computer handling.

SECTION 6.7 - MEASUREMENT CONSIDERATIONS AND THE
STATISTICAL TECHNIQUES APPLIED

Two types of tests can be applied to analyse the data obtained; parametric and non-parametric tests. For parametric statistics to be applicable, three main requirements have to be satisfied. Firstly, "normality"; that is the samples with which we work, must be drawn from populations that are normally distributed. Secondly, "homogeneity of variance", in a sense, variances are assumed to be homogeneous from group to group, within the bounds of random variation. Finally, "continuity and equal intervals of measures", the third requirement is that the measures used must be continuous measures with equal intervals. In contrast, the application of non-parametric tests are constrained by less strict assumptions than parametric tests. They are particularly free of assumptions about the characteristics or the form of the distributions of the populations of research samples.²⁵

In order to decide whether parametric or non-parametric statistics are more appropriate to be applied to the data, both the level of measurement attained and the assumptions that can be made about the population must be specified. Indeed, sociological data do not possess a point of origin of equal increments between attributes and therefore, at best, the researchers in the social sciences can obtain ordinal measures. This raises the question of whether or not it is reasonable to perform arithmetic operations with ordinal data. As Siegel explains, the problem is that the

²⁵ See, for more detail about these assumptions:

Kerlinger, Fred N., Foundations of Behavioural Research, (New York: Holt, Rinehart and Winston, Inc., Second Edition, 1973), pp.286-288

ordinal scale is not isomorphic to the numerical system known as arithmetic and thus, it would be illogical to calculate means, variances and other measures which are products of arithmetical operations. Accordingly, it is inappropriate to apply parametric techniques to such data obtained by ordinal scales and obviously, non-parametric statistics are the appropriate ones.²⁶ On the contrary, Labovitz argues that the distinction between interval and ordinal data is theoretical since, in most situations, parametric techniques can be applied to any ordinal data with small error which can be justified by the advantages of parametric statistics. He claims that:

Although some small error may accompany the treatment of ordinal variables as interval, this is offset by the use of more powerful, more sensitive, better developed, and more clearly interpretable statistics with known sampling error.²⁷

For the aforementioned reasons, there is a tendency in the social sciences to use parametric statistics, although there is often no clear idea of the shape of variability of the distribution of the population and the data to be tested are measured in either ordinal or nominal scale. However, for analysis in this study, it was decided to use both techniques; parametric and non-parametric.

²⁶ Siegel, Sidney, Non-parametric Statistics For The Behavioural Sciences, (Tokyo: McGraw-Hill Kogakusha, Ltd., 1956), p.26

²⁷ Labovitz, Sanford, "The Assignment of Numbers To Rank Order Categories", American Sociological Review, Vol.35, No.3, (June, 1970), p.515;

see also:

Warr, Peter B. and Christopher Knapper, The Perception of People and Events, (London: John Wiley & Sons, 1968), p.61;

Hays, William L., Statistics For Psychologists, (New York: Holt, Rinehart and Winston, Inc., 1963), p.71;

Black, James A. and Dean J. Champion, op. cit., p.195.

SECTION 6.8 - SUMMARY

As the value of the suggested approach for evaluating the effectiveness of an information system lies in its practicability and validity, it was necessary to conduct an empirical study. Thirty-one organisations of the nationalised industries and their subsidiaries had indicated a willingness to take part in the research project. A considerable proportion (61%) of these organisations fell into the field of "transport and communication" and "gas, electricity and water" industries. About 42% of the participating organisations were classified as large (10,000 employees and more), whereas 26% were medium (5,000 - less than 10,000) and 32% small (less than 5,000).

One hundred and ninety-eight respondents represented the thirty-one organisations participating in the research project. The respondents were divided into four groups: 67 senior managers (users of information), 51 assistant managers (persons affected by the decisions taken), 54 management accountants (providers of information), and 26 heads of management accounting departments.

For collecting the data, it was decided to use the mailed questionnaire technique. Four different questionnaires were designed to achieve the purpose of the research project: (1) questionnaire for head of management accounting department or any other person with special responsibility for internal accounting reports; (2) manager (senior executive) questionnaire; (3) assistant manager questionnaire; and (4) management accountant questionnaire. The questionnaires were pretested and accordingly improved. The data obtained by these questionnaires were coded and transferred onto punching sheets, from which the punch cards were punched. The

data obtained were checked to ensure that no error could exist. The programmes of the SPSS (the Statistical Package for the Social Sciences) were used to analyse the data at the University of Stirling's Computer Unit. Both parametric and non-parametric statistics were applied in the analysis.

This chapter, in which the research methodology was discussed, is one of three chapters concerned with the empirical study. The following two chapters (VII and VIII) are devoted to describing the respondents' profile and their management accounting systems and the research findings. The first one (Chapter VII) presents the mailing procedures employed, response rate, test for non-response bias, and describes the respondents' profile and their management accounting systems. The second one (Chapter VIII) is concerned with the research findings. It concentrates on the results of the application of the suggested approach in evaluating the effectiveness of management accounting systems now in operation in the nationalised industries and their subsidiaries.

CHAPTER VII
DESCRIPTION OF RESPONDENTS' PROFILE AND THEIR
MANAGEMENT ACCOUNTING SYSTEMS

It was stated in the previous chapter that the suggested approach for evaluating the effectiveness of management information systems would be tested in evaluating the effectiveness of the management accounting systems of public utilities and other organisations in nationalised industries. The technique used in data collection was mailed questionnaires. Four different questionnaires were used in this study. The main purpose of the first one, the questionnaire for head of management accounting department or the person with special responsibility for internal accounting reports, was to identify the management accounting systems of the organisations participating in this study and the methods currently used in evaluating the effectiveness of these systems. The other three questionnaires were addressed to senior managers, as users of information, assistant managers, as persons responsible for carrying out, and affected by, the decisions taken by their superiors, and management accountants, as providers of information. The major purpose of these questionnaires was to elicit respondents' views regarding their management accounting systems.

As the technique used in this study was mailed questionnaires, response rate and non-response bias should be taken into consideration in the evaluation of the conclusions drawn from the data obtained. In this chapter, therefore, the mailing procedures employed in this study are described, response rate is presented and discussed, and a test for non-response bias is undertaken. The

respondents' profile and a description of their management accounting systems are also presented in this chapter. Thus, this chapter is divided into four sections:

- Section I - Response rate and non-response bias.
- Section II - Description of respondents' profile.
- Section III - Description and analysis of the management accounting systems and the policies applied in evaluating their effectiveness.
- Section IV - Summary and conclusions.

SECTION 7.1 - RESPONSE RATE AND NON-RESPONSE BIAS

7.1.1 Introduction: Mailing Procedures

As previously stated, four different mailed questionnaires were used in this study, they were circulated among four groups of participants: (1) heads of management accounting departments; (2) senior managers; (3) assistant managers; and (4) management accountants. The first batch of the questionnaires was mailed to the participants in September 1978, the last one mailed in March 1979. The procedures employed in the questionnaires mailing are described below.

First, each participant was sent the appropriate questionnaire (first class postage) accompanied with cover letter which included such information as: (1) the name and the position of the person within the participating organisation who provided the participant's name; and (2) the assurance of anonymity. Each cover letter was personalised (individually typed) and produced on Department of Accountancy and Business Law, University of Stirling letterhead. A copy of the organisation's letter, which indicated its approval of participation in the research project and included the names of the participants selected, was also attached with the

cover letter. A self-addressed stamped (first class) envelope was sent with the questionnaire.

Second, three weeks after the initial mailing, a reminder letter (first class postage) accompanied by a copy of the appropriate questionnaire, was sent to the participants who had not returned the initial questionnaire. The reminder letter (see Appendix 7.2) stressed the significance of the participant's co-operation and its effect on the success of the research project. No additional attempts were made to obtain the return of completed questionnaires. The non-respondent participants were considered as declining participation in the research project.

7.1.2 Response Rate

The initial mailing was sent to 241 participants whose names and addresses were provided by the participating organisations. The total number of the usable questionnaires received from the initial mailing was 147, that is 61 percent of the total sample. After sending the reminder letter, the response rate was increased to approximately 82 percent, that is 198 usable questionnaires. In addition to the 198 usable questionnaires, only nine questionnaires were returned and considered unusable; one because the respondent did not mention his name and his organisation's name, thus it was not possible to group it either according to the organisation's industrial classification or organisation size. Another because the service period of the respondent in his present organisation was only four months. The other questionnaires were also incomplete.

Table (7.1) on page 325 presents an analysis of the response

rate according to the four groups of respondents.

TABLE (7.1)
Analysis Of The Response Rate

Mailing	Responses		Group*							
			MGR		ASM		ACC		HMAD	
	n	% of sample	n	%	n	%	n	%	n	%
First mailing	147	61.0	44	53	41	65	42	64	20	69
Second mailing	51	21.2	23	28	10	16	12	18	6	21
Total responses	198	82.2	67	81	51	81	54	82	26	90
Total sample	241	100	83	100	63	100	66	100	29	100

* MGR = senior managers; ASM = assistant managers;
ACC = management accountants;
HMAD = head of management accounting department.

It was stated in the previous chapter that mailed questionnaires have been heavily criticised for their low response rate. As can be seen from the figures in Table (7.1) this problem was not encountered in this study. The overall response rate was 82%, the response rate of each group of respondents was also at the same level of the overall response rate, with the exception of the response rate of the heads of management accounting departments (90%).

This high response rate may be attributed to the interest of the respondents in the research project, and it may also be due to the active support of the management of each organisation participating in this study. Another reason could be that the management of some participating organisations conducted the circulation of

the questionnaires concerned among the participants selected. This gave an indication that the survey was for their own organisations' interest. The high response rate may also be due to the copy of each organisation's approval of participation in the research project which was attached to the questionnaire sent, and to the personalised cover letter which accompanied each questionnaire.

7.1.3 Non-response Bias

Although the response rate attained was very high, bias of non-response still existed. The problem is whether those who did not respond would respond differently to the research variables than the respondents. However, non-response bias can be tested. Two potential approaches were considered in this study:¹

(1) Send a shorter version of the appropriate questionnaires to the non-respondents asking for only a few key items. The replies may indicate how different the non-respondents were from the rest. As the non-respondents did not respond to the initial mailing and to the reminder letter, it was likely that they would not complete and return the shorter version of the questionnaire. Therefore this approach was rejected.

¹ See, for example:

Moser, C.A. and G. Kalton, Survey Methods In Social Investigation, (London: Heinemann Educational Books Ltd., Second Edition, 1977), p.267;

Armstrong, J. Scott and Terry S. Overton, "Estimating Nonresponse Bias in Mail Surveys", Journal of Marketing Research, (August, 1977) pp.396-402;

Goodstadt, Michael S., L. Chung, R. Kronitz, and G. Cook, "Mail Survey Response Rates: Their Manipulation and Impact", Journal of Marketing Research, (August, 1977), pp.391-395;

Oppenheim, A.N., Questionnaire Design And Attitude Measurement, (London: Heinemann Educational Books Ltd., 1973), p.34

(2) Compare the replies of the respondents to the second mailing with the replies of the respondents to the initial mailing. This approach was based on the assumption that "the non-respondents are closer in their characteristics to those who respond to the follow-up effort than to those who do so to the initial mailing".² This approach was selected since it appeared more practical than the first.

7.1.3.1 Manager's Questionnaire : Test For Non-Response Bias

The replies of respondents to the initial mailing (44 senior managers) were compared with the replies of respondents to the second mailing (23 senior managers). If the two samples had been different in their responses to the questionnaire's variables, then non-response bias would have existed. Using a t-test and chi-square, the replies of the two samples were analysed for significant differences. Results of the t-test and chi square are presented in Tables (7.2) and (7.3) on pages 328 and 333, respectively. Two observations, in fact, should be borne in mind concerning the two tables and the following tables which were prepared for testing non-response bias: first, the tables include only the variables representing the raw data as extracted from the questionnaires, the variables added by the researcher are excluded (see Appendices 6.11, 6.12, 6.13 and 6.14). Second, some variables are not contained in these tables because the conditions for applying the statistical tests have not been fulfilled.

² Moser, C.A. and G. Kalton, op. cit., p.267

TABLE (7.2)

Results of T-test For Non-Response Bias In The Manager's Questionnaire

Question No.	Variable No.	Description	Mean*		T-test t	d.f.†	α
			1st M	2nd M			
1	113	Accounting function - points	44.05	34.95	1.27	59	.21
	114	Own function - points	34.78	43.40	1.31	59	.20
	115	Other function - points	21.17	21.65	.09	59	.93
2	081	Amount of detail - planning	3.65	3.91	1.18	64	.24
	082	Amount of detail - control	4.21	4.35	.52	64	.61
3	116	Number of reports received - weekly**	4.00	4.00	.18	23	.86
	117	Number of reports received - monthly**	5.00	4.00	.66	40	.52
	118	Number of reports received - quarterly**	2.00	3.00	1.11	24	.28
	119	Number of reports received - bi-annually**	2.00	3.00	.63	5	.56
120	Number of reports received - annually**	2.00	2.00	.12	29	.90	
5	084	Frequency of the reports - percentage of most	78.75	72.95	.14	10	.89
	085	Frequency of the reports - percentage of some	50.00	50.00	.00	2	1.00
8	087	Satisfaction with relevance - planning	4.33	4.22	.34	63	.73
	088	Satisfaction with adequacy - planning	4.14	4.09	.17	63	.87
	089	Satisfaction with timeliness - planning	4.21	3.87	.91	63	.37
	090	Satisfaction with reliability - planning	4.50	4.39	.31	63	.76
	091	Satisfaction with format - planning	4.43	3.96	1.37	63	.18
	092	Satisfaction with usefulness - planning	4.43	4.17	.73	63	.47
	094	Satisfaction with relevance - control	5.00	4.26	1.97	65	.05
	095	Satisfaction with adequacy - control	4.84	4.22	1.64	65	.11
096	Satisfaction with timeliness - control	4.45	3.61	1.98	65	.05	

* 1st M = first mailing; 2nd M = second mailing. † t = t value; d.f. = degrees of freedom; α = significance

** Number of reports was rounded.

TABLE (7.2) - continued

Results of T-test For Non-response Bias In The Manager's Questionnaire

Question No.	Variable No.	Description	Mean*		T-test t	d.f.†	α
			1st M	2nd M			
8	097	Satisfaction with reliability - control	4.84	4.17	1.80	65	.08
	098	Satisfaction with format - control	4.82	4.17	1.74	65	.09
	099	Satisfaction with usefulness - control	4.77	4.09	1.79	65	.08
10	106	Closeness of interpretation	5.48	5.13	.99	65	.32
11	107	Necessity of accountants' interpretation	5.66	5.78	.30	65	.77
12	108	Accountants' understanding of needs - planning	5.07	4.70	.88	65	.38
	109	Accountants' understanding of needs - control	5.50	5.09	1.05	65	.30
14	147	Consultation on reports design - percentage of most	75.00	82.50	1.89	9	.09
	148	Consultation on reports design - percentage of some	51.60	46.67	1.18	11	.27
	149	Consultation on reports design - percentage of few	22.00	16.40	1.11	11	.29
15	151	Subordinates know the content of the reports - percentage of most	83.18	84.44	.32	18	.75
	152	percentage of some	50.00	49.00	.20	7	.85
16	159	Discuss the decisions - percentage of most	81.57	81.15	.16	39	.88
	160	Discuss the decisions - percentage of some	59.67	50.00	1.76	4	.15

* 1st M = first mailing; 2nd M = second mailing. † t = t value; d.f. = degrees of freedom; α = significance

TABLE (7.2) - continued

Results of T-test For Non-response Bias In The Manager's Questionnaire

Question No.	Variable No.	Description	Mean		t	T-test d.f.	α
			1st M	2nd M			
17	031	Essential - S.D.* planning	6.09	5.82	.75	64	.46
	032	Relevant - S.D. planning	5.82	5.36	1.16	64	.25
	033	Required - S.D. planning	6.00	5.64	.98	64	.33
	034	Unbiased - S.D. planning	5.20	5.38	.32	64	.75
	035	Accurate - S.D. planning	5.45	5.14	.87	64	.39
	036	Complete - S.D. planning	4.75	4.82	.15	64	.88
	037	Adequate - S.D. planning	5.11	5.18	.15	64	.88
	038	Ordered - S.D. planning	5.80	5.45	.98	64	.33
	039	Simple - S.D. planning	4.45	3.91	1.28	64	.21
	040	Current - S.D. planning	5.07	4.23	1.90	64	.06
	041	Well-timed - S.D. planning	5.23	4.77	1.16	64	.25
	042	Essential - S.D. control	6.21	5.50	1.96	63	.06
	043	Relevant - S.D. control	5.91	5.32	1.60	63	.12
	044	Required - S.D. control	5.70	5.45	.58	63	.56
	045	Unbiased - S.D. control	5.33	5.45	.36	63	.72
	046	Accurate - S.D. control	5.67	5.32	.99	63	.33
	047	Complete - S.D. control	5.05	5.00	.11	63	.91
	048	Adequate - S.D. control	5.37	4.86	1.21	63	.23
	049	Ordered - S.D. control	5.91	5.18	2.14	63	.04
	050	Simple - S.D. control	4.49	4.00	1.10	63	.28
	051	Current - S.D. control	4.72	3.95	1.51	63	.14
	052	Well-timed - S.D. control	4.95	4.45	1.13	63	.26

* S.D. = Semantic differential

TABLE (7.2) - continued

Results of T-test For Non-response Bias In The Manager's Questionnaire

Question No.	Variable No.	Description	Mean		t	T-test d.f.	α
			1st M	2nd M			
18	053	Reports importance for planning - points	0.44	0.47	.72	63	.47
	054	Reports importance for control - points	0.56	0.53	.72	63	.47
19	067	Timeliness points - planning	0.19	0.17	.76	63	.45
	068	Relevance points - planning	0.21	0.24	1.54	63	.13
	069	Adequacy points - planning	0.19	0.18	.94	63	.35
	070	Reliability points - planning	0.23	0.23	.14	63	.89
	071	Understandability points - planning	0.18	0.17	.85	63	.40
	072	Timeliness points - control	0.22	0.22	.23	63	.82
	073	Relevance points - control	0.21	0.23	1.32	63	.19
	074	Adequacy points - control	0.19	0.16	2.00	63	.05
20	075	Reliability points - control	0.20	0.22	1.10	63	.28
	076	Understandability points - control	0.19	0.16	2.16	63	.04
	008	Statement - the key factor is user	5.70	5.57	.36	65	.72
	009	Statement - the provider of information	6.02	6.00	.08	65	.94
21	010	Statement - the principal subordinates	5.66	5.70	.12	65	.91
	011	Statement - the decision-making style	4.32	4.13	.46	65	.65
	012	Statement - the resources allocated	2.57	2.00	1.58	65	.12
	013	Statement - psychological tests	2.75	2.74	.03	65	.98
	025	Satisfaction with questionnaire	4.25	3.33	.64	5	.55
026	Satisfaction with interviews	5.31	5.57	.34	18	.74	
027	Satisfaction with complaints	5.38	4.83	.67	12	.51	
028	Satisfaction with review	4.90	5.00	.20	30	.84	

TABLE (7.2)-continued

Results of T-test For Non-response Bias In The Manager's Questionnaire

Question No.	Variable No.	Description	Mean		t	T-test d.f.	α
			1st M	2nd M			
26	112	Accountants know managers' decision-making styles	4.02	3.91	.22	65	.82
27	077	Service period in the present organisation	19.20	18.48	.20	65	.84
	078	Service period in the present job	3.64	3.92	.32	64	.75

TABLE (7.3)

Chi Square Test For Non-response Bias In The Manager's Questionnaire

Question No.	Variable No.	Description	Chi square	d.f.	α
4	128	The number of reports caused information overload	0.02	1	.89
	129	Information overload - reports received weekly	-	-	.54*
	130	Information overload - reports received monthly	-	-	.64*
	131	Information overload - reports received quarterly	-	-	.21*
	132	Information overload - reports received bi-annually	-	-	.25*
	133	Information overload - reports received annually	-	-	.25*
	134	Information overload - reports received other	-	-	.25*
	5	083	Satisfaction with the frequency of the reports	1.68	1
6	135	Conducting an expanded search - planning	0.34	1	.56
	136	Conducting an expanded search - control	0.16	1	.69
7	137	Use all the information contained in the reports	0.46	1	.50
	139	Unused information - irrelevant	-	-	.14*
	140	Unused information - reliability	0.10	1	.75
	141	Unused information - detail	0.11	1	.92
	142	Unused information - presentation	0.13	1	.72
	143	Unused information - out-dated	0.88	1	.35
	144	Unused information - other	-	-	.31*
	9	105	Ask for accountants' interpretation	0.002	1
13	110	Accountants' co-operation in determining needs	0.16	1	.69
14	146	Consultation on the design of the reports	1.58	2	.45

† d.f. = degrees of freedom; α = significance.

* Fisher's exact test.

TABLE (7.3) - continued

Chi Square Test For Non-Response Bias In The Manager's Questionnaire

Question No.	Variable No.	Description	Chi square	d.f.	α
15	150	Subordinates know the content of the reports	.002	1	.96
	155	Subordinates receive a copy of the report	.21	1	.65
	165	Content of the reports is discussed with subordinates	.002	1	.96
	157	Subordinates know the content of the reports - other	.14	1	.71
16	158	Discuss the decisions with subordinates	.10	1	.76
19	055	The relative importance of the attributes - planning	.84	1	.36
	056	The relative importance of the attributes - control	1.27	1	.26
21	018	Whether or not the organisation evaluate the system	.45	1	.50
	020	Using questionnaire	.07	1	.80
	021	Using interviews	.12	1	.73
	022	Managers' complaints	.005	1	.94
	023	Review the reports	.14	1	.71
	024	Other methods	2.41	1	.12
22	014	Evaluation should be in special circumstances only	.42	1	.52
	015	Evaluation should be periodically	.42	1	.52
	017	The interval suggested for periodical evaluation	.21	3	.98
23	101	Previous experience in systems design	.26	1	.61
24	102	Studied accounting	.21	1	.65
25	162	Decision-making style (analytic, heuristic)	.14	1	.70

+ d.f. = degrees of freedom; α = significance.

The results of the t-test and chi square in Table (7.2) and Table (7.3) on pages 328 and 333, respectively, did not indicate non-response bias at the .01 level of significance for any of the variables tested. This means that respondents of manager's questionnaires were representative of the sample of senior managers.

7.1.3.2 Assistant Manager's Questionnaire:
Test for Non-Response Bias

As shown in Table (7.1) on page 325 response rate of assistant managers was 81 percent. Although this rate is relatively high and may permit extrapolation of the results to the complete sample of assistant managers, the question remained regarding whether those who had not responded would respond differently to the research variables. Thus, Table (7.4) and Table (7.5) on pages 336 and 340, respectively, were prepared for the purpose of examining non-response bias.

The conclusion which can be drawn from the results presented in Tables (7.4) and (7.5) is that respondents of assistant manager's questionnaires were representative of the sample of assistant managers. The results shown in the two tables illustrated a lack of non-response bias at the .01 level of significance for any of the variables tested except variable number 102, i.e. background in accounting (see question No.14 in Table 7.5 on page 340). However, this particular variable did not prove a significant influence on assistant managers' responses (see page 435 footnote 15). Therefore, the bias did not affect any of the conclusions drawn from the data analysis.

TABLE (7.4)

Results of T-test For Non-response Bias In The Assistant Manager's Questionnaire

Question No.	Variable No.	Description	Mean *		t	T-test d.f.	α
			1st M	2nd M			
1	109	Assistant knows the content of the reports - percentage of most	85.00	86.43	.43	20	.67
2	087	Satisfaction with relevance - planning	4.72	4.89	.36	46	.72
	088	Satisfaction with adequacy - planning	4.62	4.44	.32	46	.75
	089	Satisfaction with timeliness - planning	3.69	3.78	.18	46	.85
	090	Satisfaction with reliability - planning	3.82	3.56	.54	46	.59
	091	Satisfaction with format - planning	4.08	4.00	.19	46	.85
	092	Satisfaction with usefulness - planning	4.21	4.33	.28	46	.78
	094	Satisfaction with relevance - control	4.44	4.89	.76	48	.45
	095	Satisfaction with adequacy - control	4.44	4.11	.57	48	.57
	096	Satisfaction with timeliness - control	3.83	3.78	.10	48	.92
	097	Satisfaction with reliability - control	4.12	4.11	.02	48	.98
	098	Satisfaction with format - control	4.02	4.33	.58	48	.56
	099	Satisfaction with usefulness - control	4.24	4.33	.18	48	.86
3	081	Amount of detail - planning	3.84	4.20	.92	46	.36
	082	Amount of detail - control	3.80	4.10	.66	48	.51
4	084	Frequency of the reports - percentage of most	82.50	83.33	.19	19	.85
5	053	Reports importance for planning - points	0.47	0.42	.98	46	.33
	054	Reports importance for control - points	0.53	0.58	.98	46	.33

* 1st M = first mailing; 2nd M = second mailing. t = t value; d.f. = degrees of freedom; α = significance.

TABLE (7.4) - continued

Results of T-test For Non-response Bias In The Assistant Manager's Questionnaire

Question No.	Variable No.	Description	Mean		t	T-test d.f.	α
			1st M	2nd M			
6	067	Timeliness points - planning	0.18	0.20	.53	47	.60
	068	Relevance points - planning	0.22	0.23	.41	47	.69
	069	Adequacy points - planning	0.18	0.18	.29	47	.77
	070	Reliability points - planning	0.24	0.23	.51	47	.61
	071	Understandability points - planning	0.17	0.17	.29	47	.78
	072	Timeliness points - control	0.22	0.26	1.36	48	.18
	073	Relevance points - control	0.19	0.19	.43	48	.67
	074	Adequacy points - control	0.18	0.15	1.09	48	.28
7	075	Reliability points - control	0.23	0.24	.33	48	.74
	076	Understandability points - control	0.18	0.16	.86	48	.40
	106	Satisfaction with managers' reliance - planning	4.43	5.00	1.21	42	.23
	107	Satisfaction with managers' reliance - control	4.56	5.11	1.17	43	.25
8	117	Discuss the decisions - percentage of most	84.62	80.83	1.06	17	.31
	118	Discuss the decisions - percentage of some	51.50	55.00	.45	10	.66
9	030	Essential - S.D.* planning	5.70	5.44	.47	44	.64
	032	Relevant - S.D. planning	5.49	5.56	.12	44	.91
	033	Required - S.D. planning	6.03	4.78	2.29	44	.03
	034	Unbiased - S.D. planning	4.38	4.33	.08	44	.93
	035	Accurate - S.D. planning	4.62	4.33	.49	44	.63
	036	Complete - S.D. planning	4.76	4.11	1.11	44	.27
	037	Adequate - S.D. planning	4.73	4.78	.08	44	.93
	038	Ordered - S.D. planning	5.16	5.44	.58	44	.56

* S.D. = semantic differential.

TABLE (7.4) - continued

Results of T-test For Non-response Bias In The Assistant Manager's Questionnaire

Question No.	Variable No.	Description	Mean		t	T-test d.f.	α
			1st M	2nd M			
9	039	Simple - S.D.* planning	4.22	4.56	.59	44	.56
	040	Current - S.D. planning	4.59	4.89	.48	44	.64
	041	Well-timed - S.D. planning	4.57	4.33	.42	44	.68
	042	Essential - S.D. control	5.82	6.00	.41	45	.69
	043	Relevant - S.D. control	5.66	5.56	.19	45	.85
	044	Required - S.D. control	6.05	5.11	1.71	45	.09
	045	Unbiased - S.D. control	4.50	4.89	.74	45	.46
	046	Accurate - S.D. control	4.47	4.11	.61	45	.55
	047	Complete - S.D. control	4.74	4.56	.30	45	.77
	048	Adequate - S.D. control	4.84	4.89	.08	45	.93
	049	Ordered - S.D. control	5.34	5.67	.81	45	.42
	050	Simple - S.D. control	4.34	4.78	.77	45	.45
051	Current - S.D. control	4.11	4.44	.56	45	.58	
052	Well-timed - S.D. control	4.60	4.44	.28	45	.78	
10	008	Statement - the key factor is user	5.83	6.00	.38	49	.70
	009	Statement - the provider of information	6.17	6.10	.21	49	.84
	010	Statement - the principal subordinates	5.93	5.60	.91	49	.37
	011	Statement - decision-making style	4.34	3.20	1.81	49	.08
	012	Statement - the resources allocated	3.07	2.90	.26	49	.79
	013	Statement - psychological tests	3.12	2.00	2.37	49	.02
11	026	Satisfaction with interviews	3.80	4.25	1.43	7	.20
	027	Satisfaction with complaints	4.00	3.67	.41	10	.69
	028	Satisfaction with review	3.60	3.57	.06	20	.95

* S.D. = semantic differential

TABLE (7.4) - continued

Results of T-test For Non-response Bias In The Assistant Manager's Questionnaire

Question No.	Variable No.	Description	Mean		t	T-test d.f.	α
			1st M	2nd M			
15	077	Service period in the present organisation	17.29	20.08	.69	49	.50
	078	Service period in the present job	4.84	3.59	.75	49	.45

TABLE (7.5)

Chi Square Test For Non-response Bias In The Assistant Manager's Questionnaire

Question No.	Variable No.	Description	Chi square	d.f.	α
1	108	Assistants know the content of the reports	-	-	.15*
	113	Assistants receive a copy of the reports	.56	1	.46
	114	Content of the reports is discussed with assistants	1.13	1	.29
	115	Assistants know the content of the reports - other	.83	1	.36
4	083	Satisfaction with the frequency of the reports	-	-	.14*
6	055	The relative importance of the attributes - planning	.05	1	.83
	056	The relative importance of the attributes - control	.73	1	.39
7	105	Manager discussed his needs with his assistants	.13	1	.72
8	116	Manager discusses the decisions with his assistants	.80	1	.37
11	018	Whether or not the organisation evaluate the system	2.87	1	.09
	020	Using questionnaire	-	-	.31*
	021	Using interviews	.14	1	.71
	022	Managers' complaints	.03	1	.87
	023	Review the reports	.10	1	.75
	024	Other methods	-	-	.31*
12	014	Evaluation should be in special circumstances only	2.87	1	.09
	015	Evaluation should be periodically	2.87	1	.09
13	101	Previous experience in systems design	.28	1	.60
14	102	Studied accounting	-	-	.01*

+ d.f. = degrees of freedom; α = significance.

* Fisher's exact test

7.1.3.3 Management Accountant's Questionnaire:
Test for Non-response Bias

The questionnaire's results were compared for the first and second mailing to test for non-response bias. As previously applied, categorical questions were analysed using chi square test and interval questions were tested using t-test. The results are shown in Tables (7.6) and (7.7) on pages 342 and 345, respectively.

Tables (7.6) and (7.7) show that the conclusions based on only three variables could be questionable. The first variable was number 039, that is the scale of simple/complex used in the modified semantic differential (see question No. 10 in Table 7.6 on page 343). The mean score of respondents to the initial questionnaire on the scale was 4.3 (a 7-point scale was used), while it was 3.0 for respondents to the second mailing. However, the modified semantic differential proved a partial validity in measuring accountants' views and was not used in comparing senior managers', assistant managers' and management accountants' views (see page 519 footnote 26). Variables 068 and 076, i.e. the relative importance of the attributes relevance and understandability, respectively (see question No. 12 in Table 7.6 on page 344), could also be questionable. As will be shown later in Chapter VIII, the relative importance of the information attributes from accountants' viewpoints does not affect the measurement of the effectiveness of the management accounting system which is the main purpose of this study. However, the results in Tables (7.6) and (7.7) indicate that, generally, respondents of management accountants' questionnaires were representative of the sample of management accountants.

TABLE (7.6)

Results of T-test For Non-response Bias In The Management Accountant's Questionnaire

Question No.	Variable No.	Description	Mean*		t	T-test d.f.	α
			1st M	2nd M			
1	081	Amount of detail - planning	3.69	3.50	.55	52	.58
	082	Amount of detail - control	3.93	3.67	.69	52	.49
2	084	Frequency of the reports - percentage of most	80.00	84.38	1.43	23	.17
	085	Frequency of the reports - percentage of some	57.50	50.00	1.34	3	.27
3	087	Rating of relevance - planning	4.38	4.08	.74	52	.46
	088	Rating of adequacy - planning	4.31	4.33	.06	52	.95
	089	Rating of timeliness - planning	4.26	4.25	.03	52	.98
	090	Rating of reliability - planning	4.55	4.92	.99	52	.33
	091	Rating of format - planning	4.50	4.17	.79	52	.43
	092	Rating of all dimensions - planning	4.33	4.33	.00	52	1.00
	094	Rating of relevance - control	4.38	4.42	.08	52	.94
	095	Rating of adequacy - control	4.52	4.42	.26	52	.79
	096	Rating of timeliness - control	4.43	4.17	.55	52	.59
	097	Rating of reliability - control	4.76	5.25	1.19	52	.24
4	098	Rating of format - control	4.43	3.83	1.47	52	.15
	099	Rating of all dimensions - control	4.45	4.25	.55	52	.59
4	108	Accountants' understanding of needs - planning	3.88	3.67	.39	52	.70
	109	Accountants' understanding of needs - control	4.10	4.25	.31	52	.76
6	112	Accountants know managers' decision-making styles	4.57	4.92	.64	52	.52
8	107	Necessity of accountant's interpretation	5.88	5.08	1.80	52	.08

* 1st M = first mailing; 2nd M = second mailing; † t = t value; d.f. = degrees of freedom; α = significance.

TABLE (7.6) - continued

Results of T-test For Non-response Bias In The Management Accountant's Questionnaire

Question No.	Variable No.	Description	Mean		t	T-test d.f.	α
			1st M	2nd M			
9	106	Closeness of interpretation	4.69	4.67	.05	52	.96
10	031	Essential - S.D.* planning	5.43	4.91	1.23	49	.23
	032	Relevant - S.D. planning	5.08	5.00	.16	49	.88
	033	Required - S.D. planning	5.03	4.27	1.47	49	.15
	034	Unbiased - S.D. planning	3.65	3.45	.46	49	.65
	035	Accurate - S.D. planning	5.08	5.18	.27	49	.79
	036	Complete - S.D. planning	3.98	3.36	1.33	49	.19
	037	Adequate - S.D. planning	4.40	3.91	.95	49	.35
	038	Ordered - S.D. planning	4.60	4.00	1.42	49	.16
	039	Simple - S.D. planning	4.30	3.00	2.72	49	.01
	040	Current - S.D. planning	4.95	5.36	.73	49	.47
	041	Well-timed - S.D. planning	4.30	3.82	1.03	49	.31
	042	Essential - S.D. control	5.38	4.83	1.21	50	.23
	043	Relevant - S.D. control	5.30	5.33	.08	50	.94
	044	Required - S.D. control	5.05	4.92	.29	50	.77
	045	Unbiased - S.D. control	4.20	3.67	1.18	50	.25
	046	Accurate - S.D. control	5.08	5.08	.02	50	.99
	047	Complete - S.D. control	4.23	4.25	.05	50	.96
	048	Adequate - S.D. control	4.55	4.67	.22	50	.82
	049	Ordered - S.D. control	4.93	4.50	.87	50	.39
	050	Simple - S.D. control	4.60	4.00	1.46	50	.15
051	Current - S.D. control	5.35	5.25	.20	50	.84	
052	Well-timed - S.D. control	4.78	4.75	.06	50	.95	
11	053	Reports importance for planning - points	0.47	0.44	.62	50	.54
	054	Reports importance for control - points	0.53	0.56	.62	50	.54

* S.D. = semantic differential

TABLE (7.6) - continued

Results of T-test for Non-response Bias In The Management Accountant's Questionnaire

Question No.	Variable No.	Description	Mean		t	T-test d.f.	α
			1st M	2nd M			
12	067	Timeliness points - planning	0.19	0.16	2.11	51	.04
	068	Relevance points - planning	0.21	0.26	2.71	51	.01
	069	Adequacy points - planning	0.18	0.19	.23	51	.82
	070	Reliability points - planning	0.20	0.21	.89	51	.38
	071	Understandability points - planning	0.22	0.18	1.50	50	.14
	072	Timeliness points - control	0.22	0.25	1.02	50	.31
	073	Relevance points - control	0.21	0.24	1.57	50	.12
	074	Adequacy points - control	0.18	0.15	1.88	50	.07
13	075	Reliability points - control	0.19	0.20	.75	50	.46
	076	Understandability points - control	0.21	0.17	2.81	50	.01
	008	Statement - the key factor is user	5.31	4.33	1.97	52	.06
	009	Statement - the provider of information	6.00	5.25	1.72	52	.09
	010	Statement - the principal subordinates	4.98	4.58	.98	52	.33
	011	Statement - decision-making style	4.60	3.91	1.35	51	.18
	012	Statement - the resources allocated	3.10	2.58	.90	52	.38
	013	Statement - psychological tests	2.98	2.58	.93	52	.36
14	026	Satisfaction with interviews	4.94	6.00	1.79	20	.09
	027	Satisfaction with complaints	4.06	3.00	1.58	19	.13
	028	Satisfaction with review	5.00	5.13	.28	33	.78
17	077	Service period in the present organisation	17.29	14.68	.70	51	.49
	078	Service period in the present job	3.77	2.86	.79	52	.43

TABLE (7.7)

Chi Square Test For Non-response Bias In The Management Accountant's Questionnaire

Question No.	Variable No.	Description	Chi square	d.f.	α [†]
2	083	Satisfaction with the frequency of the reports	.03	1	.86
5	110	Accountants' co-operation in determining needs	.003	1	.96
7	105	Ask for accountants' interpretation	.65	2	.72
12	055	The relative importance of the attributes - planning	.98	1	.32
	056	The relative importance of the attributes - control	2.26	1	.13
14	018	Whether or not the organisation evaluate the system	.08	1	.77
	020	Using questionnaire	.36	1	.55
	021	Using interviews	.006	1	.94
	022	Managers' complaints	.06	1	.81
	023	Review the reports	-	-	.31*
	024	Other methods	.79	1	.37
15	014	Evaluation should be in special circumstances only	.37	1	.54
	015	Evaluation should be periodically	.37	1	.54
	017	The cycle suggested for periodical evaluation	.45	1	.93
16	101	Studied behavioural accounting	-	-	.59*
	102	Studies psychology	.03	1	.86

† d.f. = degrees of freedom; = significance.

* Fisher's exact test.

7.1.3.4 Questionnaire for Head of Management Accounting Department : Test For Non-response Bias

Although response rate of heads of management accounting departments was very high (90%), a test for non-response bias was performed. Tables (7.8) and (7.9) on pages 347 and 348, respectively present the results. The conclusion which can be drawn from the results in the two tables is that respondents of the questionnaire for head of management accounting department were representative of the sample of heads of management accounting departments.

SECTION 7.2 - DESCRIPTION OF RESPONDENTS' PROFILE

As the approach suggested for evaluating the effectiveness of management information systems mainly was based on the views of the individuals who used the information, provided it, and affected by the decisions taken which were based, among other things, on the information provided and used, it was believed that a description of some characteristics of respondents, which would affect their responses, was necessary. All groups of respondents but the group of heads of management accounting departments were asked to provide information concerning their service period in their present organisations and current jobs; whether or not they studied accounting, psychology, and behavioural accounting. The respondents were also asked to indicate whether or not they had previous experience in designing and development of information systems, and were consulted about the content and format of the reports currently received. They were also asked to reveal their decision-making styles.

The characteristics examined in this study, obviously, were not all the possible characteristics of the respondents. As the

TABLE (7.8)

Results of T-test For Non-response Bias In The Questionnaire Of Head Of Management Accounting Department

Question No.	Variable No.	Description	Mean*		t	T-test d.f.	α
			1st M	2nd M			
3	27	Strategic planning - points	43.20	42.00	.07	18	.95
	28	Tactical planning - points	48.75	33.00	1.03	19	.32
	29	Management control - points	61.56	62.00	.04	19	.97
	30	Operational control - points	50.63	33.00	1.31	19	.21
6	47	Satisfaction with interviews	5.50	4.00	3.67	6	.01
	49	Satisfaction with review	5.13	5.00	.13	9	.90
10	68	Managers' participation in system design	4.55	4.33	.28	24	.78
11	75	Satisfaction with discussions	4.80	4.60	.35	18	.73
14	08	Statement - the key factor is user	5.75	5.83	.16	24	.87
	09	Statement - the provider of information	6.55	6.83	1.07	24	.30
	10	Statement - the principal subordinates	5.60	5.33	.55	24	.59
	11	Statement - decision-making style	3.60	3.67	.11	24	.91
	12	Statement - the resources allocated	2.90	2.33	.78	24	.45
	13	Statement - psychological tests	2.35	2.50	.24	24	.81
16	93	Styles affect the reports design	2.60	3.17	.92	24	.37

* 1st M = first mailing; 2nd M = second mailing.

† t = t value; d.f. = degrees of freedom; α = significance.

TABLE (7.9)

Chi Square Test For Non-response Bias In The Questionnaire Of Head Of Management Accounting Department

Question No.	Variable No.	Description	Chi square	d.f.	α
2	19	Other information function	.06	1	.80
	22	Function title : MIS	-	-	.28*
	23	Function title : information and statistics	-	-	.55*
	24	Function title : other	-	-	.51*
	25	To whom is the manager responsible?	1.63	2	.44
4	31	The organisation evaluates the system	-	-	1.00*
	33	Effectiveness is evaluated	.13	1	.72
	34	Efficiency is evaluated	3.60	1	.06
	35	The system is reviewed	.18	1	.67
5	36	The system is evaluated in special circumstances only	-	-	.80*
	37	The system is evaluated periodically	-	-	.80*
	39	The interval of the periodical evaluation	-	-	.75*
6	41	Using questionnaires	-	-	.89*
	42	Using interviews	-	-	.69*
	43	Managers' complaints	-	-	.44*
	44	Review the reports	-	-	.58*
	45	Other	-	-	.58*
7	52	Effectiveness criteria : managers' satisfaction	-	-	.42*
	53	Effectiveness criteria : decisions outcomes	-	-	.56*
	54	Effectiveness criteria : other	-	-	.42*

† d.f. = degrees of freedom; α = significance.

* Fisher's exact test

TABLE (7.9) - continued

Chi Square Test For Non-response Bias In The Questionnaire Of Head Of Management Accounting Department

Question No.	Variable No.	Description	Chi square	d.f.	α
8	55	Report issued on the effectiveness	-	-	.80*
	58	Report issues - qualitative terms	-	-	.50*
	60	Report issued - comparison	-	-	.75*
9	63	Internal auditors evaluate the system	-	-	.55*
	64	Management accountants evaluate the system	-	-	.91*
	65	System designers evaluate the system	-	-	.32*
	67	Others evaluate the system	-	-	.77*
11	69	System meets managers' needs	-	-	.69
	77	The method used in special circumstances only	-	-	.50*
	78	The method used periodically	-	-	.50*
	80	The interval of the periodical use of the method	-	-	.17*
12	81	Managers' complained	.12	1	.73
	82	Procedures followed to reveal accountants' views	-	-	.33*
13	83	Obtaining subordinates views	.03	1	.85
	86	Subordinates - interviews	-	-	.24*
	87	Subordinates - other	-	-	.06*
15	88	Determining managers' style	-	-	1.00*
17	14	Evaluation should be in special circumstances only	.22	1	.64
	15	Evaluation should be periodically	.22	1	.64
	17	The interval suggested for periodical evaluation	-	-	.49*

† d.f. = degrees of freedom; α = significance.

* Fisher's exact test

respondents might be reluctant to reveal all their traits, it was decided to concentrate on the characteristics which it was thought that respondents would be ready to reveal, meanwhile having a salient effect on their responses. However, it seems that the characteristics examined in this study provided a somewhat complete profile of the respondents.

7.2.1 Respondents' Service Period in the Present Organisation and Job

Table (7.10) and (7.11) on page 351 were prepared to show respondents' working period in their present organisations and jobs. As shown in these two tables, respondents differed in the period of service they spent in their organisations and their current jobs. However, as shown in Table (7.10), a substantial number of respondents (68%) have been working in their organisations more than ten years with an average of 18 years. Only five respondents (3%) had spent less than a year in their organisations, they were senior managers. The table also shows that over two-thirds of respondents of each group have been working more than ten years in their organisations.

Although the largest number of respondents of all respondents as a whole, and of each group separately, have been working in their present organisations more than ten years, it was found that, not surprisingly, less than one-tenth have been working for the same period in their present position. This can be seen from the figures presented in Table (7.11). The table shows also that more than half of all respondents as a whole, and of each group, have been working in their present jobs for periods ranging from 1-5 years with an average for all respondents of 3.9 years.

TABLE (7.10)

Respondents' Service Period In The Present Organisations

Service Period	MGR		ASM		ACC		Total	
	n	%	n	%	n	%	n	%
Less than one year	5	8	-	-	-	-	5	3
1-5 years	9	13	9	18	11	21	29	17
Over 5-10 years	8	12	5	10	7	13	20	12
More than 10 years	45	67	37	73	35	66	117	68
	67	100	51	100*	53	100	171	100
Mean	18.95		17.84		16.70		17.92	
Standard deviation	13.91		11.47		11.28		12.39	
Median	15.00		18.00		13.00		15.92	
Skewness	.29		.38		.57		.42	

MGR = Senior Managers; ASM = Assistant Managers;
ACC = Management Accountants

* Total is not 100 due to rounding.

TABLE (7.11)

Respondents' Service Period In The Present Jobs

Service Period	MGR		ASM		ACC		Total	
	n	%	n	%	n	%	n	%
Less than one year	12	18	8	16	8	15	28	16
1-5 years	34	52	26	51	38	70	98	57
Over 5-10 years	14	21	14	28	3	6	31	18
More than 10 years	6	9	3	6	5	9	14	8
	66	100	51	100*	54	100	171	100*
Mean	3.73		4.60		3.56		3.94	
Standard deviation	3.39		4.68		3.50		3.85	
Median	2.00		3.17		2.10		2.42	
Skewness	1.33		2.82		1.85		2.35	

MGR = Senior Managers; ASM = Assistant Managers;
ACC = Management Accountants

* Total is not 100 due to rounding.

7.2.2 Respondents' Accounting, Behavioural Accounting and Psychological Background

As this study is concerned with the effectiveness of the management accounting systems, respondents' accounting background may influence their perception of usefulness of the information provided by these systems and accordingly affect their satisfaction. Table (7.12) presents the proportion of both senior managers and assistant managers who have studied/not studied accounting.

TABLE (7.12)

Respondents' Accounting Background

Group	Senior Managers		Assistant Managers		Total	
	n*	%	n	%	n*	%
Have studied accounting	22	33	16	31	38	32
Have not studied accounting	44	67	35	69	79	68
	66	100	51	100	117	100

Chi-square = 0.007; degrees of freedom = 1; significance = 0.98.

* 1 senior manager (1.5% of 67 or 1% of total 118) did not indicate whether or not he had studied accounting.

The figures in Table (7.12) reveal that almost one-third (33%) of senior managers and assistant managers (31%) had studied accounting.

On the other hand, management accountants, as providers of information, were asked to state whether or not they studied behavioural accounting³ and psychology. The results are presented in Table (7.13) on page 354.

³ Behavioural accounting is "an offspring from the union of accounting and behavioural science. That is, it represents the application of the method and outlook of behavioural science to accounting problems", see (footnote 3 continued on page 353)

As can be seen from the figures in Table (7.13) only two management accountants (4%) indicated that they had studied behavioural accounting. The table shows also that eleven percent of management accountants had studied psychology.

7.2.3 Respondents' Previous Experience in Design and Development of Information Systems

Senior managers and assistant managers were asked to indicate whether or not they had had previous experience in design and development of information systems. Table (7.14) shows the results.

(footnote 3 continued from page 352)

American Accounting Association, Committee On The Relationship of Behavioural Science and Accounting, "Report of the Committee on The Relationship of Behavioural Science and Accounting", The Accounting Review, (Supplement to Vol. XLIX, 1974), p.127, pp.127-139.

For more detail, see also for example:

Shackleton, Ken, "Management Accounting and Behavioural Science", Managerial Finance, (Vol.2, No.3, 1976), pp.270-293;

McInnes, William M., "Behavioural Science - Can We Meet The Challenge?", Accountancy, (May, 1976), pp.52-54;

Ray, G.H. and J.A. Piper, "A Closer Examination of Some Aspects of Behavioural Accounting Research", Management Decision, (Vol.12, No.3, 1974), pp.179-188;

Schiff, Michael and Arie Y. Lewin (Eds), Behavioural Aspects of Accounting, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1974);

Hopwood, Anthony, Accounting and Human Behaviour, (London: Haymarket Publishing Ltd., First Published, 1974);

Lee, T.A., "Psychological Aspects of Accounting", Accounting and Business Research, (Summer, 1972), pp.223-233;

Caplan, Edwin H., Management Accounting and Behavioural Science, (Menlo Park, California: Addison-Wesley Publishing Company, 1971);

American Accounting Association, Committee on Behavioural Science Content of The Accounting Curriculum, "Report of The Committee on Behavioural Science Content of The Accounting Curriculum", The Accounting Review, (Supplement to Vol. XLVI, 1971), pp.247-285;

McRae, T.W., "The Behavioural Critique of Accounting", Accounting And Business Research, (Spring, 1971), pp.83-92;

Bruns, William J., Jr., and Don T. De Coster (Eds), Accounting And Its Behavioural Implications, (New York: McGraw-Hill Book Company, 1969).

TABLE (7.13)

Management Accountants' Background In
Behavioural Accounting and Psychology

Group	Behavioural Accounting		Psychology	
	n*	%	n	%
Have studied	2	4	6	11
Have not studied	50	96	48	89
	52	100	54	100

* 2 management accountants (4% of 54) did not indicate whether or not they have studied behavioural accounting

TABLE (7.14)

Respondents' Previous Experience In Design And Development
Of Information Systems

Group	Senior Managers		Assistant Managers		Total	
	n [†]	%	n*	%	n**	%
Have had experience	56	86	34	68	90	78
Have had no experience	9	14	16	32	25	22
	65	100	50	100	115	100

Chi square = 4.46; degrees of freedom = 1; significance = .03

† 2 senior managers (3% of 67) did not indicate their experience.

* 1 assistant manager (2% of 51) did not indicate his experience.

** 3 respondents (3% of 118) did not indicate their experience.

The figures in Table (7.14) indicate that almost eight out of every ten senior managers and their assistants (78%) have had previous experience in design and development of information systems.

7.2.4 Respondents' Participation In Designing The Management Accounting Systems of Their Present Organisations

In order to examine the extent to which senior managers, as users of information, participated in designing the management accounting systems of their organisations, they were asked to indicate whether or not they had been consulted about the format and content of the reports received (see Appendix 6.6: Manager - Questionnaire, question No.14). The results are presented in Table (7.15).

TABLE (7.15)

Senior Managers' Participation In Designing The Internal Accounting Reports

Managers were consulted about the format and content of:			Mean	S.D.	Median	Skewness
	n	%	%	%	%	%
All of the reports	18	27				
Most of the reports	13	19	79.00	7.36	79.38	.13
Some of the reports	15	22	50.46	6.48	49.69	1.01
Few of the reports	15	22	19.85	8.95	20.63	-.33
None at all	6	9				
	<u>67</u>	<u>100*</u>				

* Total is not 100 due to rounding.

Table (7.15) shows that only 27 percent of senior managers were consulted about the design of all of the reports received. Only six senior managers (9%) indicated that they had not been consulted at all. The table shows also that a considerable proportion

(22%) were consulted about the design of a few of the reports, a similar proportion (22%) were consulted about some of the reports, and 19% about most of the reports.

7.2.5 Respondents' Decision-Making Styles

Senior managers as decision-makers may differ in their strategies by which they operate to reach the decisions which they make. As indicated in Chapter III, the approach adopted in this study divided decision-makers into two styles; analytic and heuristic. The analytic decision-maker reduces a problem to a set of causal relationships and tries to find a solution by using formulae and models. This style tends to use more information and prefers detailed information. The heuristic decision-maker solves problems through intuition and relies more heavily on feedback. This style prefers to use less information and likes aggregated summary reports.

As can be seen from the figures in Table (7.16) the majority of senior managers (82%) tended to be more heuristic.

TABLE (7.16)

Senior Managers' Decision-Making Styles

Decision-Making Style	n*	%
Analytic	12	18
Heuristic	53	82
	65	100

* 2 senior managers (3% of 67) did not indicate their styles

7.2.6 Summary

Although comprehensive traits of the respondents were not obtained, a profile of the respondents participating in this study can be made with the few characteristics available: (a) the majority of respondents (68%) have been working for their present organisations more than ten years; (b) more than half of the respondents (57%) have been working in their current jobs for periods ranging from one to five years; (c) only about one-third (32%) of senior managers and their assistants have studied accounting, also only four percent of management accountants have studied behavioural accounting and eleven percent studied psychology; (d) the majority of senior managers and their assistants (78%) had previous experience in designing and developing information systems; (e) only twenty-seven percent of senior managers were consulted about the format and content of all of the reports received, nineteen percent about most of the reports, twenty-two percent about some of the reports, twenty-two percent about few of the reports, and nine percent were not consulted at all; (f) the largest proportion of senior managers (82%) described themselves as heuristic decision-makers.

SECTION 7.3 - DESCRIPTION AND ANALYSIS OF THE MANAGEMENT ACCOUNTING SYSTEMS AND THE POLICIES APPLIED IN EVALUATING THEIR EFFECTIVENESS

7.3.1 Description of the Systems Currently in Operation

The management accounting systems were not, of course, the only formal information systems of the organisations participating in this study. The investigation indicated that in 54 percent of the organisations, other specialised information functions than the accounting functions had been found. The majority of these organi-

sations (79%) had only one specialised information function in addition to the accounting function, while twenty-one percent of these organisations had more than one function. In sixty-four percent of the organisations this function was called "Information and Statistics", while in fifty percent they were called "Management Information Systems". Only two organisations (14%) gave this function different titles such as "Management Services" and "Financial Appraisal". The manager of this function was directly responsible to the finance director in fifty percent of the organisations, to the chief executive in a much smaller proportion (21%) of the organisations, in twenty-nine percent of the organisations the manager was directly responsible to other persons with different titles such as general director, deputy director, and director of economic planning.

As this study was concerned with the effectiveness of the management accounting systems, it was necessary to describe these systems and to reveal their relationships with the other specialised information functions in the participating organisations. The investigation indicated that all but two of the management accounting systems (92%) were partially computerised. Only one system (4%) was completely computerised, while another one (4%) was not computerised at all. The majority of the management accounting systems (79%) were partially integrated with the other specialised information functions in the participating organisations, fourteen percent were completely integrated, while only one system (7%) was an entirely separate system.

However, as shown in Table (7.17) on page 359, the management accounting systems provided slightly over sixty percent (62%) of

the information used by managers in management control, and not much less than this proportion of the information used in operational control, tactical planning, and strategic planning; 46%, 45% and 43% respectively (see Appendix 6.5: question No.3).

TABLE (7.17)

Proportions Of Information Provided By The Management Accounting Systems Of The Total Information Used By Managers In The Managerial Functions*

The Managerial Functions	Mean	S.D.	Median	Skewness
Strategic Planning	42.90	32.81	34.50	.29
Tactical Planning	45.00	29.96	40.00	.42
Management Control	61.67	20.33	60.00	.004
Operational Control	46.43	26.79	49.38	.07

*5 Heads of management accounting departments (19% of 26) did not indicate the proportions of the information provided by the systems.

From the points of view of senior managers, as users of information, the accounting function was still the main source of information in the organisations participating in this study. Senior managers were asked to indicate the proportions of the information provided by the accounting function, their own functions, and other functions (see Appendix 6.6 : Manager - Questionnaire, question No. 1). The results are presented in Table (7.18) on page 361.

Table (7.18) shows that forty-one percent of the information used by senior managers was provided by the accounting function, while their own functions and other functions provided thirty-eight percent and twenty-one percent, respectively.

The accounting information provided for senior managers was based on different reporting periods ranging from once annually to once a week. In order to reveal the reporting periods which were

most frequently used by the organisations participating in this study, senior managers were asked to indicate the frequency and the number of the internal accounting reports which they were receiving (see Appendix 6.6 : Manager - Questionnaire, question No.3). Table (7.19) on page 361 shows the results of this investigation.

As can be seen from the figures in Table (7.19) the most frequently used period by the participating organisations for providing senior managers with the accounting information was monthly. The vast majority of senior managers (96) were receiving internal accounting reports once a month. The table shows also that sixty percent of senior managers were receiving reports once annually. The reports provided once quarterly and once a week were being received by a considerable proportion of senior managers, forty-eight and forty-three percent respectively. A small proportion of senior managers (10%) were receiving reports once bi-annually.

The average of the reports received once a month was five reports, while the average was four and three for the reports received once a week and once quarterly, respectively. Two reports, on average, were being received once bi-annually as well as once annually, as shown in Table (7.20) on page 363.

7.3.2 Organisations' Policies in Evaluating The Effectiveness of The Systems

An investigation indicated that a considerable proportion (48%) of the organisations participating in this study were not evaluating the effectiveness of their management accounting systems systematically and in regular manner. However, the majority of the participating organisations (87%) had, at least, methods for making sure that their systems had met the informational needs of managers

TABLE (7.18)

Proportion Of The Information Provided By The Accounting
Function From Senior Managers' Viewpoints*

Information Provided By:	Mean	S.D.	Median	Skewness
The Accounting Function	41.06	26.35	34.00	.47
Manager's Function	37.61	24.32	39.70	.14
Other Functions	21.33	18.93	19.79	.96
	100			

* 6 senior managers (9% of 67) did indicate the proportion of the information provided.

TABLE (7.19)

The Frequency Of The Internal Accounting Reports
Received By Senior Managers

Reports Received:	Number and Percentage of Senior Managers	
	n	%
Once a week	29	43
Once a month	64	96
Once quarterly	32	48
Once bi-annually	7	10
Once annually	40	60
Other	4	6

(see Appendix 6.5 : Questionnaire For Head of Management Accounting Department, question No. 11). All of these organisations were relying on the discussions with managers as an approach for making sure that managers' informational needs had been met. Less than half of these organisations (45%) were periodically applying this approach. In fact, the vast majority of heads of management accounting departments (90%) were satisfied with this approach, only two (10%) stated they were dissatisfied with this method. However, the mean score of satisfaction was 4.75 (standard deviation 1.07) on a 7-point scale.

As this study was concerned with the systematic and regular evaluation of the effectiveness of the management accounting systems, heads of the management accounting departments were asked whether or not their organisations were evaluating the effectiveness of the systems (see Appendix 6.5 : question No. 4). The results are presented in Table (7.21) on page 363.

The figures in Table (7.21) indicated that the majority of the organisations participating in this study (68%) were reviewing their management accounting systems to make sure that the procedures were being followed. The table shows also that slightly over fifty percent (52%) of the organisations were evaluating the effectiveness of their systems.

A further investigation indicated also that only thirty-one percent of the organisations were periodically evaluating the effectiveness of their management accounting systems. Annual evaluation of the effectiveness of the management accounting systems was adopted by the majority (75%) of the organisations which were evaluating their systems periodically.

TABLE (7.20)

Number Of The Internal Accounting Reports
Received By Senior Managers*

Reports Received	Mean	S.D.	Median	Skewness
Once a week	4	3.06	3	1.29
Once a month	5	3.63	4	1.82
Once quarterly	3	2.14	2	1.01
Once bi-annually	2	2.14	2	1.81
Once annually	2	1.81	1	1.23

* 25 senior managers (37% of 67) did not state the number of reports received, although they pointed out that they received reports on one or more of the periods mentioned in the table.

TABLE (7.21)

Proportion Of The Organisations Who Were Evaluating Their
Management Accounting Systems And The Types of Evaluation

Type of Evaluation	Number and Percentage of the Organisations	
	n	%
Effectiveness	13	52
Efficiency	7	27
Review of the system	17	68
None	1	4

Reviewing the content and format of the reports was the most widely used method applied in evaluating the effectiveness of the management accounting systems. This method was being used by eighty-five percent of the organisations. The second most widely used method was interviews, which was applied by sixty-two percent of the organisations. Slightly over half of the organisations (54%) were relying on managers' complaints about reports in evaluating the effectiveness of the systems. Only three organisations (23%) were using questionnaires. The results mentioned above are presented in Table (7.22).

TABLE (7.22)

The Methods Used In Evaluating The Effectiveness Of The Management Accounting Systems

Method Used	Number and Percentage of The Organisations	
	n	%
Review of the reports	11	85
Interviews	8	62
Managers' Complaints	7	54
Questionnaires	3	23

A further analysis of these methods indicated that generally, heads of management accounting departments were satisfied with the methods used in evaluating the effectiveness of the systems. Table (7.23) on page 365 presents the distribution of their satisfaction with these methods (see Appendix 6.5 : question No.6).

The majority (85%) of the organisations participating in this study were using managers' satisfaction with the information provided as criterion in determining the effectiveness of the management accounting systems. Much less than this proportion (46%) were using decisions outcomes. Only thirty-one percent of the

TABLE (7.23)

Satisfaction Of Heads Of Management Accounting Departments With The Methods
Used In Evaluating The Effectiveness Of The Systems

Method Used	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
Review of the reports	-	9	-	18	18	55	-	5.09	1.30	5.58	-1.32
Interviews	-	-	-	25	38	38 [†]	-	5.13	.84	5.17	- .22
Managers' complaints	-	14	29	43	14	-	-	3.57	.98	3.67	- .21
Questionnaires	-	-	23	67	-	-	-	3.67	.58	3.75	- .71

* A 7-point scale was used.

† Total is not 100 due to rounding.

organisations were applying both managers' satisfaction and decisions outcomes (see Appendix 6.5 : question No.7).

Further, the investigation revealed that about one-third (31%) of the organisations were issuing reports on the effectiveness of their management accounting systems. It was perhaps surprising to find that only twenty-five percent of these organisations indicated in the reports issued comparisons with the findings of previous evaluations, while seventy-five percent of the organisations did not (see Appendix 6.5 : question No.8).

In the majority of the organisations (67%), the persons who were in charge of evaluating the effectiveness of the management accounting systems were management accountants. In forty-two percent of the organisations the systems were evaluated by system designers. It was perhaps unexpected to find that in only twenty-five percent of the organisations which were evaluating the effectiveness of their management accounting systems, internal auditors were in charge of this task. In fact, in the majority of the organisations (67%), more than one of the specialists mentioned above were in charge of this function. In a considerable proportion (38%) of the organisations, both systems designers and management accountants were evaluating the effectiveness of the systems. In a much smaller proportion of organisations (13% - 25%), other combinations of those specialists were used (see Appendix 6.5 : question No.9).

SECTION 7.4 - SUMMARY AND CONCLUSIONS

The purpose of this chapter was to ascertain that each group of the respondents participating in this study was representative of the sample of the group. The purpose of the chapter was also to determine the respondents' profile, that is their characteristics which might affect their responses. In this chapter, the management accounting systems of the participating organisations were described, and the policies applied in evaluating the effectiveness of these systems were highlighted as well.

In fact, response rate was relatively high, compared with the surveys using mailed questionnaires either for the total sample or for the sample of each group of respondents; namely, senior managers, assistant managers, management accountants, and heads of management accounting departments. The overall response rate was 82%, the response rate of each group of respondents was also at the same level of the overall response rate, with the exception of the response rate of the group of heads of management accounting departments which was 90%. In addition to the high response rates, the respondents of each group were representative of the sample of the group. Both t-test and chi square indicated that non-response bias did not exist.

A majority (68%) of the respondents participating in this study have been working for their present organisations more than ten years, a smaller proportion (57%) have been working in their current jobs from 1-5 years. Thirty-two percent of senior managers and their assistants have studied accounting. A very small proportion (4%) of management accountants have studied behavioural accounting, and only eleven percent studied psychology. A majority (78%) of

senior managers and their assistants had previous experience in designing and developing information systems. However, only twenty-seven percent of senior managers were consulted about the format and content of all of the reports received, while nineteen percent were consulted about most of the reports, twenty-two percent about some of the reports, another twenty-two percent about a few of the reports, and nine percent were not consulted at all. The majority (82%) of senior managers were heuristic decision-makers.

The management accounting systems of the organisations participating in this study were generally computerised, ninety-two percent of the systems were partially, while only one system (4%) was completely, computerised. The majority of these systems (79%) were partially integrated with other specialised information functions in the participating organisations. However, the management accounting systems provided a considerable proportion (41%) of the information used by managers. The most frequently used period by the participating organisations for providing senior managers with the accounting information was monthly, ninety-six percent of senior managers were receiving the internal accounting reports on this basis.

Slightly over fifty percent (52%) of the participating organisations were evaluating the effectiveness of their management accounting systems, only thirty-one percent of these organisations were periodically evaluating the systems. Annual evaluation was adopted by seventy-five percent of the organisations. Reviewing the content and format of the reports was the most widely used method being applied in evaluating the effectiveness of the systems, followed by interviews. However, regular reports on the effective-

ness of the management accounting systems were not being issued by a majority (69%) of these organisations. The persons in charge of evaluating the effectiveness of the systems were management accountants in sixty-seven percent of the organisations. In forty-two percent of the organisations the systems were evaluated by system designers. However, in a considerable proportion of the organisations (38%) both management accountants and system designers were in charge of evaluating the effectiveness of the systems.

CHAPTER VIII
RESEARCH FINDINGS

In Chapters V and VI the conceptual and the operational frameworks of the approach suggested for evaluating the effectiveness of management information systems were presented. As discussed in these chapters, the suggested approach is based on the assumption that users' satisfaction with the information provided by an information system is a feasible substitute for measuring the effectiveness of that system. It is assumed that each need for a decision causes a search for "useful information". If the decision-maker, the user of the information, perceives that a formal information system was designed to provide such information, he would first rely on and/or query that source for the information needed. If the information available is useful, that is relevant, reliable, sufficient, timely, and understandable, then the present information system is satisfactory; no expanded search to less familiar information sources is required by the decision-maker.

An expanded search, indeed, is a cause of frustration to the decision-maker because of the delay and the utilisation of excessive resources caused by lacking useful information. In a psychological sense, the information system causes the frustration by actually blocking the decision-maker from making a decision entirely and/or effectively. In fact, the information system is continually evaluated by users of the information as decisions are made. The more frequently the user finds the information provided by the system is useless or not as useful as he expects, the more he is frustrated by the system. In other words, the more the decision-maker is frustrated, the less satisfaction he has with the information system.

Satisfaction with an information system, however, is influenced by some psychological factors such as perception, the motivational effect of the information provided, and the decision-making style of the user of the information. Also, some demographic characteristics of the user and other factors may affect his satisfaction such as: the service period in his organisation, the educational background, past experience in design and development of the information system, participation in the design of the system now in operation, and the policy adopted by his organisation in evaluating the effectiveness of the information system.

Although user satisfaction is the core of the suggested approach, the views of another two persons should be taken into consideration. The first one is the provider of the information; does he really know the actual informational requirements of the decision-makers? The other one is the person affected by the decisions taken which are based on, among other things, the information provided; does he agree that the decision-maker appeared to have all useful information?

As the value of the suggested approach lies in its practicability and validity, it was decided to test it in evaluating the effectiveness of the management accounting systems in the nationalised industries (public utilities and other organisations). The results of this application are presented and analysed in this chapter, which is divided into nine sections as follows:

- (1) Managers' satisfaction with the information provided
- (2) The influence of some demographic characteristics on managers' satisfaction.
- (3) The influence of the decision-making style on managers' satisfaction.
- (4) The relationship between managers and accountants and its effect on managers' satisfaction.

- (5) The effect of evaluating the effectiveness of the management accounting systems on managers' satisfaction.
- (6) The modified semantic differential technique as a device for evaluating the approach of managers' satisfaction.
- (7) Managers' satisfaction and the effectiveness of the management accounting systems.
- (8) The acceptability of the approach suggested for evaluating the effectiveness of management information systems.
- (9) Summary and conclusions.

SECTION 8.1 - MANAGERS' SATISFACTION WITH THE INFORMATION PROVIDED

8.1.1 The Overall Satisfaction With The Information Provided

8.1.1.1 Senior Managers' Satisfaction

It was stressed in Chapter V that user's satisfaction with the information provided is the key factor in evaluating the effectiveness of an information system. In order to measure user's satisfaction, two different questions were asked. One was direct while the other was based on the semantic differential technique. This section presents the results of the direct question. Section 6 will discuss the findings of the application of the semantic differential.

Senior managers in the organisations participating in the research project were asked their opinion, as users of information, on the management accounting systems now in operation (see Appendix 6.6 : Manager - Questionnaire, question No. 8). The purpose of the question was to reveal to what extent senior managers were satisfied with the internal accounting reports which they receive. The satisfaction with the information provided for use in planning and for use in control was investigated.

In order to measure senior managers' satisfaction, five criteria

were used, they were: relevance, reliability, sufficiency, timeliness and understandability. As discussed in Chapter II, these criteria should be fulfilled in order to provide useful information. The senior managers were also asked to express their overall rating of the reports received. For this purpose, "usefulness" as the major (inclusive) criterion was used.

Indeed, both the five criteria and the criterion of "usefulness" measure the same aspect; namely user's satisfaction with the information provided. Double measures, however, allowed a check on consistency in satisfaction scores. If the average scores of the five criteria do not differ significantly from the scores of the criterion of usefulness, one may consider that the question concerned adequately measures stated (actual) satisfaction. The overall satisfaction measured by the sole criterion of usefulness will be presented firstly on the following pages, while that generated by the set of the five criteria will be shown later in this section.

The senior managers' overall scores, i.e. overall satisfaction with the internal accounting reports, are shown in Table (8.1) on page 374.

As can be seen from Table (8.1), 20 percent of senior managers were not satisfied (1, 2, or 3) with the information provided for use in planning. Only one senior manager of the 65 was totally

TABLE (8.1)

Senior Managers' Overall Satisfaction With The Information Provided

The Information Used In	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
Planning †	2	6	12	46	12	14	8	4.34	1.34	4.15	0.19
Control	2	8	12	37	12	15	13**	4.54	1.51	4.28	0.05

* A 7-point scale was used where 1 = dissatisfied, 4 = satisfied, and 7 = highly satisfied.

** Total is not 100 due to rounding.

† 2 responses (3% of 67) did not indicate their ratings on this scale.

dissatisfied. At the other extreme, five managers (8%) ranked their level of satisfaction as 7, that is, highly satisfied. The table shows also that 22 percent of senior managers were not satisfied with the information provided for use in control, only one senior manager was totally dissatisfied. In contrast, nine managers (13%) were highly satisfied. Indeed, most senior managers (80%, 77%) expressed feelings of satisfaction with the information provided for use in planning and control. Figures (8.1) and (8.2) on page 376 present histograms of senior managers' overall satisfaction with the information provided for use in planning and control, respectively.

The mean score of managers' satisfaction with the information provided for use in planning was 4.34 (satisfied), and the median was 4.15. Regarding the information provided for use in control, the mean and the median were 4.54 (satisfied) and 4.28, respectively. These figures indicate that senior managers were merely satisfied with their management accounting systems, but not highly satisfied. With these results it appears that there is room for improvement in most of the management accounting systems of the organisations participating in the research project.

From the results previously presented, it seems that senior managers were more satisfied with the information provided for use in control (the mean was 4.54) than with that provided for use in planning (the mean was 4.34). The t-test was used to examine the difference between these two means. The result indicated that the difference was not significant at the .05 or at .10 levels. With 64 degrees of freedom the t-value was equal to 1.12 which is significant at .27 level for the two-tailed test.

FIGURE (8.1)

Histogram of Senior Managers' Overall Satisfaction With The Information Provided For Use In Planning

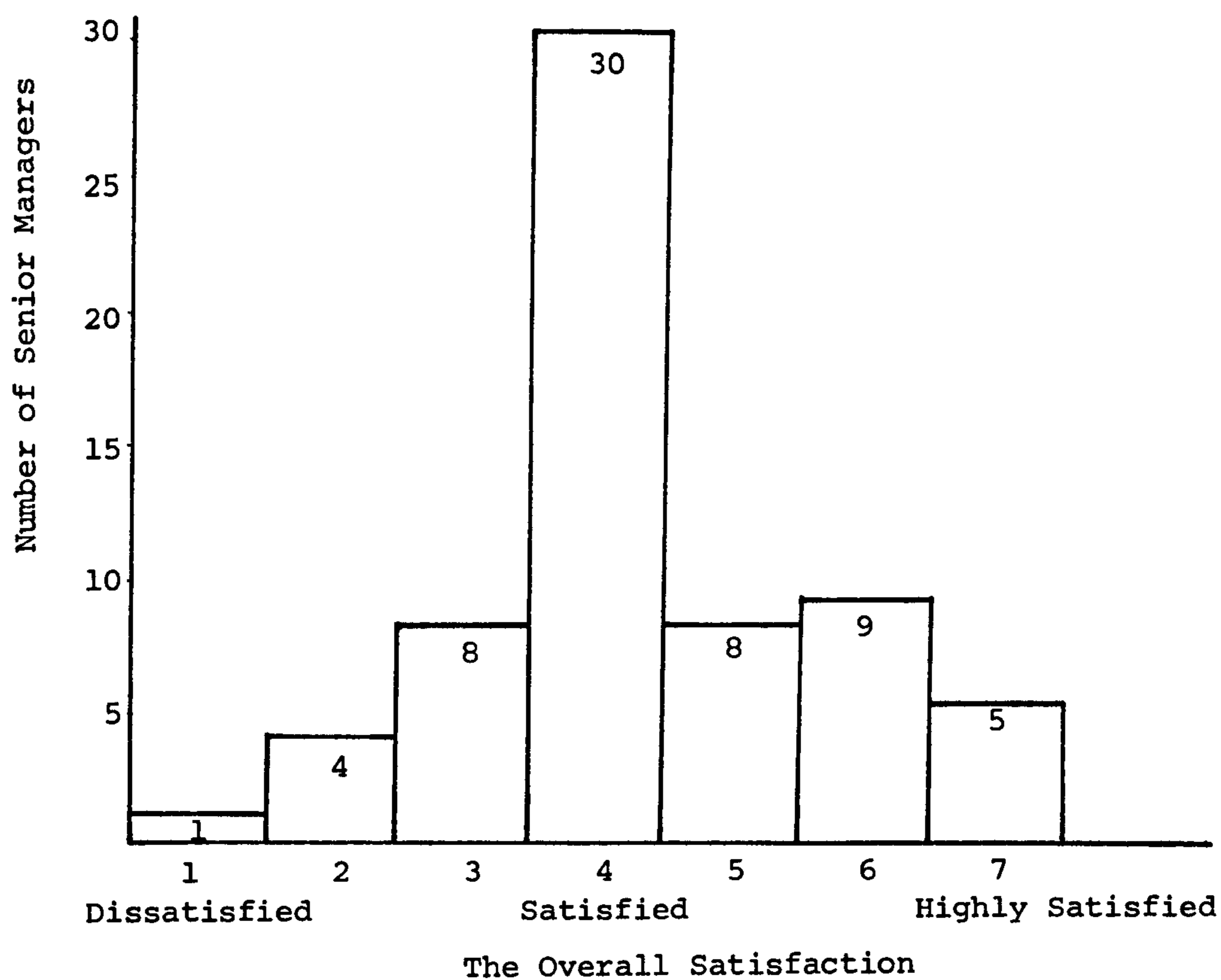
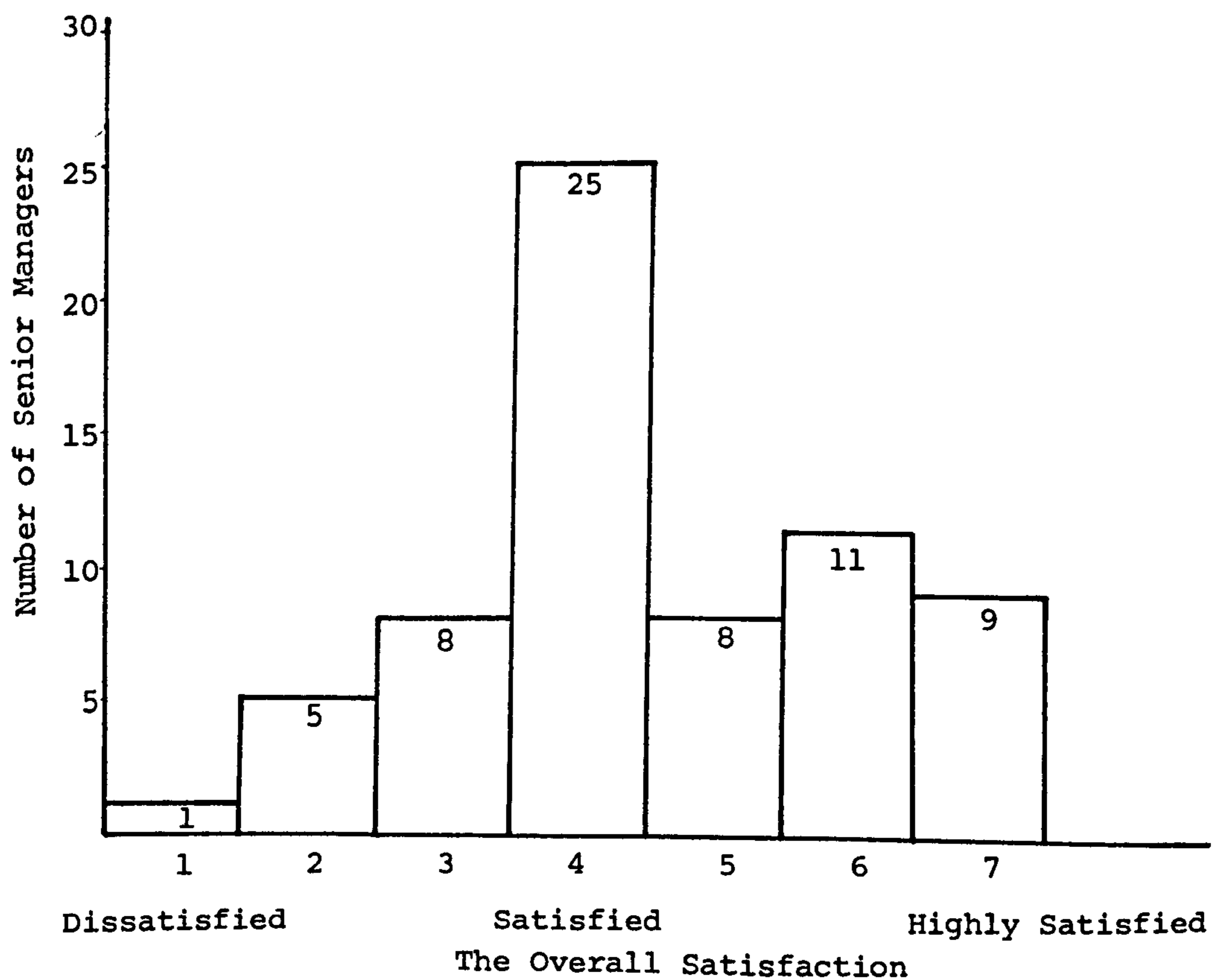


FIGURE (8.2)

Histogram of Senior Managers' Overall Satisfaction With The Information Provided For Use In Control



As the overall satisfaction with the information provided for use in planning and control was already measured, it was necessary to measure the overall satisfaction with the management accounting systems as a whole. The scores extracted were in ten groups; in order to present them in less and more meaningful categories, it was decided to regroup them. The scores of the overall satisfaction were divided into five groups as follows: (1) high satisfaction (7 points score); (2) above the level of satisfaction (above 4 and less than 7 points score); (3) the level of satisfaction (4 points score); (4) below the level of satisfaction (above 1 and less than 4 points score); (5) high dissatisfaction (1 point score). The results are presented in Table (8.2).

TABLE (8.2)

Senior Managers' Overall Satisfaction With Their
Management Accounting Systems

Scores of the Overall Satisfaction	Number and Percentage of Managers	
	n*	%
High satisfaction	5	8
Above the level of satisfaction	21	32
The level of satisfaction	22	34
Below the level of satisfaction	17	26
High dissatisfaction	-	-
	65	100
Mean = 4.42; Standard deviation = 1.29; Median = 4.10; Skewness = .41		

* 2 respondents (3% of 67) indicated their satisfaction with one aspect of the systems' performance, thus they were excluded.

The figures shown in Table (8.2) reveal that only five senior managers (8%) claimed that they were highly satisfied with their

management accounting systems as a whole. None of the senior managers indicated that they were totally dissatisfied with both the information provided for planning and control. However a considerable proportion of senior managers (26%) were not satisfied with their systems. Thirty-four percent of senior managers were satisfied, and 32 percent had overall satisfaction scores above the level of the average satisfaction (more than 4 points score). The mean score of the overall satisfaction with the management accounting systems was 4.42, that is slightly over the level of satisfaction (4 points score). The implication of this result is that one or more of the management accounting systems' aspects could be improved in order to increase senior managers' overall satisfaction. This will be discussed later in this section.

8.1.1.2 Assistant Managers' Satisfaction

In order to ascertain how the management accounting systems were effective, the assistant managers, as persons responsible for carrying out the decisions taken by the senior managers and affected by such decisions, were asked to express their views on the information provided to their superiors. In fact, the 51 assistant managers participating in the research project stated that they knew the content of the internal accounting reports which their superiors (senior managers) received. Thirty-nine percent claimed that they knew the content of all reports, 45 percent knew the content of most of the reports and 10 percent knew the content of some reports. That is 84 percent of the assistants knew, at least, the content of most of the reports. Only three assistants (6%) stated that they

knew the content of a few reports (about 22% of the reports).¹

The assistant managers' views on the information provided for their superiors (see Appendix 6.7 : Assistant Manager - Questionnaire, question No. 2) are presented in Table (8.3) on page 380 compared with their superiors' overall satisfaction.

The figures presented in Table (8.3) showed that about one-quarter of the assistant managers, as persons affected by the decisions taken, were not satisfied with the information provided to their superiors, either for planning or for control. However, a significant difference between the means of the overall satisfaction of senior managers, as users of the information, and assistant managers, as persons affected by the decisions taken, did not exist at the .01 level. Two different statistics were used, t-test and chi-square. Both indicated the conclusion mentioned above. The implication of this result is that assistant managers, as persons affected by the decisions taken agree that their superiors have been provided with all useful information. However, the mean scores of assistant managers' assessment of the appropriateness of the information provided to the senior managers for planning and control

¹ The 67 senior managers participating in this study confirmed that their principal subordinates (assistant managers) knew the content of the internal accounting reports received by senior managers. Forty-six percent of senior managers indicated that their assistants knew the content of all reports, 39 percent mentioned most of the reports and 13 percent some of the reports. That is, 85 percent of senior managers indicated that their assistants knew, at least, the content of most of the reports. Only one senior manager mentioned that his assistants knew the content of few of the reports which he received.

Indeed, the assistant managers' answers to the question concerned were not significantly different from the managers' answers at the .01 level. As the number of assistants and managers who stated few reports were only 3 and 1 respectively, it was decided to combine such a small group into the group of respondents who stated "some reports" and run a chi-square test with a smaller number of groups. With two degrees of freedom the chi-square was equal to .86, which is significant at .65 level.

TABLE (8.3)

Comparison Between Senior Managers' And Assistant Managers'
Overall Satisfaction With The Information Provided

The Information Provided for Use in:	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
<u>Planning:**</u>											
Managers	2	6	12	46	12	14	8	4.34	1.34	4.15	0.19
Assistants	-	8	17	40	17	17	2	4.23	1.23	4.13	0.12
<u>Control: †</u>											
Managers	2	8	12	37	12	15	13	4.54	1.51	4.28	0.05
Assistants	4	4	16	34	24	16	2	4.26	1.31	4.27	-0.38
	<u>T value</u>	<u>Degrees of Freedom</u>		<u>Signifi- cance</u>	<u>Chi- Square</u>	<u>Degrees of Freedom</u>		<u>Signifi- cance</u>			
Planning	0.44	111		0.66	0.61	2		0.74			
Control	1.04	115		0.30	0.21	2		0.90			

* A 7-point scale was used where 1 = dissatisfied (inappropriate); 4 = satisfied (appropriate) and 7 = highly satisfied (highly appropriate).

** Two senior managers (3% of 67) and three assistant managers (6% of 51) did not indicate their ratings on this scale.

† One assistant manager (2% of 51) did not indicate his rating on this scale.

*** Total is not 100 due to rounding.

were 4.23 and 4.26 respectively. That is the information provided was appropriate, but not highly appropriate. The implication of this result is that there is still room for improvement in most management accounting systems.

8.1.1.3 Management Accountants' Views

Management accountants, as providers of information, were asked to express their views regarding the levels required by senior managers of the information attributes. Two measures were used to elicit their views; an inclusive measure (overall rating), and the five criteria mentioned previously (see Appendix 6.8 : Management Accountant - Questionnaire, question No. 3). Table (8.4) shows the results.

TABLE (8.4)

Management Accountants' Views On The Information Attributes
As Required By Senior Managers

The Information Required For Use In:	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
Planning	-	2	7	65	7	19	-	4.33	.93	4.13	0.57
Control	-	2	15	48	17	13	6	4.41	1.13	4.19	0.60

* A 7-point scale was used where 1 = unreasonable, 4 = reasonable and 7 = very reasonable.

As can be seen from Table (8.4), the majority of management accountants (91%) indicated that the levels required by senior managers of the attributes of the information needed for use in planning were reasonable. Regarding the attributes of the information needed for use in control, 84 percent of management accountants expressed the same opinion. The implication of these results is that the users of information, senior managers, and the providers of information, management accountants, were in agreement regarding the acceptable levels of the information attributes.

8.1.2 Satisfaction with the Information Attributes

8.1.2.1 Senior Managers' Satisfaction

As discussed in Chapter II, information has no intrinsic value, any value is realised through the influence it may have on the decision-making. Such influence is extracted through human decision-makers. Thus, the value the users attribute to information is its usefulness for the decision in hand. Indeed, usefulness of information is determined by the utilities which it may possess. Information may have little value because it reaches the user too late, is inaccurate, too complex, insufficient, and/or irrelevant. Thus, the value of the information is its various attributes which make it desirable or useful, or the degree to which it possesses these attributes. It was believed that if information is to be useful, it should be relevant, reliable, sufficient, timely and understandable. These five attributes were used as information criteria, each measuring one of the information utilities.

The five criteria mentioned above were used to measure users' satisfaction with each information attribute. As previously stated, senior managers were asked to indicate their overall satisfaction with the information provided by the management accounting systems. For this purpose, the criterion of "usefulness" was used. Also, they were asked to evaluate the presence of each information attribute; the five criteria were used to achieve this purpose (see Appendix 6.6 : Manager - Questionnaire, question No. 8). This duplication in the measurement of satisfaction, however, was necessary. Although the overall satisfaction is needed, it is not solely sufficient to highlight the attributes which may need to be improved. Overall satisfaction completely hides the degrees of presence of each information attribute.

Indeed, the literature did not provide conclusive evidence that these five criteria measure the various dimensions of "usefulness", therefore it was decided to examine whether these criteria actually measured the possible dimensions of usefulness. Senior managers' overall satisfaction, measured by the sole criterion of usefulness was compared with the overall satisfaction measured by the set of the five criteria. The following hypothesis is thus proposed:

H1 : Senior managers' overall satisfaction measured by the set of the five criteria is compatible with the overall satisfaction measured by the sole criterion of usefulness.

This hypothesis is divided into two testable sub-hypotheses that relate to the association between the scores of the overall satisfaction generated by the two measures, and the differences between these scores:

H1-A : High overall satisfaction measured by the set of the five criteria are associated with high overall satisfaction measured by the sole criterion of usefulness.

H1-B : The overall satisfaction measured by the set of the five criteria are not significantly different from that measured by the sole criteria of usefulness.

As previously discussed in Chapter VI, the scales used in this study are treated as interval scales. Thus, Pearson's correlation coefficient was used to test the sub-hypothesis one-A. The correlation coefficient between the two scores of the overall satisfaction measured by the criterion of usefulness and the set of the five criteria was found to be .87 (significance = .00) for the information provided for use in planning and .94 (significance = .00)

for the information provided for use in control. As these coefficients were significant, positive and very large, the sub-hypothesis one-A is accepted.

To test the sub-hypothesis one-B, the t-test was used. The grand mean of the overall satisfaction with the information provided for use in planning, when the five criteria were employed in the measurement, was 4.25, while the mean score of the overall satisfaction measured by the criterion of usefulness was 4.34. With 64 degrees of freedom the t was equal to 1.11 which is significant at .27 level for the two-tailed test. This means that a significant difference between these two means did not exist at .01 level of significance. Also, a significant difference did not exist at the same level between the grand mean of the overall satisfaction with the information provided for use in control measured by the set of the five criteria (4.55) and the mean of the overall satisfaction measured by the criterion of usefulness (4.54). The t was equal to .19 which is significant at .85 for the two-tailed test. From this evidence, the sub-hypothesis one-B is accepted.

Acceptance of the two sub-hypotheses of Hypothesis One support that hypothesis. This means that senior managers' overall satisfaction with the information provided is consistent when measured by both the sole criterion of usefulness and the set of the five criteria (i.e. relevance, reliability, sufficiency, timeliness and understandability). In other words, the five information criteria actually measure the possible dimensions of usefulness.

Tables (8.5) and (8.6) on page 385 were prepared to present the senior managers' ratings of each attribute of the information provided for use in planning and control.

TABLE (8.5)

Senior Managers' Satisfaction With Each Attribute
Of The Information Provided For Use In Planning

Attributes	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
Relevance	-	5	20	46	9	11	9	4.29	1.30	4.05	0.66
Sufficiency	-	8	25	37	17	6	8 [†]	4.12	1.29	3.98	0.60
Timeliness	2	8	29	31	14	6	11 [†]	4.09	1.46	3.88	0.54
Reliability	-	3	20	40	14	11	12	4.46	1.35	4.17	0.55
Understan- dability	-	6	20	45	11	8	11 [†]	4.26	1.34	4.03	0.66

* A 7-point scale was used where 1 = dissatisfied, 4 = satisfied and 7 = highly satisfied.

2 respondents (3% of 67) did not indicate their satisfaction.

† Total is not 100 due to rounding.

TABLE (8.6)

Senior Managers' Satisfaction With Each Attribute
Of The Information Provided For Use In Control

Attributes	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
Relevance	2	2	15	37	12	13	19	4.75	1.49	4.36	0.14
Sufficiency	-	3	21	37	6	15	18	4.63	1.50	4.20	0.38
Timeliness	3	12	24	28	9	8	16	4.16	1.69	3.90	0.36
Reliability	-	5	15	42	12	8	19 [†]	4.61	1.47	4.23	0.43
Understan- dability	2	2	16	42	12	9	18 [†]	4.60	1.46	4.23	0.34

* A 7-point scale was used, where 1 = dissatisfied, 4 = satisfied and 7 = highly satisfied.

† Total is not 100 due to rounding.

As can be seen from the figures in Table (8.5) the proportions of senior managers who were dissatisfied with the attributes of relevance, sufficiency, timeliness, reliability and understandability were 25%, 33%, 39%, 23% and 26% respectively. An examination of these figures points out that a large proportion of senior managers (39%) were dissatisfied with the timeliness of the information provided for use in planning. Another interesting observation is that the largest proportion of senior managers (77%) were satisfied with the degree of reliability. Further, timeliness had a mean score of 4.09 (the lowest score given by senior managers), while reliability had a mean score of 4.46 (the highest score given). A possible explanation of these results is that timeliness was sacrificed to provide more accurate information. However, there was no evidence to support this explanation.

Table (8.6) presents senior managers' satisfaction with the same attributes of the information provided for use in control.

Indeed, the results presented in Table (8.6) were somewhat surprising. Although the internal accounting reports were considered more important for control than for planning,² a relatively high proportion of senior managers (39%) were dissatisfied with the timeliness of the information provided. Further, about one-quarter of the managers indicated dissatisfaction with the attribute of sufficiency. This may be attributed either to too little or too much information. Later in this section this point will be discussed in detail. However, the majority of senior managers (about 80%) were satisfied with relevance, reliability and understandability of the information.

² See Table (8.62) on page 529.

Generally, senior managers were more satisfied with the attribute of the information provided for control than for planning. Table (8.7) presents the means of the satisfaction with these attributes. As can be seen from the figures in this table, the means of the satisfaction with the attributes of the information provided for control were relatively higher than those related to planning. The differences between the means were significant at the conventional significance level (0.05) for three attributes; relevance, sufficiency, and understandability. A significant difference did not exist for the other two attributes, timeliness and reliability at the same level (0.05).

TABLE (8.7)

Comparison Between Senior Managers' Satisfaction With The Attributes Of The Information Provided For Planning And The Attributes Of The Information Provided for Control

The Information Used In	The Information Attributes									
	Relevance		Sufficiency		Timeliness		Reliability		Understandability	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Planning*	4.29	1.30	4.12	1.29	4.09	1.46	4.46	1.35	4.26	1.34
Control	4.75	1.49	4.63	1.50	4.16	1.69	4.61	1.47	4.60	1.46
T value	2.37		3.07		0.31		0.96		2.57	
Degrees of freedom	64		64		64		64		64	
Significance**	0.02		0.00		0.76		0.34		0.01	

* 2 respondents (3% of 67) did not indicate their satisfaction.

** Two-tailed test

8.1.2.2 Assistant Managers' Satisfaction

Assistant managers, as persons affected by the decisions taken, were asked to express their views on the attributes of the information provided to their superiors (senior managers) for use in planning and control.³ Tables (8.8) and (8.9) on page 389 show assistant managers' ratings of the attributes of the information provided.

As can be seen from the data in Table (8.8) a considerable proportion of assistant managers (41%) were not satisfied with the attribute of timeliness of the information provided to their superiors for use in planning. The mean score was 3.71 (inappropriate). Another interesting observation is that a large proportion of assistant managers (46%) indicated their dissatisfaction with the degree of reliability (the mean was 3.77). The implications of these two results will be discussed later in this section, compared with the senior managers' satisfaction scores of these attributes.

The most important observation which can be drawn from the data in Table (8.9) is that as a large proportion of assistant managers (41%) were not satisfied with the timeliness of the information provided to their superiors for use in planning, a similar proportion of the assistants (40%) were also dissatisfied with the timeliness of the information provided for use in control. Indeed, the comparison between the views of assistant managers and senior managers on the information attributes may give some explanation of this result.

³ T-test proved the consistency in assistant managers' scores elicited by the sole criterion of usefulness and the set of the five criteria. A significant difference did not exist at .01 level between the means of the two measures either for the information provided for use in planning or in control. T values were .41 and .61, with 47 and 49 degrees of freedom, which are significant at .68 and .54, respectively for two-tailed test.

TABLE (8.8)

Assistant Managers' Ratings Of Each Attribute Of The Information Provided For Use In Planning

Attributes	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
Relevance	-	4	13	23	33	19	8	4.75	1.26	4.81	- 0.16
Sufficiency	-	8	15	25	23	21	8	4.58	1.41	4.59	- 0.10
Timeliness	4	8	29	40	13	2	4	3.71	1.24	3.71	0.37
Reliability	2	13	31	29	15	6	4	3.77	1.33	3.64	0.48
Understandability (Format)	2	2	27	35	23	10 [†]	-	4.06	1.10	4.03	- 0.12

* 3 respondents (6% of 51) did not indicate their ratings.

† Total is not 100 due to rounding.

TABLE (8.9)

Assistant Managers' Ratings Of Each Attribute Of The Information Provided For Use in Control

Attributes	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
Relevance	4	6	12	32	20	10	16	4.52	1.59	4.38	- 0.10
Sufficiency	4	6	16	34	14	14	12	4.38	1.56	4.21	- 0.002
Timeliness	8	4	28	30	22	4	4	3.82	1.38	3.83	- 0.05
Reliability	2	10	28	20	18	18	4	4.12	1.47	4.00	0.11
Understandability (Format)	2	12	18	36	14	12	6	4.08	1.43	4.00	0.20

* 1 respondent (2% of 51) did not indicate his ratings.

Table (8.10) was prepared to present comparison between the mean scores of senior managers and assistant managers of the five attributes of the information provided by the management accounting systems.

TABLE (8.10)

Comparison Between The Mean Scores of Senior Managers And Assistant Managers Of The Five Information Attributes

The Information Used In	Attributes				
	Relevance	Sufficiency	Timeli- ness	Relia- bility	Understand- ability (Format)
<u>Planning</u>					
Managers	4.29	4.12	4.09	4.46	4.26
Assistants	4.75	4.58	3.71	3.77	4.06
<u>Control</u>					
Managers	4.75	4.63	4.16	4.61	4.60
Assistants	4.52	4.38	3.82	4.12	4.08

An examination of Table (8.10) points out that while senior managers were satisfied with the attributes of timeliness and reliability of the information provided for use in planning (the means were 4.09 and 4.46, respectively), assistant managers indicated dissatisfaction with the degrees of presence of these attributes. The likely explanation of the lack of consistency between the two groups is that assistant managers, as persons participating in, and responsible for, carrying out the decisions taken by their superiors,⁴

⁴ The 67 participating senior managers claimed that they discussed the decisions which they would make with their principal subordinates and the 51 participating assistant managers confirmed this claim. Only one senior manager (2%) and five assistant managers (10%) stated that senior managers discussed few of the decisions (20%) with their principal subordinates. However, 87 percent of senior managers and 63 percent of assistant managers indicated that managers and their assistants discussed together, at least, most of the decisions taken (about 80%). Indeed, a significant difference at the .01 level did not exist between the managers' and the assistants' answers of the question concerned. With two degrees of freedom chi-square was equal to 11.94, which is significant at 0.00.

viewed the attributes of timeliness and reliability as more important than senior managers did. This perhaps is partially attributable to the differences in the organisational position of both senior managers and assistant managers. Timeliness and accuracy of the information needed for planning at the level of senior managers may be relatively less important because of the broad scope of the planning at this level. On the other hand, assistant managers, who are assumed to make the detailed policies for carrying out the decisions taken by their superiors, believe that the information provided for use in planning needs to be timely and, relatively, more accurate. Indeed, the mean scores of assistant managers of the two attributes, i.e. timeliness and reliability were very close to the level of satisfaction (4 points on the scale used).

Table (8.10) on page 390 also shows that assistant managers were not satisfied with the attribute of timeliness of the information provided to their superiors for use in control (the mean was 3.82), while senior managers were satisfied with the degree of the presence of this attribute (the mean was 4.16). It is possible that assistant managers, as persons responsible for carrying out the decisions taken by their superiors, relatively pay more attention to the timeliness of the feedback about performance results and accordingly, they were not satisfied with the timeliness of the information provided for use in control. This, however, is not to say that senior managers do not pay enough attention to this aspect. Indeed, the mean score of assistant managers of the attribute of timeliness was very close to the level of satisfaction (the mean score was 3.82 points, while the level of satisfaction was 4 points).

Generally, the differences in senior managers and assistant

managers' views on the degree of the presence of the other information attributes were not significant at .01 level. This conclusion was drawn from the results of the t-test and chi-square test presented in Appendix (8.1) and Appendix (8.2), respectively.

8.1.2.3 Management Accountants' Views

As the approach suggested for evaluating the effectiveness of an information system takes into consideration the views of the providers of the information, management accountants were asked to indicate to what extent they felt that the levels required by senior managers of the information attributes⁵ were reasonable, i.e. attainable and economical (see Appendix 6.8 : Management Accountant - Questionnaire, question No. 3). The results are presented in Table (8.11) on page 393.

The figures presented in Table (8.11) indicate that management accountants rated the levels required by senior managers of the information attributes as reasonable and practicable (more than 4 points on the 7-point scale). The mean scores of management accountants ranged from 4.26 to 4.87. Generally, the majority of management accountants (70% - 91%) believed that the levels of the information attributes as required by senior managers were attainable and practicable. Appendices (8.3) and (8.4) give much more details regarding the distribution of the accountant's responses. The

⁵ As previously stated, two measures were used to elicit the respondents' views on the information attributes, a sole inclusive criterion and a set of five criteria. In order to ascertain whether or not the score elicited by the sole criterion presented in Table (8.4) on page 381, was consistent with the average score elicited by the set of the five criteria, the t-test was used. A significant difference did not exist at the .01 level. For the attributes of the information needed for use in planning and control, the t values were .80 and 1.35, respectively with 53 degrees of freedom for both which are significant at .42 and .18 levels, respectively for two-tailed tests.

implication of these results is that there was mutual understanding between accountants and managers, and agreement on the acceptable levels of the information attributes.

TABLE (8.11)

Management Accountants' Views On The Level Required
By Senior Managers Of Each Information Attribute

The Information Attributes	Information Needed For Planning				Information Needed For Control			
	Mean	S.D.	Median	Skewness	Mean	S.D.	Median	Skewness
Relevance	4.32	1.23	4.12	0.44	4.39	1.34	4.19	0.36
Sufficiency	4.32	1.23	4.10	0.56	4.50	1.23	4.35	0.28
Timeliness	4.26	1.38	4.03	0.53	4.37	1.45	4.20	0.24
Reliability	4.63	1.14	4.35	0.45	4.87	1.26	4.70	0.08
Format	4.43	1.28	4.17	0.52	4.30	1.25	4.09	0.64

8.1.3 Relevance of Information

As stated in Chapter IV, one of the possible causes of ineffectiveness of an information system is the case in which managers operate under a lack of relevant information, although they may suffer from an overabundance of irrelevant information. This aspect is investigated in this section.

The figures presented in Tables (8.5) and (8.6) on page 385 indicated that senior managers were merely satisfied, but not highly satisfied with the relevance of the information provided for use in planning and control (the mean scores were 4.29 and 4.75, respectively). On the other hand, the tables showed also that one-quarter of senior managers were dissatisfied with the relevance of the information provided for use in planning (their scores were less than 4 points), and another considerable proportion (19%) indicated dissatisfaction with the same attribute relating to the information provided for use in control.

Indeed, with these results, it was not surprising to find that of the 67 participating senior managers, 49 (73%) did not use all the information contained in the internal accounting reports because some of the items were irrelevant to their decisions (see Appendix 6.6 : Manager - Questionnaire, question No. 7). Although these managers felt that there was an overabundance of irrelevant information, the previous finding did not reveal whether or not the managers were lacking some relevant items of information. In fact, further enquiry was needed.

Senior managers were asked how often they conduct an expanded search to obtain accounting information which they felt was relevant to the management of their functions and was not contained in the internal accounting reports which they received (see Appendix 6.6 : Manager - Questionnaire, question No. 6). The results of this investigation are presented in Table (8.12).

TABLE (8.12)

How Often Senior Managers Conduct An Expanded Search
To Obtain Accounting Information

How Often	Information Needed For Planning		Information Needed For Control	
	n	%	n	%
Never	5	8	4	6
Seldom	14	21	11	16
Occasionally	35	52	48	72
Frequently	13	19	4	6
	67	100	67	100

As can be seen from the figures in Table (8.12) the largest proportions of senior managers (52% and 72%) occasionally conducted an expanded search to obtain accounting information which was needed for use in planning and control and had not been contained in the internal accounting reports. Fewer proportions of senior managers (21% and 16%) stated that they seldom did such an expanded search. Only a small proportion of senior managers (8% and 6%) stated they had never conducted an expanded search. At the other extreme, the proportions of managers who were frequently conducting expanded searches to obtain information for use in planning and control were 19% and 6% respectively.

Indeed, one of the likely causes which prompt managers to frequently conduct expanded searches to obtain relevant information is that the information provided is not always tailored to managers' needs, presumably because of the failure to ascertain their specific requirements. Although this problem may be partially attributed to the system designers who may not adequately specify such needs, managers themselves, in some cases, are not sure of the information they need. For managers to know what information they want, particularly in planning, they should be aware of each type of decision they will make and have an adequate model of each. As stated in Chapter IV, managers, in some cases, perhaps cannot identify precisely the important variables involved in the problem.

Conducting an expanded search to obtain relevant information, however, is a cause of frustration to the managers. The more frequently they find the information provided is irrelevant and an expanded search is needed, the more they are frustrated by the management accounting systems and the less satisfaction they have

with the systems. In order to ascertain that an expanded search causes frustration, the following hypothesis is suggested for testing:

- H2 : Senior managers' overall satisfaction with the management accounting systems is inversely proportional to how often managers conduct expanded searches to obtain relevant information which is assumed to be provided by these systems.

For the purpose of testing the aforementioned hypothesis, it was decided to divide senior managers into four groups based on how often they conduct expanded searches to obtain relevant information. The four groups were as follows: (1) managers who never conduct an expanded search; (2) managers who seldom carry out such a search; (3) managers who do so occasionally; and (4) managers who frequently conduct expanded searches. Two statistical techniques were used to decide whether this hypothesis was accepted or rejected, the one-way analysis of variance and the t-test.

The one-way analysis of variance was used firstly to determine whether or not there was a significant difference between the overall satisfaction scores (measured by the criterion of usefulness) of the four groups of managers. The null hypothesis which was to be tested was that: the overall satisfaction scores of the four groups of managers were equal. The mean scores of the overall satisfaction of the four groups (i.e. never, seldom, occasionally and frequently) with the information provided for planning were 5.80, 4.50, 4.33 and 3.62 respectively (the related standard deviations were 1.64, .94, 1.26 and 1.45). This indicates that there was a difference between the overall satisfaction of the four groups of managers. Further, high overall satisfaction was associated with low frequency of

conducting expanded searches, and vice versa. At the .05 level, F-ratio was significantly large (F value = 3.75; degrees of freedom (3,61); significance = .02) so the null hypothesis is rejected and accordingly hypothesis two, regarding the information provided for planning, may be partially accepted. Likewise, the results of analysis of variance regarding the information provided for the control support hypothesis two (F value = 5.45; degrees of freedom (3,63); significance = 0.00).⁶ Acceptance of hypothesis two means that managers' overall satisfaction with their management accounting systems is inversely proportional to how often they conduct expanded searches to obtain relevant information.

In fact, the results aforementioned partially support Hypothesis Two. As the difference between the overall satisfaction of the four groups of managers (i.e. never, seldom, occasionally and frequently) may be attributed to how frequently they conduct expanded searches to obtain relevant information, it may also be due to another reason. In fact, further analysis is needed to ascertain that the previous results are attributed to how often managers conduct expanded searches to obtain relevant information. Managers' satisfaction with the attribute of relevance was separately examined. Regarding the satisfaction of the four groups with the relevance of the information provided for planning, the difference between the scores of these groups was significant at the .10 level, but not at

⁶ The mean scores of the overall satisfaction of the four groups (i.e. never, seldom, occasionally and frequently) were 6.00, 4.27, 4.67 and 2.25, respectively. The related standard deviations were 1.41, 1.49, 1.37 and .96. Although the mean score of the second group (seldom) was lower than the mean score of the third group (occasionally), the mean scores of the other two groups (never and frequently) were very consistent with the hypothesis (the means were 6.00 and 2.25, respectively).

the .05 level (F value = 2.46; degrees of freedom = (3,61); significance = .07).⁷ A significant difference, however, did exist at .05 level regarding the satisfaction with the relevance of the information provided for control (F value = 3.95; degrees of freedom = (3,63) significance = 0.01).⁸ Obviously, there is consistency between these results and the results related to the managers' overall satisfaction.

On the other hand, the Pearson correlation coefficient between the scores of the managers' overall satisfaction with the information provided for planning and the scores of satisfaction with the attribute of relevance of this information was found to be .84 (significance = 0.00). Similar correlation coefficient and level of significance were found also regarding the information provided for control. It is clear that these correlation coefficients are significant, positive, and very large. This means that high overall satisfaction with the information provided to managers is associated with high satisfaction with the attribute of relevance.

The overall conclusion is that conducting expanded searches to obtain relevant information influences the satisfaction with the attribute of relevance; the satisfaction with the attribute of relevance, in turn, affects the overall satisfaction with the information provided by the management accounting systems. To put it differently, managers' overall satisfaction with the management accounting systems is inversely proportional to how often managers

⁷ The mean scores of the four groups (i.e. never, seldom, occasionally, and frequently) were 5.60, 4.50, 4.15 and 3.92, respectively. The related standard deviations were 1.95, 1.09, 1.15 and 1.38.

⁸ The mean scores of the four groups (i.e. never, seldom, occasionally, and frequently) were 6.00, 4.55, 4.85 and 2.75, respectively. The related standard deviations were 1.41, 1.57, 1.37 and 1.26.

conduct expanded searches to obtain relevant information which is assumed to be provided by these systems.

8.1.4 Quantity of Information

8.1.4.1 Senior Managers' Satisfaction

An ineffective information system is one which provides its users with either insufficient relevant information or an overabundance of irrelevant information. To examine this area, senior managers participating in this study were asked to indicate their satisfaction with the attribute of sufficiency of the information provided by the management accounting systems. The results were presented in Tables (8.5) and (8.6) on page 385. The figures in these tables indicated that senior managers were satisfied with the attribute of sufficiency of the information provided for planning and control. However, their scores of this attribute were slightly over the point of satisfaction. On a 7-point scale, the mean scores of this attribute for the information provided for planning and control were 4.12 (standard deviation = 1.29) and 4.63 (standard deviation = 1.50), respectively. Further, these tables showed that 33 percent of managers were not satisfied with the attribute of sufficiency of the information provided for planning, and 24 percent indicated dissatisfaction with this attribute of the information provided for control.

To analyse the adequacy of the information provided by the management accounting systems in more depth, senior managers were asked how they felt about the amount of detailed information (i.e. too little, about right, too much) contained in the internal accounting reports which they received (see Appendix 6.6 : Manager - Questionnaire, question No. 2). The results, indeed, were somewhat

surprising as can be seen from the figures in Table (8.13).

TABLE (8.13)

Senior Managers' Views On The Amount Of Detailed Information

Information Used In	Frequency of Responses*													
	1		2		3		4		5		6		7	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Planning	-	-	5	8	17	26	37	56	4	6	3	5 [†]	-	-
Control	1	2	2	3	6	9	37	56	10	15	10	15	-	-

* 1 respondent (2% of 67) did not indicate his rating.

A 7-point scale was used where 1 = too little; 4 = about right and 7 = too much

† Total is not 100 due to rounding.

The figures in Table (8.13) reveal that 56 percent of senior managers found the amount of detailed information in the internal accounting reports was about right, the rest of the senior managers indicated that this amount was not considered to be the right quantity. Figures (8.3) and (8.4) on page 401 present histograms of senior managers' responses. The results presented in Table (8.13) are not quite consistent with the figures in Tables (8.5) and (8.6) on page 385, in which it was indicated that the proportions of senior managers who were satisfied with the attributes of adequacy of the information provided for planning and control were 68% and 76% respectively. The most likely explanation of this difference is that although the amount of detailed information had been found by some senior managers to be not equal to the right quantity, senior managers considered it still in the region of acceptance.

Indeed, this explanation was supported by further analysis.

About 39 percent of senior managers indicated that although they had found the amount of detailed information provided for planning was not about right, they considered it still in the region of acceptance. Regarding the information provided for control, a considerable

FIGURE (8.3)

Histogram Of The Senior Managers' Views On The Amount of Detailed Information Provided For Planning

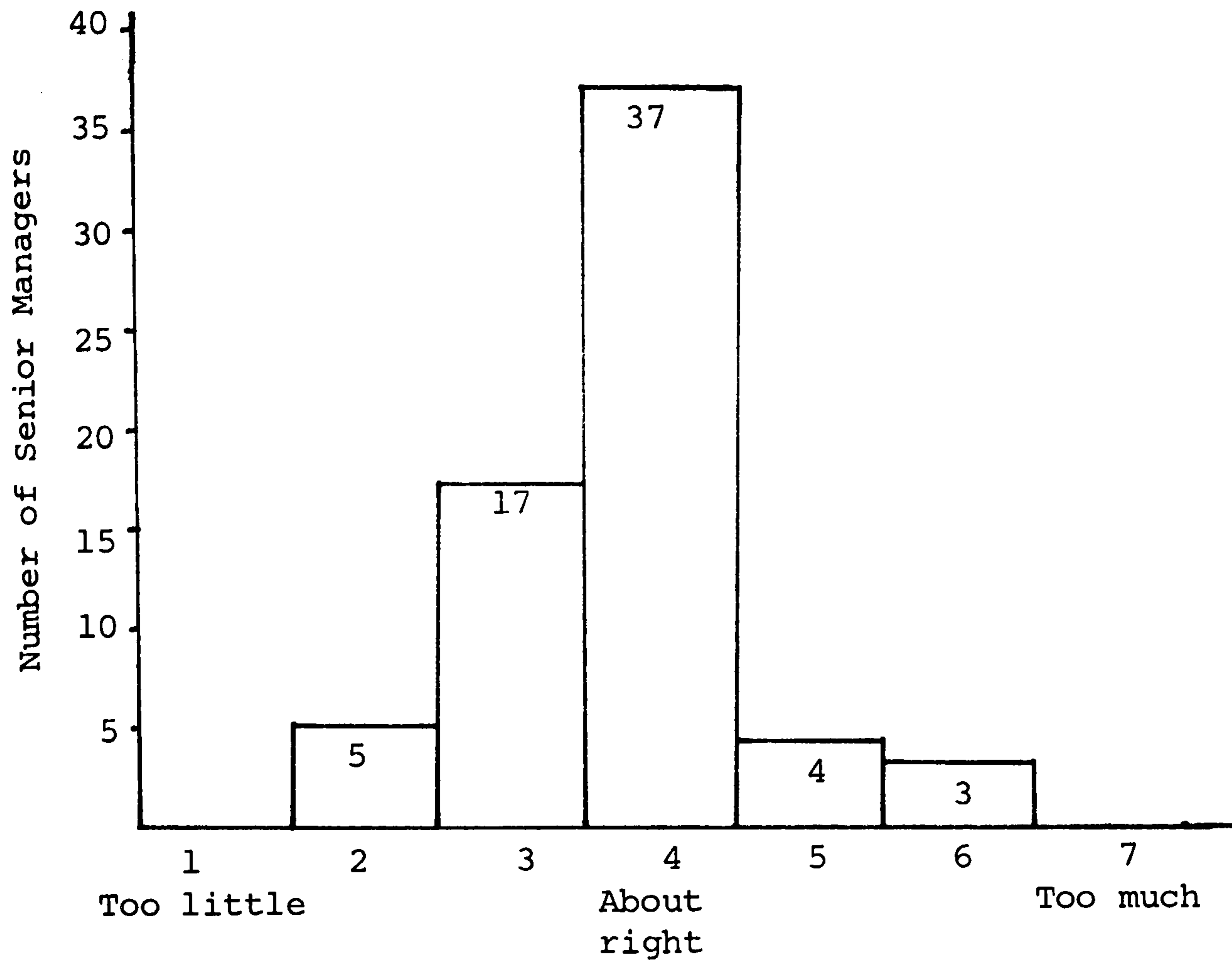
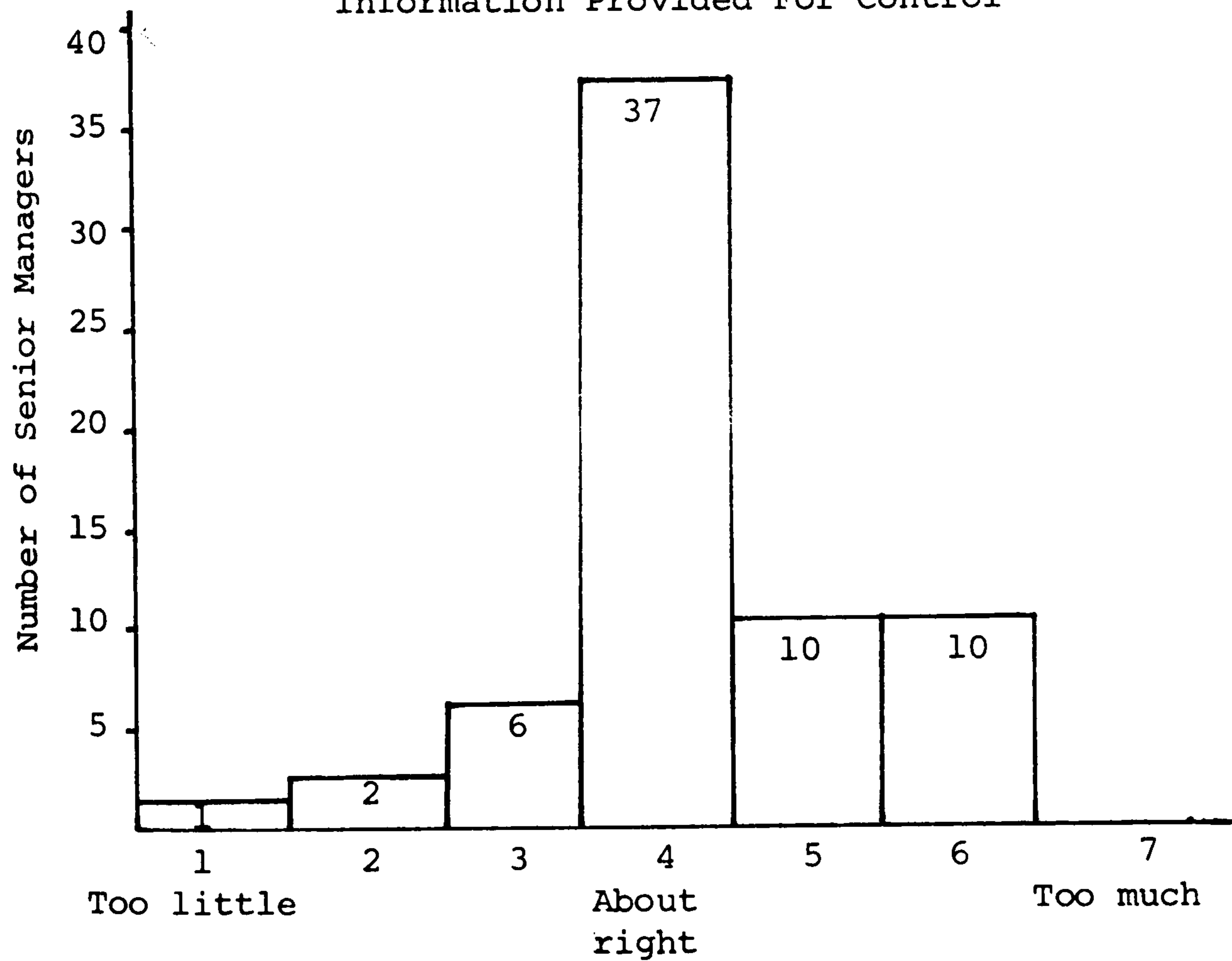


FIGURE (8.4)

Histogram Of The Senior Managers' Views On The Amount of Detailed Information Provided For Control



proportion of senior managers (66%) who stated that the amount of detailed information was not about right were being satisfied with this amount. It is surprising, in fact, to find that although some senior managers indicated that the amount of detailed information was not about right, the proportion of senior managers who were satisfied with the amount of detailed information provided for planning was considerably less than the proportion of those who were satisfied with the amount of detailed information provided for control (39% and 66%, respectively). In fact, another further analysis is needed to explain this observation.

From the figures in Table (8.13) on page 400, it can be seen that the amount of detailed information provided for use in planning was found by 34% of senior managers to be less than the right quantity, while the amount of detailed information provided for use in control was considered by 30% of senior managers to be more than the right quantity. The implication of these results is that the causes of managers' dissatisfaction with the amount of detailed information are different. While the dissatisfaction with the amount of detailed information provided for use in planning is due to receiving too little information, the dissatisfaction with the amount of the information provided for use in control can be attributed to providing too much information. This, in fact, provides an explanation of the observation mentioned in the previous paragraph since more information is preferable to less.

However, too much information is questionable. As stated in Chapters III and IV, the interest among some information providers has been mainly to focus on processing and supplying the decision-makers with an over-abundance of information. This is based on the assumption that the more information a decision maker has, the

better his decision will be. There is no doubt that up to a certain point, more information reduces uncertainty and results in better decisions. However, beyond this point, the over-abundance relates to information which is irrelevant to the needs of the decision-makers and they must spend a great deal of time and effort separating the relevant from the irrelevant. On the other hand, too much detailed information could result in a less structured information perception which might hinder the making of rational decisions. This can be attributed to the limited capacity of the decision-maker as a human being to assimilate mentally, all the information available. In other words, when more information than can reasonably be used is provided, information overload sets in. Under this condition, the usual reaction of the decision-makers is to select certain information from the mass available and base their actions entirely on this, ignoring the rest. In such a case, it is likely that not all relevant information will be selected and consequently the decisions taken may be affected.

A limited investigation of this phenomenon, i.e. "information overload" was conducted. Senior managers were asked if they felt that the number of the internal accounting reports which they received had caused "information overload" (see Appendix 6.6 : Manager - Questionnaire, question No. 4). Eight senior managers out of 66 (12%) complained that the number of the internal accounting reports had caused "information overload". Seven of these managers⁹ indicated that the amount of detailed information provided for use in planning and control was more than the right quantity (above 4 points). The means were 4.29 (standard deviation 1.25) and 5.29 (standard deviation 1.11) respectively.

⁹ One senior manager out of eight did not indicate his views on the amount of detailed information received.

8.1.4.2 Assistant Managers' Satisfaction

Assistant managers, as persons affected by the decisions taken, were asked to indicate their views on the amount of detailed information in the accounting reports which their superiors (senior managers) received. The results are presented in Table (8.14).

TABLE (8.14)

Assistant Managers' Views On The Amount Of Detailed Information Provided To Senior Managers

Information Provided For	Less Than The Right Quantity		About Right		More Than The Right Quantity	
	n	%	n	%	n	%
Planning*	13	27	24	50	11	23
Control**	16	32	23	46	11	22

* 3 respondents (6% of 51) did not indicate their views.

** 1 respondent (2% of 51) did not indicate his views.

As can be seen from the figures in Table (8.14), in the opinion of 50 percent of assistant managers, the amount of detailed information provided to their superiors (senior managers) for use in planning was about right, while 27% indicated that it was less than the right quantity and 23% found it more than the right quantity. Indeed, a significant difference did not exist at the .01 level of significance between the views of senior managers and their assistants on the amount of detailed information provided for use in planning. With 112 degrees of freedom the t value was 0.95, which is significant at 0.34. Also, chi square was 3.21 with two degrees of freedom, which is significant at 0.20.

Table (8.14) also shows that less than half of the assistant managers (46%) believed that the amount of detailed information provided to their superiors (senior managers) for use in control was equal to the right quantity. A considerable proportion of assistant

managers (32%) stated that the amount of detailed information was less than the right quantity. In contrast, only 14 percent of senior managers indicated that such quantity was less than about right. The implication of this result is that some assistant managers feel that the information provided to their superiors is not quite adequate to fairly evaluate the subordinates' performance. However, both t-test and chi-square did not prove a significant difference at the .01 level between the views of senior managers and their assistants on the amount of detailed information provided for use in control. T value was 1.86 with 114 degrees of freedom, which is significant at 0.07. Also, with two degrees of freedom, chi-square was 5.74 which is significant at 0.06.

8.1.4.3 Management Accountants' Views

As the approach suggested for evaluating the effectiveness of an information system takes into consideration the views of the providers of information, management accountants were asked to indicate whether the amount of detailed information, as specified by senior managers, represented the managers' actual requirements (see Appendix 6.8 : Management Accountant - Questionnaire, question No. 1). Table (8.15) on page 406 presents the results, compared with senior managers and assistant managers' views.

Table (8.15) shows that only 39 percent of management accountants believed that the amount of detailed information, as specified by senior managers was equal to the managers' actual requirements, while 61% indicated that the amount of detail required was not about right. Regarding the information required for use in planning, almost four out of every ten management accountants (41%) stated that the amount of the detailed information, as specified by managers, was

TABLE (8.15)

Comparison Between Senior Managers', Assistant Managers', And Management Accountants' Views On The Amount Of Detailed Information

Group	The Amount Of Detailed Information		
	Less Than The Right Quantity	About Right	More Than The Right Quantity
	% of respondents	% of respondents	% of respondents
<u>Information Used In Planning</u>			
Accountants	41	39	20
Managers	34	56	11
Assistants	27	50	23
<u>Information Used In Control</u>			
Accountants	32	39	30
Managers	14	56	30
Assistants	32	46	22

less than their actual requirements, while considerable proportions of senior managers and their assistants, 34% and 27% respectively, indicated that the amount of detailed information was less than the right quantity. The implication of this result is that there are mutual complaints between accountants, and senior managers and their assistants, concerning the amount of detailed information required and provided. As discussed in Chapter IV, management accountants, as providers of information, should seek to know what the managers want, and they should also analyse the current decision models in relation to the objectives and suggest types of information they might find useful. The problem, however, is that some information providers assume that the managers know exactly what information

they need. On the other hand, some managers may not be sure of the information they want.

Regarding the amount of detailed information provided for use in control, although only a small proportion of senior managers (14%) indicated that the amount of detailed information was less than the right quantity, it is surprising that a considerable proportion of management accountants (32%) stated that such an amount, as specified by managers, was less than the managers' actual requirements. Also, a similar proportion of assistant managers (32%) believed that the amount of detailed information provided to their superiors was less than the right quantity. The views of both the providers of information and the persons affected by the decisions taken implicitly indicate that the control function can be more effective if senior managers were provided with a greater amount of detailed information. However, providing managers with a greater quantity of information should be balanced with their feelings of information overload.

8.1.5 Frequency of Information

8.1.5.1 Senior Managers' Satisfaction

As stated in Chapter II, frequency of information is the time period between the preparation of successive reports or answers to enquiries. It may be possible to report too frequently or too infrequently. Both are not to be acceptable. At one extreme, too infrequently may lead to providing the decision-makers with obsolete information and consequently it will not be useful. At the other extreme, when the reporting cycle is shorter than the time necessary to assimilate and evaluate the information received, the decision-maker cannot make full use of one report before he receives other reports, or even the next issue of the same report, this situation can

be described as a case of "information overload". Therefore, the timing of reports must be matched with the decision-maker's ability to use them.

In order to investigate this aspect of management accounting information reporting in the participating organisations, senior managers were asked how satisfied they were with the frequency of the internal accounting reports which they received. Five alternatives were given to reveal managers' satisfaction. Managers were asked to indicate whether they were satisfied with the frequency of: (1) all reports; (2) most of the reports (70% - 99%); (3) some of the reports (40% - 69%); (4) few reports (1% - 30%); and (5) none at all (see Appendix 6.6 : Manager - Questionnaire, question No. 5). Table (8.16) presents the results of this investigation.

TABLE (8.16)

Senior Managers' Satisfaction With The Frequency Of The
Internal Accounting Reports

Managers Are Satisfied With	Respondents	
	n	%
All of the reports	43	64
Most of the reports	18	27
Some of the reports	5	8
A few of the reports	1	2
None at all	-	-
	67	100*

*Total is not 100 due to rounding.

Table (8.16) shows that none of the senior managers were totally dissatisfied with the frequency of all of the internal accounting reports which they received. The table reveals also that only one senior manager (2%) was satisfied with the frequency of a few

reports, and five (8%) were satisfied with the frequency of some of these reports (50% of the reports which they received). The mean scores of the satisfaction of these groups with the timeliness of the information provided for planning and control were 2.83 (standard deviation 1.17) and 2.67 (standard deviation 1.21), respectively, i.e. dissatisfaction. Indeed, dissatisfaction with the frequency of the reports received may be attributed to either "information overloading" in a case of reporting too frequently, or to "lacking relevant information" if the reports were being received too infrequently.

To elicit the reasons for dissatisfaction with the frequency of the internal accounting reports, further analysis was needed for the responses of senior managers who indicated satisfaction with the frequency of only a few or some of the reports. The analysis reveals that 67% of these senior managers felt that the number of the reports caused "information overload". Further, the mean scores of the satisfaction of these managers with the attribute of adequacy of the information provided for planning and control were 2.67 (standard deviation .52) and 3.17 (standard deviation .98) respectively. This means that senior managers were not satisfied with the amount of the information provided. However, dissatisfaction with the amount of information received may be attributed to too much, or too little information. Another further analysis reveals that 50% of these managers found that the amount of information provided for planning had been more than the right quantity, as well as the amount of information provided for control which was indicated by 83% of these senior managers. From the above results it seems that the dissatisfaction of this limited number of senior managers with the frequency of the reports may be attributed to receiving information

too frequently. However, no explicit evidence existed to support this.

The figures presented in Table (8.16) on page 408 indicate also that the majority of senior managers (64%) were satisfied with the frequency of all of the reports received, while 27 percent were satisfied with most of the reports (about 79% of the reports received). A further analysis supports the results presented in Table (8.16). Senior managers who were satisfied with the frequency of all and most of the reports had mean scores of satisfaction with the attributes of timeliness of the information provided for planning and control of 4.22 (standard deviation 1.43) and 4.31 (standard deviation 1.67), respectively. In contrast, the mean scores of managers who were satisfied with the frequency of a few and some of the reports were 2.83 (standard deviation 1.17) for the attribute of timeliness of the information provided for planning and 2.67 (standard deviation 1.21) for the timeliness of the information provided for control. The t-test was used to test the difference between the means of the two groups of senior managers. Regarding the difference between the means of satisfaction with the timeliness of the information provided for planning, with 63 degrees of freedom the t was equal to 2.30, which is significant at .03. Concerning the timeliness of the information provided for control, with 65 degrees of freedom, t was 2.35, which is significant at .02. The conclusion is that a significant difference did exist at the .05 level between the means of satisfaction with the timeliness of the information of the two groups of managers mentioned above.

8.1.5.2 Assistant Managers' Satisfaction

Assistant managers, as persons affected by the decisions taken, were asked to indicate their views on the frequency of the internal accounting reports which their superiors (senior managers) received (see Appendix 6.7 : Assistant Manager - Questionnaire, question No.4). The results of this investigation compared with managers' views are shown in Table (8.17).

TABLE (8.17)

Comparison Between Assistant Managers' And Senior Managers' Views
On The Frequency Of The Internal Accounting Reports

Satisfaction With The Frequency Of	Number of		Percentage of	
	ASM*	MGR	ASM	MGR
All of the reports	21	43	42	64
Most of the reports	21	18	42	27
Some of the reports	7	5	14	8
A few reports	1	1	2	2
None at all	-	-	-	-
	50	67	100	100 [†]

Chi-square = 5.73; degrees of freedom = 2; significance = 0.06

ASM = Assistant Manager, MGR = Senior Manager

* 1 respondent (2% of 51) did not answer this question.

† Total is not 100 due to rounding.

The figures in Table (8.17) reveal that while the majority of senior managers (64%) were satisfied with the frequency of all of the reports, a smaller proportion of assistant managers (42%) indicated the same satisfaction. The situation was reversed concerning the satisfaction with the frequency of most of the reports, 42 percent of assistant managers were satisfied with the frequency of most of the reports, while only 27 percent of senior managers indicated the same satisfaction. However, a significant difference at the .01

level did not exist between senior managers' views and assistant managers' views on the frequency of the internal accounting reports.

8.1.5.3 Management Accountants' Views

As the approach suggested for evaluating the effectiveness of an information system takes into account the views of the information providers, it was decided to ask management accountants their views on the frequency of the internal accounting reports (see Appendix 6.8 : Management Accountant - Questionnaire, question No. 2).

Table (8.18) shows the results compared with the senior managers' views.

TABLE (8.18)

Comparison Between Management Accountants' and Senior Managers' Views On The Frequency Of The Internal Accounting Reports

Happy With The Frequency of	Number of		Percentage of	
	ACC	MGR	ACC	MGR
All of the reports	21	43	39	64
Most of the reports	27	18	50	27
Some of the reports	6	5	11	8
A few reports	-	1	-	2
None at all	-	-	-	-
	54	67	100	100*

Chi-square = 8.06; degrees of freedom = 2; significance = 0.02

ACC = Management Accountants, MGR = Senior Manager
 * Total is not 100 due to rounding.

As can be seen from Table (8.18) a significant difference at the 0.01 level did not exist between senior managers' views, as users of information, and management accountants' views, as providers of information, on the frequency of the internal accounting reports. Both were in the same line concerning this area of information reporting

8.1.6 An Investigation Into Some Important Reasons Affecting The Information Usage

As stated in Chapter III, an effective information system is one which can be utilised by the decision-makers. Indeed, the utilisation of an information system does not merely refer to providing the decision-makers with the information. Rather, it means that the decision-makers receive, examine, and use the information provided. In other words, they include the information provided by the system in their human information processing system which was defined as the cognitive system that has the capacity to organise, manipulate and integrate information for decision-making. Accordingly, the decision-makers may physically receive the information but they may not examine it, and even if they examine the information received, there is no guarantee that they use it and consequently their decisions will not be impacted. In general, the decision-makers may not use the information provided for one or more of the following reasons: the information is irrelevant, unreliable, the amount of detail is too much, the information is out-dated, and finally the information is ill-presented.

To elicit the reasons which drive the decision-makers to disregard the information provided by the management accounting systems, senior managers were asked to indicate whether or not they used all the information contained in the reports which they received and to state the reasons if they did so (see Appendix 6.6 : Manager - Questionnaire, question No. 7). Fifty-four senior managers (81%) out of the sixty-seven indicated that they did not use all the information contained in the internal accounting reports which they had received, while only thirteen managers (19%) stated that they used all the information.

To analyse non-use of the information in more depth, managers who stated that they did not use all the information contained in the reports received were asked to indicate their reasons. The results are presented in Table (8.19).

TABLE (8.19)

Reasons For The Non-Use Of All The Information Contained
In The Internal Accounting Reports

Reasons	Respondents	
	n	% (N = 54)
Irrelevance	49	91
Unreliability	19	35
Too much information	18	33
Information is out-dated	16	30
Information is ill-presented	6	11

The figures in Table (8.19) show that almost nine out of every ten senior managers who stated they did not use all the information contained in the reports received, indicated that the irrelevance of some items to their decisions was one of the reasons. Unreliability, too much information and obsolete information were less stated by senior managers (35%, 33% and 30% respectively) as reasons for non-use of the information. Only six senior managers (11%) indicated ill-presentation as one of the reasons for non-use of the information.

The analysis of senior managers' responses indicated also that 39 percent of senior managers stated only one of the reasons mentioned, 33 percent pointed out two reasons, while 29 percent mentioned more than two reasons. Only two senior managers (6% of 33 who mentioned more than one reason) stated the five reasons. Of the eighteen senior managers who stated two reasons, 39 percent mentioned

irrelevance and unreliability, 33 percent stated irrelevance and too much detailed information, 22 percent mentioned irrelevance and ill-timing, and 6 percent specified unreliability and too much detailed information. From these findings, it is reasonably clear that irrelevance was the most common reason for non-use of all the information contained in the internal accounting reports.

8.1.7 Summary and Conclusions

This section presented part of the research findings of the approach suggested for evaluating the effectiveness of an information system. The section presented the results of measuring senior managers' satisfaction with the information provided by the management accounting systems of the organisation participating in this study. The views of both management accountants, as providers of information, and assistant managers (i.e. the principal subordinates) as persons participating in, and affected by, senior managers' decisions, were also discussed compared with the senior managers' views.

The approach used in the measurement was based on the assumption that user's satisfaction can be attributed to receiving useful information. Two measures of satisfaction were presented in this section, an inclusive sole criterion which was used in measuring the "usefulness" of the information from the senior managers' perspective, that is, senior managers' overall satisfaction. The second measure was a set of five criteria, each measuring the degree of presence of one of the attributes of "useful information". The assumption on which these criteria were developed is that if the information is to be useful, it should be relevant, reliable, sufficient (adequate), timely and understandable.

The overall satisfaction measured by the sole criterion of usefulness was consistent with the overall satisfaction measured by the set of the five criteria. A significant difference did not exist between the results produced by the two measures. For the purpose of comparison, these measures were also used to elicit assistant managers' and management accountants' views on some aspects of management accounting information reporting. Again, the sole criterion and the set of the five criteria proved consistency in the results produced.

As the approach used in this study was based on the views of the users of information (i.e. senior managers), the providers of information (i.e. management accountants) and the persons affected by the decisions taken (i.e. assistant managers), it is useful to present the results of this section in three groups.

8.1.7.1 The Satisfaction of Senior Managers (The Users of The Information)

Seven major results can be presented in this part, they are as follows:

1. Slightly over fifty percent (52%) of senior managers occasionally conducted expanded searches to obtain relevant accounting information needed for use in planning which had not been contained in the accounting reports received. Seventy-two percent conducted such searches to obtain information needed for control. However, the proportions of senior managers who frequently conducted expanded searches to obtain information needed for planning and control were 19 percent and 6 percent respectively. It was found also that senior managers' overall satisfaction with the information provided either for

planning or for control was inversely proportional to how often they conducted expanded searches.

2. Fifty-six percent of senior managers found the amount of detailed information in the internal accounting reports was about right. A considerable proportion of senior managers (34%) indicated that the amount of detailed information provided for planning was less than the right quantity, while thirty percent stated that the amount of detailed information provided for control was more than the right quantity.
3. The majority of senior managers (64%) were satisfied with the frequency of all of the reports received, and twenty-seven percent were satisfied with the frequency of most of the reports (about 79%). That is, ninety-one percent of senior managers were satisfied, at least, with the frequency of most of the reports.
4. A small proportion of senior managers (19%) indicated that they used all the informational elements in the internal accounting reports. The majority (81%), however did not do so. Irrelevance of some of the items was the most common reason for non-use of all the information in the reports. Ninety-one percent of senior managers who stated they did not use all the information, mentioned that reason. Unreliability, too much information, and out-dated information were mentioned as other reasons, by relatively low proportions of senior managers, 35%, 33% and 30% respectively. Ill-presentation was stated by only eleven percent of senior managers.
5. Generally, senior managers were merely satisfied with the degree of presence of each attribute of the information

provided for planning, but not highly satisfied. The mean scores ranged from 4.09 to 4.46 (a 7-point scale was used). However, a large proportion of senior managers (39%) were dissatisfied with the attribute of timeliness, while a very large proportion (77%) were satisfied with the attribute of reliability. Although senior managers were also satisfied with each attribute of the information provided for control, the mean scores ranged from 4.16 to 4.75, a considerable proportion (39%) were dissatisfied with the attribute of timeliness. Further, senior managers were satisfied with the attributes of the information provided for control more than for planning. However, a significant difference did not exist for two attributes; timeliness and reliability at the .05 or .10 levels of significance.

6. Senior managers were more satisfied with the information provided by the management accounting systems for use in control (the mean was 4.54) than with the information provided for planning (the mean was 4.34). Indeed, a significant difference between the two means did not exist at the .01 level of significance. Obviously, senior managers were merely satisfied, but not highly satisfied.
7. Seventy-four percent of senior managers were satisfied with their management systems as a whole, and 26 percent were not satisfied. The mean score of the overall satisfaction with the systems was 4.42, that is slightly over the point of satisfaction (a 7-point scale was used).

8.1.7.2 The Views of Management Accountants
(The Providers of The Information)

Three major results are presented below:

1. The vast majority of management accountants (91%) indicated that, on the whole, the levels required by senior managers for the attributes of the information needed for planning was attainable and practicable. Concerning the levels of the attributes of the information required for control, 84 percent of management accountants expressed the same opinion. Regarding the level required for each attribute, management accountants indicated also that the levels were attainable and practicable. The mean scores ranged from 4.26 to 4.87 (a 7-point scale was used). The implication of these results is that, from the accountants' perspective, there was mutual understanding and agreement between the providers of the information and the users on the acceptable levels of the information attributes.
2. Sixty-one percent of management accountants believed that the amount of detailed information required by senior managers for use in planning was not equal to their actual requirements. A considerable proportion of accountants (41%) indicated that the amount of detailed information was less than the actual requirements, and 20 percent stated that it was more than the requirements. Regarding the information needed for control, 62 percent of management accountants indicated that the quantity required was not equal to the actual requirements of senior managers, while 32 percent stated less, and 30 percent found it more. The implication of these results is that some management accountants were not quite happy with the amount of detailed information specified by senior managers.

3. Half of the management accountants believed that the frequency of most (about 81%) of the accounting reports received by senior managers was appropriate. Another considerable proportion of accountants (39%) were happy with the frequency of all of the reports. That is 89 percent of management accountants were satisfied, at least, with the frequency of most of the reports. At the .01 level of significance, a significant difference between management accountants and senior managers was not found. Both, indeed, were in the same line concerning this area of information reporting.

8.1.7.3 The Views of Assistant Managers (The Persons Affected By The Decisions Taken)

Four major results can be drawn from the data analysis presented in this section:

1. Fifty percent of assistant managers indicated that the amount of detailed information provided to their superiors (senior managers) for use in planning was about right, 27 percent stated that it was less than the right quantity, while 23 percent mentioned that it was more. Regarding the information provided for use in control, less than half of the assistant managers (46%) believed that the amount of detailed information was about right. A considerable proportion (32%) indicated that the amount of detailed information was less than the right quantity, and 22 percent mentioned that it was more. Indeed, a significant difference between senior managers' views and assistant managers' views did not exist at the .05 level of significance, either for the information provided for planning or for control.

2. Forty-two percent of assistant managers were satisfied with the frequency of all of the internal accounting reports received by their superiors (senior managers). Another proportion of the assistants (42%) were satisfied with the frequency of most of the reports (about 83%). That is, 84 percent of assistant managers were satisfied, at least, with most of the reports. A significant difference at the .05 level of significance was not found between the assistants' views and the managers' views on this aspect of the information reporting.
3. With the exception of the attributes of timeliness and reliability, assistant managers indicated that the levels of information attributes were appropriate. Concerning the attributes of timeliness and reliability of the information provided for planning, the levels were not appropriate, the mean scores were 3.71 and 3.77 respectively. Also, assistant managers believed that the attribute of timeliness of the information provided for control was not appropriate (the mean score was 3.82). Indeed, these scores were very close to the point of appropriateness (4 points on a 7-point scale). In contrast, senior managers were satisfied with these attributes, but not highly satisfied, the mean scores were 4.09, 4.46 and 4.16, respectively. Generally, the differences between assistant managers' and senior managers' ratings of the other information attributes were not significant at the .01 level of significance.
4. In the opinion of assistant managers, the information provided to their superiors (senior managers) by the management accounting systems for use in planning and control were appropriate, but not highly appropriate. The mean ratings of the degree of

the appropriateness of the information provided for planning and control were 4.23 and 4.26 respectively, that is, slightly over the point of appropriateness (4 points on a 7-point scale). Indeed, a significant difference between the mean ratings of assistant managers and senior managers did not exist at the .05 level of significance.

8.1.7.4 Conclusions

The conclusions which can be drawn from the results and the associated descriptive statistics presented in this section are as follows:

1. From the evidence presented in this section, it appears that management accountants, as providers of the information, and senior managers, as users, generally, were on the same line concerning the aspects of accounting information reporting covered in this section. It was reasonably clear that a problem of communication between managers and accountants did not exist
2. Although assistant managers, as persons participating in and affected by the senior managers' decisions, and senior managers differed in their assessment of some aspects of the accounting information reporting covered in this section, the differences, generally, were not statistically significant. Indeed, assistant managers' views highlighted some aspects of the accounting information reporting which may need, from the assistants' perspective, improving, such as timeliness and accuracy of the information provided for planning, and timeliness and adequacy of the information provided for control.

3. The evidence in this section indicates that, in general, the management accounting systems in the participating organisations satisfied their users by providing them with the useful information needed, especially for control. However, senior managers and their assistants were merely satisfied, but not highly satisfied. In other words, there is still room for improvement in most management accounting systems. The major conclusion which comes out of the analysis of the results presented in this section, is to place more emphasis on the level of detail and timeliness of the information provided.

SECTION 8.2 - THE INFLUENCE OF SOME DEMOGRAPHIC CHARACTERISTICS ON MANAGERS' SATISFACTION

In the introduction of this chapter it was stated that although managers' satisfaction is influenced by their perception of the usefulness of the information provided by the management accounting systems, satisfaction may be impacted also by some demographic characteristics of managers. In this section, the influence of four of these characteristics are examined; namely: (1) participation in the management accounting system design; (2) the previous experience in information systems design; (3) background in accounting; and (4) the service period in present organisation and job.

8.2.1 Participation In The Management Accounting System Design

One of the most important principles of an information system design is that user's needs must be well represented in the system design. Since the user environments are generally dynamic, they are constantly undergoing change. Since the organisation is changing, the management tools of the organisation, including the

information systems, must also change in order to respond to the evolving informational requirements of users. This can be partially fulfilled by user's involvement in systems design/redesign.

As stated in Chapter IV, the lack of management involvement in the system's design has been stressed as a significant factor contributing to the failure of management information systems to perform as expected. The lack of users' participation, in fact, will lead to an information system that will not be responsive to the user's informational needs.

In order to examine the influence of senior managers' participation in the management accounting system's design on the satisfaction with the information provided by these systems, both heads of management accounting departments in the participating organisations, and senior managers were asked their views on this issue. An analysis of the responses of heads of management accounting departments (see Appendix 6.5 : question No.10) indicated that the majority (77%) were happy about senior managers' participation in the design of the organisations' management accounting systems (the mean of the points score was 4.5 and the standard deviation was 1.61 on a 7-point scale).

On the other hand, senior managers were asked whether they had been consulted in any way about the format and content of the internal accounting reports received (see Appendix 6.6 : Manager - Questionnaire, question No. 14). The results of this investigation were presented in Table (7.15) on page 355. As can be seen from the figures in this table, 18 senior managers (27%) out of 67, were consulted about the design of all of the reports, 13 (19%) about most of the reports (about 79% of the reports), 15 (22%) about some of the reports (that is about 51% of the reports), 15 (22%) about a few

reports (that is 20% of the reports received), and 6 senior managers (9%) indicated that they had not been consulted at all.

Although users' participation in, and consultation on the reports which they will receive was stressed as the most important principle of the systems design, the current practice in the participating organisations revealed that this principle was not adopted in all cases. Two respondents' comments on this issue may clarify this matter:¹⁰

"The problem that faces the provider of the information is to provide information to each of the managers to meet his own peculiar requirements and to incorporate this information into standard format acceptable to all"

(by a management accountant)

"Managers are not encouraged to request special systems/reports to meet particular circumstances but when they do, are agreeably surprised."

(by a management accountant)

However, as participating senior managers indicated different degrees of consultation, one would expect that senior managers who were consulted about the format and content of all or most of the reports would be more satisfied with the information provided by the management accounting systems than those who were consulted about the design of a few of the reports, or were not consulted at all. Thus, managers' satisfaction with the information provided by the management accounting systems may be considered to be inversely proportional to the degrees of consultation on the design of the

¹⁰ These quotations were extracted from the last page of the questionnaires on which respondents were invited to write down any comments which they wished to make. The sources of the quotations presented above and the other quotations which will be presented later, are kept deliberately vague, because all respondents were assured of the anonymity of their replies, comments and organisations.

reports. In order to ascertain whether or not managers' consultation influenced their satisfaction, the following hypothesis is suggested for testing:

H3: Senior managers who are consulted about the design of the reports are more satisfied than those who are not consulted.

For the purpose of analysing the data associated with this hypothesis, it was decided to divide senior managers into two groups, those who were not consulted at all or consulted about the design of a few reports (about 20% of the reports), and those who were consulted about the design of all, or at least, most of the reports (about 79% of the reports). Two types of statistical test were used in deciding whether the hypothesis mentioned above is rejected or accepted, they were t-test and chi-square. The results are presented in Table (8.20) on page 427.

As can be seen from the figures presented in Table (8.20) senior managers who were consulted about the format and content of at least most of the reports were more satisfied with their management accounting systems than those who were not consulted at all or consulted only about the format and content of a few reports. The results are supportive to Hypothesis Three but not at the .05 or even at the .10 levels of significance. Obviously, both t-test and chi-square failed to indicate significant difference between the satisfaction of the two groups. Therefore, Hypothesis Three is rejected.

However, the difference in satisfaction between the two groups mentioned above, apart from the fact that it was not statistically significant, may be attributed to the influence of other demographic characteristics such as the previous experience in information systems

TABLE (8.20)

The Influence of Consultation On The Design Of The
Accounting Reports On Senior Managers' Satisfaction
With The Information Provided

Group	The Overall Satisfaction†					
	Planning		Control		Overall	
	Mean*	S.D.	Mean*	S.D.	Mean**	S.D.
(1) Those who were consulted about all or most of the reports	4.35	1.15	4.66	1.36	4.47	1.17
(2) Those who were not consulted at all or consulted about a few reports	4.10	1.20	4.44	1.37	4.27	1.19
T value	.75		.57		.58	
Degrees of freedom	49		50		49	
Significance***	.23		.29		.28	
Chi-square	.03		.78		.01	
Degrees of freedom	2		2		2	
Significance	.99		.68		.99	

† A 7-point scale was used.

* The mean scores of the five information attributes.

** The mean scores of managers' satisfaction with the attributes of both the information provided for planning and control.

*** One tailed-test

design, the background in accounting, the service period in the present organisation and in the current job, and the decision-making style (i.e. analytic or heuristic). To examine to what extent the two groups of senior managers are different or similar, a further analysis was needed. The results are shown in Table (8.21) on page 429.

Table (8.21) shows that a significant difference between the characteristics of the two groups did not exist at the .05 or at the .10 levels of significance. That is, these two groups are very similar except for the degree of consultation on the design of the accounting reports. This means that because of the difference in degrees of consultation, senior managers who had been consulted about the design of all or most of the reports received were more satisfied with their systems than those who had not been consulted at all, or consulted about the design of a few reports.

8.2.2 The Influence Of Previous Experience In Information Systems Design

Previous experience in information systems design was presented in Chapter VII as a part of respondents' profiles. Among the sixty-five senior managers answering the question on the previous experience (see Appendix 6.6 : Manager - Questionnaire, question No. 23), fifty-six (83%) indicated that they had previous experience in information systems design.¹¹

Indeed, it was not clear whether the previous experience in information systems design influenced managers' satisfaction

¹¹ Of the fifty assistant managers answering this question, thirty-four (68%) indicated that they had previous experience in designing information systems.

TABLE (8.21)

The Demographic Characteristics Of Senior Managers By The Degree Of Consultation
On The Design Of The Reports

Group	Service period in the present organisation		Service period in the current job		Previous experience in information systems design		Have studied accounting style*		Decision-making style*	
	Average Years	Average Years	Average Years	Average Years	Yes %	No %	Yes %	No %	A %	H %
(1) Who were not consulted at all or consulted about a few reports	16.94	3.73	79	21	30	70	20	80		
(2) Who were consulted about all or most of the reports	18.18	3.40	87	13	32	68	13	87		
T (or chi-square) value	.32	.34	.13		.02		.06			
Degrees of freedom	50	49	1		1		1			
Significance	.75	.73	.71		.89		.81			

* A = Analytic; H = Heuristic

with their management accounting systems. To attempt to shed some light on this issue, the following hypothesis is proposed for testing:

H4 : There is significant difference in satisfaction with management accounting systems between senior managers who have previous experience in designing information systems and those who have not previous experience.

The hypothesis mentioned above is, in fact, an exploratory hypothesis. It merely seeks to reveal whether or not previous experience in information systems design influences users' evaluation of the information systems. For this purpose, senior managers were divided into two groups, those who had previous experience, and those with no previous experience. The overall satisfactions with the information provided for planning, control, and the system as a whole, were measured for both groups. The results are shown in Table (8.22) on page 431.

The results presented in Table (8.22) indicated that senior managers who had previous experience in information systems design were more satisfied with the information provided for use in planning than those with no previous experience. The difference between the two means of satisfaction scores was .21. Concerning the information provided for use in control, the situation was reversed. The difference between the two means was .42. The mean scores of satisfaction with the systems as a whole were nearly equal, the difference between the means of the two groups was not remarkable (.02). The results of both t-test and chi-square indicated that the difference between the satisfaction scores of senior managers who had previous experience in information systems design and those with no previous experience was not significant at

TABLE (8.22)

The Influence Of Previous Experience In Information Systems Design On Senior Managers' Satisfaction With The Information Provided

Group	The Overall Satisfaction†					
	Planning		Control		Overall	
	Mean*	S.D.	Mean*	S.D.	Mean**	S.D.
(1) Who had previous experience	4.24	1.11	4.47	1.32	4.35	1.15
(2) Who had no previous experience	4.03	1.16	4.89	1.36	4.33	1.05
T value	.50		.89		.06	
Degrees of freedom	61		63		61	
Significance***	.62		.38		.95	
Chi-square	1.77		.37		1.30	
Degrees of freedom	2		2		2	
Significance	.41		.83		.04	

† A 7-point scale was used.

* The mean scores of the five information attributes.

** The mean scores of managers' satisfaction with the attributes of both the information provided for planning and control.

***Two-tailed test.

the .05 or at the .10 levels of significance, and could not support Hypothesis Four.¹² Therefore, Hypothesis Four is rejected. This means that managers' previous experience in information systems design did not significantly influence their evaluation of the management accounting systems.

The analysis of the other demographic characteristics, however, indicated that these two groups, in general, tend to be similar, as can be seen from the figures of Table (8.23) on page 433, except for having and not having previous experience in information systems design. This means that the difference in satisfaction can be, intuitively, attributed to the influence of previous experience in systems designing.

8.2.3 The Influence Of The Background In Accounting

As the research project concentrates on the effectiveness of management accounting systems, senior managers were asked to indicate whether or not they had studied accounting, the results were presented in Table (7.12) on page 352. Among the sixty-six senior managers answering the question concerned, twenty-two (33%) had studied accounting.¹³ The study of accounting, in fact, may influence managers' satisfaction with the information provided by management accounting systems. To ascertain whether or not that assumed influence existed, the following hypothesis is suggested for testing:

¹² The statistical tests did not prove also that the previous experience in information systems design had influenced assistant managers' evaluation of the information provided to their superiors, i.e. senior managers, see Appendix 8.5.

¹³ Sixteen assistant managers (31%) out of the fifty-one participating in this study indicated that they had studied accounting.

TABLE (8.23)

The Demographic Characteristics of Senior Managers Who Had Previous Experience
In Information Systems Design And Those Who Had Not

Group	Service period in the present organisation		Service period in the current job		Consultation on reports design*			Have Studied Accounting		Decision-making style**	
	Average Years	Average Years	Average Years	job	N+F %	S %	M+A %	Yes %	No %	A %	H %
(1) Who had no previous experience	21.43	2.57	44	11	44***	-	100	11	89		
(2) Who had previous experience	18.34	3.95	27	25	48	38	63	20	80		
T (or chi-square) value	.61	1.06	1.50							.03	
Degrees of freedom	63	62	2							1	
Significance	.54	.29	.47				.02+			.86	

* N+F = were not consulted at all or consulted about a few reports; S = were consulted about some of the reports; M+A = were consulted about most or all of the reports.

** A = Analytic; H = Heuristic.

+ Since the expected frequency in a cell was less than 5, Fisher's exact test was applied.¹⁴

¹⁴ Siegel, Sidney, Nonparametric Statistics, (Tokyo: McGraw-Hill Kogakusha, Ltd., 1956), pp.96-99

H5 : Senior managers who have studied accounting are more satisfied with their management accounting systems than those who have not studied accounting.

The mean scores of satisfaction for both groups are presented in Table (8.24).

TABLE (8.24)

Comparison Between The Satisfaction Of Senior Managers Who Have Studied Accounting And Those Who Have Not Studied Accounting

Group	The Overall Satisfaction†					
	Planning		Control		Overall	
	Mean*	S.D.	Mean*	S.D.	Mean**	S.D.
(1) Have studied accounting	4.25	.98	4.49	1.35	4.37	1.09
(2) Have not studied accounting	4.19	1.17	4.52	1.32	4.32	1.16
T value	.20		.09		.15	
Degrees of freedom	62		64		62	
Significance ***	.42		.46		.44	
Chi-square	6.72		.32		.74	
Degrees of freedom	2		2		2	
Significance	.04		.85		.69	

† A 7-point scale was used.

* The mean scores of the five information attributes

** The mean scores of managers' satisfaction with the attributes of both the information provided for planning and control.

*** One-tailed test.

From the statistical tests' results presented in Table (8.24) it can be seen that the difference between the satisfaction of the two groups, generally, was not statistically significant at the .05 or at the .10 level of significance, therefore Hypothesis Five is rejected. Also, the figures shown in Table (8.24) did not clearly

indicate that senior managers who have studied accounting were more satisfied with their management accounting systems than those who have not studied accounting. The differences in satisfaction, in fact, were not remarkable.¹⁵

However, the above results, aside from the difference in the satisfaction were not statistically significant, and may be attributed to other demographic characteristics than studying accounting. The results of an examination of these characteristics are shown in Table (8.25) on page 436.

As can be seen from the figures of Table (8.25), the two groups of senior managers, i.e. those who have studied accounting and those who have not, tend to be similar; since this is not a laboratory experiment, some doubt concerning similarity may remain. However, this doubt is not serious since the statistical tests did not prove there had been a significant difference between the characteristics of the two groups. Accordingly, the difference in managers' satisfaction can be attributed to the influence of an accounting background.

8.2.4 The Influence Of Service Period In Present Organisation and Job

Senior managers' service period in their present organisations and jobs might have some bearing on their satisfaction with the management accounting systems. In order to examine whether the satisfaction is associated with the service period, the two following

¹⁵ A significant difference did not exist also between assistant managers who have not studied accounting and those who have studied accounting concerning the evaluation of the information provided to their superiors, see Appendix 8.6.

TABLE (8.25)

The Demographic Characteristics Of Senior Managers Who Have Studied Accounting And Of Those Who Have Not Studied Accounting

Group	Service period in the present organisation		Service period in the current job		Consultation on reports on design*		Previous experience in information systems design		Decision-making style**	
	Average Years	Average Years	N+F %	S %	M+A %	Yes %	No %	A %	H %	
(1) Who have not studied accounting	18.67	3.55	32	21	47	80	20	18	82	
(2) Who have studied accounting	19.79	4.23	27	27	46	100	-	19	81	
T (or Chi-square) value	.30	.77	.42						.07	
Degrees of freedom	64	63	2						1	
Significance	.76	.45	.81					.02†	.80	

* N+F = were not consulted at all or consulted about a few reports; S = were consulted about some of the reports; M+A = were consulted about most or all of the reports.

** A = Analytic; H = Heuristic

† Since the expected frequency in a cell was less than 5, Fisher's exact test was applied.¹⁶

¹⁶ Siegel, Sidney, op. cit., pp.96-99

exploratory hypotheses are suggested for testing:

H6 : There is a relationship between satisfaction with the management accounting systems and senior managers' service period in the present organisation.

H7 : There is a relationship between satisfaction with the management accounting systems and senior managers' service period in the present job.

For the purpose of testing these hypotheses, it was decided to divide senior managers into two groups; those who have worked in their present organisations not more than fifteen years, and those who have worked more than fifteen years. Also, senior managers were divided into another two groups, those who have worked in their present jobs in their organisations not more than five years, and those who have worked more than five years. To test the hypotheses mentioned above, the mean scores of the overall satisfaction of each group were measured and compared with the satisfaction of the other group in the same pair. Two statistical tests, t-test and chi-square, were used to examine the differences between the satisfaction of the two groups in each pair. The mean scores of satisfaction of each group and the associated results of the statistical tests are presented in Tables (8.26) and (8.27) on page 438.

From an examination of Table (8.26) on page 438, it is clear that the differences between the satisfaction of the two groups were very trivial. The results of both the parametric and non-parametric statistical tests indicate that these differences were not significant at the .05 or even at the .10 levels of significance. Therefore, Hypothesis Six is rejected. That is, it cannot be assumed that there is a relationship between managers' satisfaction with the management accounting system and the length

TABLE (8.26)

The Relationship Between Service Period In The Present
Organisation And The Satisfaction With
The Information Provided

Group	The Overall Satisfaction†					
	Planning		Control		Overall	
	Mean*	S.D.	Mean*	S.D.	Mean**	S.D.
(1) Service period is not more than 15 years	4.21	1.17	4.52	1.45	4.36	1.23
(2) Service period is more than 15 years	4.29	1.12	4.58	1.24	4.39	1.10
T value	.30		.16		.10	
Degrees of freedom	63		65		63	
Significance	.77		.88		.92	
Chi-square	.15		1.35		1.27	
Degrees of freedom	2		2		2	
Significance	.93		.51		.53	

† A 7-point scale was used

* The mean scores of the five information attributes

** The mean scores of managers' satisfaction with the attributes of both the information provided for planning and control.

TABLE (8.27)

The Relationship Between Service Period In The Present
Job And The Satisfaction With The Information Provided

Group	The Overall Satisfaction†					
	Planning		Control		Overall	
	Mean*	S.D.	Mean*	S.D.	Mean**	S.D.
(1) Service period is not more than 5 years	4.37	1.22	4.67	1.42	4.52	1.25
(2) Service period is more than 5 years	3.94	.87	4.14	.98	4.03	.84
T value	1.42		1.53		1.59	
Degrees of freedom	63		64		63	
Significance	.16		.13		.12	
Chi-square	.77		1.66		3.06	
Degrees of freedom	2		2		2	
Significance	.68		.44		.22	

† A 7-point scale was used

* The mean scores of the five information attributes

** The mean scores of managers' satisfaction with the attributes of both the information provided for planning and control.

of his service period in the present organisation. Pearson's correlation coefficient test also confirmed this conclusion. The correlation coefficients between the service period in the present organisation and the satisfaction with the information provided for planning, control, and the information provided in general were .13 ($\alpha = .16$), .11 ($\alpha = .18$) and .10 ($\alpha = .22$), respectively.¹⁷

However, the results of examining the relationship between the satisfaction with the information provided by management accounting systems and the service period in the present job were relatively different from the aforementioned results. As can be seen from the figures of Table (8.27), although the differences between the two groups were not significant at the .05 level of significance (t-test), the differences were not too far from the .10 level which can be accepted in social studies. Also, it is interesting to note that senior managers who have worked in their present jobs more than five years were less satisfied, but not statistically significant, by the information provided by the management accounting systems than those who have worked not more than five years. The correlation coefficients between the service period in the present job and the satisfaction with the information provided for planning, control, and the information provided in general were found to be -.13 ($\alpha = .16$), -.21 ($\alpha = .04$), and -.18 ($\alpha = .07$), respectively.

¹⁷ The analysis of the similar data of assistant manager's questionnaires indicated that there had not been significant differences between the two groups of assistant managers (i.e. those who have worked in the present organisations more than 15 years, and those who have worked 15 years and less) in the evaluation of the information provided to their superiors, see Appendix (8.7). Pearson's correlation coefficient test confirmed also that there had not been a relationship between the service period in the present organisations and the evaluation of the information provided. The correlation coefficients related to the information provided for planning, control and the information provided in general were .07 ($\alpha = .33$), .26 ($\alpha = .04$), and .17 ($\alpha = .12$), respectively.

The correlation coefficients presented above indicate that there was negative relationship, which was obviously very weak, between service period in the present job and the satisfaction with the information provided by the management accounting systems. That is, the longer the senior manager stays in his present job, the less he is satisfied with the information provided by the management accounting systems. It is clear that, with the exception of the correlation between the service period in the present position and the satisfaction with the information provided for planning, the correlation coefficients are significant at the .10 level of significance. That is, the correlation coefficients are large enough to cause rejection of the hypothesis of no correlation. Indeed, these coefficients are too small to be considered supportive of Hypothesis Seven which indicates that there is a significant relationship between satisfaction and the length of the service period in the present job.¹⁸

However, senior managers' satisfaction may be influenced by other demographic characteristics than the service period in the

¹⁸ A significant difference did not also exist between assistant managers who have worked in their present jobs more than five years and those who have worked five years and less, concerning the evaluation of the information provided to their superiors, see Appendix (8.8). The correlation coefficients between the service period in the present job and the evaluation of the information provided for planning, control, and the information provided in general were .10 ($\alpha = .26$), .06 ($\alpha = .35$), and .08 ($\alpha = .28$), respectively. Obviously, these coefficients were in the opposite direction (positive) of the coefficients related to senior managers' satisfaction. However, the coefficients were very trivial and obviously not significant in the statistical sense.

present organisation and job. In order to ascertain that the results and conclusions previously reached relating to Hypothesis Six and Hypothesis Seven are actually due to the influence of the service period in present organisation and job, the other demographic characteristics were examined. For this purpose, Table (8.28) and Table (8.29) on pages 442 and 443, were prepared.

As can be seen from the figures of Table (8.28), the differences between the other demographic characteristics were not significant at the .01 level of significance. However, Table (8.29) on page 443, shows that a significant difference in the service period in the present organisation existed. As previously stated, the service period in the present organisation, indeed, had no influence on managers' satisfaction. The overall conclusion is that the two groups of senior managers in each pair of groups tended to be similar.

8.2.5 The Demographic Characteristics As Determinants of Managers' Satisfaction : Further Analysis

From the analysis of the influence of the demographic characteristics on managers' satisfaction, it is reasonably clear that only two characteristics, i.e. degree of consultation on the reports design and the service period in the current job, may have an impact on the manager's satisfaction. To examine to what extent the two characteristics, as independent variables, influenced, in combination, managers' satisfaction, as dependent variable, a stepwise multiple regression analysis was used. For this purpose, the multiple regression model presented on page 444 was applied:

TABLE (8.28)

Comparison Between The Demographic Characteristics Of Senior Managers Grouped
By The Length Of The Service Period In The Present Organisation

Group	Service Period in the present job		Consultation on reports design*		Previous experience in information systems design		Have Studied Accounting		Decision- making style**	
	Average Years	N+F %	S %	M+A %	Yes %	No %	Yes %	No %	A %	H %
(1) Service period is not more than 15 years	2.78	35	18	47	88	12	30	70	12	88
(2) Service period is more than 15 years	4.75	27	27	46	84	16	36	64	25	75
T (or chi-square) value	2.44		1.05		.002		.07		1.04	
Degrees of freedom	64		2		1		1		1	
Significance	.02		.59		.96		.79		.31	

* N+F = were not consulted at all or consulted about a few reports.

S = were consulted about some of the reports.

M+A = were consulted about most or all of the reports

** A = Analytic; H = Heuristic

TABLE (8.29)

Comparison Between The Demographic Characteristics of Senior Managers Grouped
By The Length Of The Service Period In The Present Job

Group	Service Period in the present organisation		Consultation on reports design*		Previous experience in information systems design		Have Studied Accounting		Decision-making style**	
	Average Years	N+F %	S %	M+A %	Yes %	No %	Yes %	No %	A %	H %
(1) Service period is not more than 5 years	15.43	33	21	46	86	14	36	64	20	80
(2) Service period is more than 5 years	25.76	30	25	45	90	10	30	70	16	84
T (or chi-square) value	3.00	.10	.00	.02	.00	.02	.02	.02	.002	.002
Degrees of freedom	64	2	1	1	1	1	1	1	1	1
Significance	.004	.95	1.00	.88	.97	.88	.88	.88	.97	.97

* N+F = were not consulted at all or consulted about a few reports.
S = were consulted about some of the reports.
M+A = were consulted about most or all of the reports.

** A = Analytic; H = Heuristic

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5$$

where:

- Y = Manager's overall satisfaction with the information provided by the management accounting systems
- x_1 = Length of the service period in the current job
- $x_2 - x_5$ = Dummy variables representing the degrees of consultation on the reports design (i.e. all, most, some, and a few of the reports).

The results obtained are shown in Table (8.30).

TABLE (8.30)

The Consultation On The Reports Design And The Service Period In Current Job As Determinants Of Senior Managers' Satisfaction

Variables Entered	F Ratio	Significance	R ²	Change In R ²
(1) Consultation on all of the reports	3.04	.09	.046	.046
(2) Service period in the current job	1.82	.18	.073	.027
(3) Consultation on most of the reports	.49	.49	.081	.008
(4) Consultation on a few of the reports	.42	.52	.087	.006
(5) Consultation on some of the reports	.11	.74	.089	.002

The figures in Table (8.30) indicate that consultation on the design of the reports and the length of the service period in the current job, in combination, explained about nine percent ($R^2 = .089$) of the variation in managers' satisfaction with the information provided by the management accounting systems. The dummy variable representing consultation on the design of all of the reports explained about five percent ($R^2 = .046$) of the variation in the satisfaction and it was significant at the .10 level of significance ($F = 3.04$; $\alpha = .09$). The other four variables explained about

four percent (change in $R^2 = .043$) of the variation and none were significant at the .05 or the .10 levels of significance. However, the length of the service period in the current job explained about three percent (change in $R^2 = .027$) of the variation in managers' satisfaction ($F = 1.82$; $\alpha = .18$). These results, in fact, confirm the conclusions reached previously in this section.

8.3.6 Summary And Conclusions

In this section, four demographic characteristics of senior managers were studied to examine whether or not they influenced managers' satisfaction with the information provided by the management accounting systems. It was concentrated in this section on the influence of the following characteristics: (1) the degree of consultation on the design of the accounting reports received; (2) the previous experience in information systems design; (3) the background in accounting; and (4) the length of the service period in the present organisation and job.

The influence of each characteristic mentioned above was separately examined. However, to ascertain that the results produced and the conclusions drawn from the analysis of the related data were attributed to the influence of a given characteristic and not to the influence of others, the similarity of senior managers' groups was examined as well.

From the analysis of the data used in examining the influence of the four demographic characteristics, the following conclusions can be drawn:

- (1) The degree of prior consultation on the design of the accounting reports received influenced managers' satisfaction

with the information provided by the management accounting systems. However, the analysis of the data associated with this factor indicated that this influence had not been statistically significant.

- (2) Sufficient evidence did not exist to support that the previous experience in information systems design influenced managers' satisfaction with the information provided by the management accounting systems. The analysis of the data related to this factor did not indicate that there had been a compatible relationship between previous experience and satisfaction, also the statistical tests used did not show a significant difference between the satisfaction of senior managers who had previous experience and those who had not.
- (3) The analysis of data related to the background in accounting did not indicate that this factor had influenced senior managers' satisfaction. A significant difference did not exist between senior managers who have studied accounting and those who have not studied accounting.
- (4) There was a negative relationship, but not statistically significant, between the length of the service period in the present job and the satisfaction with the information provided by the management accounting systems. In other words, the longer the senior managers work in their present jobs, the less they are satisfied with the management accounting systems.
- (5) A statistically significant relationship was not found between the length of the service period in the present organisation and senior managers' satisfaction with the information provided by the management accounting systems.

SECTION 8.3 - THE INFLUENCE OF THE DECISION-MAKING STYLE ON MANAGERS' SATISFACTION

8.3.1 Introduction

As stated in Chapter III, individuals differ in their approaches in decision-making. Given like information, decision-makers do not arrive at identical decisions. Two extremes of decision-making styles can be identified; the analytic or systematic style, and the heuristic or intuitive style. The decision-maker with analytic style reduces a problem to a set of causal relationships and tries to find a solution by using formulae and models. At the other extreme is the decision-maker with heuristic style who solves problems through intuition and relies more heavily on feedback. Obviously decision-makers are not expected to be at the extremes in terms of this classification, but may tend towards one or the other. Pure analytic or pure heuristic are theoretical styles and may not exist in real life. Thus, the two terms are used in this study to refer to the tendency to be more analytic or more heuristic.

The two styles of decision-makers, obviously, process the same information differently, and can be more effective with different types of information. Research on human information processing, as presented in Chapter III indicates that the decision-maker with analytic style tends to use more information, prefers detailed reports, while the heuristic style prefers to use less information and likes aggregated summary reports.

8.3.2 The Influence Of The Decision-Making Style on Managers' Satisfaction

Senior managers participating in this study were divided into two groups according to their tendencies to be more analytic or more

heuristic. Of the sixty-five senior managers answering the question on the decision-making style, only twelve (18 percent) indicated that they had tended to be more analytic, while fifty-three (82 percent) heuristic. Although the two groups are different, the management accounting systems may satisfy both. Thus, to give a prior assumption about the satisfaction of each group is not an easy matter. However, in order to reveal whether or not there was a significant difference in the satisfaction between the two groups, the following exploratory hypothesis is suggested for testing.

H8 : There is significant difference in the satisfaction with the information provided by the management accounting systems between senior managers with analytic styles and those with heuristic styles.

The results of testing this hypothesis are presented in Table (8.31) on page 449.

As can be seen from the figures in Table (8.31) both decision-making styles, i.e. analytic and heuristic, were satisfied with the information provided by the management information systems. Although there were differences between the satisfaction of the two groups, the statistical tests did not indicate that these differences had been significant at the .05 level of significance. The implication of this result is that although the analytic and the heuristic styles were different, the management accounting systems satisfied both.

Apart from the fact that the statistical tests used did not indicate, as presented above, significant differences between the satisfaction of analytic and heuristic managers, the other demographic characteristics should be examined to ascertain that the two groups were similar. Table (8.32) on page 450 was prepared for this purpose.

TABLE (8.31)

Comparison Between The Satisfaction Of Senior Managers
Who Were Analytic And Those Who Were Heuristic

Group	The Overall Satisfaction †					
	Planning		Control		Overall	
	Mean*	S.D.	Mean*	S.D.	Mean**	S.D.
Analytic	4.17	1.11	4.82	1.20	4.49	1.03
Heuristic	4.22	1.12	4.46	1.35	4.31	1.16
T value	.15		.85		.49	
Degrees of freedom	61		63		61	
Significance	.88		.40		.63	
Chi-square	.48		4.98		.73	
Degrees of freedom	2		2		2	
Significance	.79		.08		.69	

† A 7-point scale was used.

* The mean scores of the five information attributes.

** The mean scores of managers' satisfaction with the attributes of both the information provided for planning and control.

TABLE (8.32)

The Demographic Characteristics Of The Analytic And Heuristic Senior Managers

	Service period in the present organisation		Service period in the current job		Consultation on reports on design*			Previous Experience in information systems design		Have Studied Accounting	
	Average Years		Average Years		N+F %	S %	M+A %	Yes %	No %	Yes %	No %
Analytic	21.76		3.08		33	33	34	92	8	33	67
Heuristic	18.30		3.91		30	21	49	85	15	32	68
T (or chi-square) value	.77		.77			1.23		.03			.07
Degrees of freedom	63		62			2		1		1	1
Significance	.45		.44			.54		.86			.80

* N+F = were not consulted at all or consulted about a few reports.
 S = were consulted about some of the reports.
 M+A = were consulted about most or all of the reports

The figures in Table (8.32) do not reveal that there were significant differences between the others demographic characteristics of senior managers with analytic styles and those with heuristic styles. This indicates that the others' demographic characteristics did not affect the results presented in Table (8.31) and the satisfaction measured can be attributed to the difference in the decision-making styles.

The influence of the decision-making style on the satisfaction, however, was examined by another technique. A stepwise multiple regression analysis was used to examine to what extent managers' satisfaction with the information provided by the management accounting systems is determined by the decision-making style, the degree of consultation on the reports design, and the length of service period in the current job, in combination. The regression equation included the managers' overall satisfaction as a dependent variable. The independent variables were: (1) dummy variables for the degrees of consultation on the reports design; (2) a dummy variable for the decision-making style; and (3) a variable representing the length of the service period in the current job. The results are presented in Table (8.33) on page 452.

Table (8.33) shows that the degree of consultation, the service period in the current job, and the decision-making style (heuristic), in combination, explained about 11 percent ($R^2 = .107$) of the variation in the managers' overall satisfaction with the information provided by the management accounting systems. The dummy variable representing the decision-making style (heuristic) explained only two percent of the variation in satisfaction. It was also not significant at the .05 or the .10 levels of significance ($F = 1.42$; $\alpha = .24$).

TABLE (8.33)

The Decision-Making Style As A Determinant Of
Senior Managers' Overall Satisfaction

Variables Entered	F	Signi- ficance	R ²	Change in R ²
(1) Consultation on all of the reports	3.04	.09	.046	.046
(2) Service period in the current job	1.82	.18	.073	.027
(3) Decision-making style (Heuristic)	1.42	.24	.094	.021
(4) Consultation on most of the reports	.58	.45	.103	.009
(5) Consultation on a few of the reports	.19	.67	.106	.003
(6) Consultation on some of the reports	.04	.85	.107	.001

Another regression equation was computed for the analytic style of decision-making with the same variable. The result obtained indicated that this style, i.e. analytic, had a very minor impact on managers' overall satisfaction. The dummy variable representing this style explained less than .01 percent ($R^2 = .004$). It was also insignificant at the .05 or the .10 levels of significance. From this and the other result, presented above, it can be concluded that the decision-making style of the sample of the managers participating in this study appeared to have no significant impact on managers' satisfaction with the information provided by the management accounting systems.

8.3.3 An Empirical Test Of The Differences Between The Analytic and Heuristic Decision-Making Styles

It was stated earlier that the two styles of decision-makers are different in their preferences of the amount of detailed information required. The analytic managers tend, relatively, to use more information and, accordingly, they like to receive detailed reports, while the heuristic managers tend to use less information depending on their intuition, thus they prefer to be provided with aggregated summary reports. In order to ascertain whether or not there was a significant difference between these two styles as the research on human information processing revealed, two areas are examined; (1) conducting expanded searches to obtain additional information; and (2) information overload.

Indeed, the results of the investigation on the two areas mentioned above should be interpreted with caution for several reasons. First, the sizes of the two groups, i.e. analytic and heuristic, were greatly different, while only 12 (18%) of senior managers indicated that they had tended to be more analytic, 53 (82%) had tended to be more heuristic. Secondly, the size of the analytic group (12 senior managers) may distort the results. By employing a large sample, however, the effects of any bias will be small enough to be considered insignificant, on the other hand the results produced may be reversed. Lastly, researches on human information processing, indeed, have been conducted in laboratory experiments. Since this investigation was conducted in real organisations, the situation therefore was different. However, an attempt will be made to test empirically the influence of the characteristics of each style, i.e. analytic and heuristic, on the amount of detailed information used and preferred to be contained in the reports received.

8.3.3.1 Conducting Expanded Searches To Obtain Additional Information: Analytic Style Versus Heuristic Style

As the decision-maker with analytic style tends to use more information than the heuristic, it is expected that the former will conduct expanded searches to obtain additional information, relatively more than the latter. In order to test empirically this notion, it is hypothesised that:

H9 : Senior managers with analytic styles conduct expanded searches to obtain additional information more than senior managers with heuristic styles.

Table (8.34) shows the results of testing the hypothesis mentioned above.

TABLE (8.34)

The Influence Of Senior Managers' Decision-Making Styles On Conducting Expanded Searches To Obtain Additional Information

Group*	For Planning		For Control	
	Never and Seldom	Occasionally and Frequently	Never and Seldom	Occasionally and Frequently
	%	%	%	%
Analytic	8	92	8	92
Heuristic	32	68	25	75
Chi-square	1.70		.71	
Degrees of freedom	1		1	
Significance	.19		.40	

* 12 senior managers indicated that they had tended to be analytic and 53 to be heuristic

The figures of Table (8.34) indicate that senior managers with analytic styles tended to conduct expanded searches to obtain additional information, relatively more than those with heuristic styles. These figures, indeed, are supportive to Hypothesis Nine but not at the .05 or the .10 levels of significance.

8.3.3.2 Information Load (Too Little, Too Much, About Right): Analytic Style Versus Heuristic Style

The two styles of the decision-makers differ in their preference of the amount of detailed information. A given amount of information may cause information overload for one style but not for the other. As the search on human information processing identified the characteristics of each style, it is expected that senior managers with analytic styles complain about too little information more than those with the heuristic styles. Thus, the following hypothesis is proposed for testing:

H10: Senior managers with analytic style complain about "too little" information more than those with heuristic styles, while the latter complain about "too much" information more than the former.

The results of this hypothesis are presented in Table (8.35).

TABLE (8.35)

Comparision Between Views Of The Analytic and Heuristic Senior Managers On The Amount Of Detailed Information

Group	Information Provided For Use In Planning			Information Provided For Use In Control		
	Less than the right quantity	About right	More than the right quantity	Less than the right quantity	About right	More than the right quantity
	%	%	%	%	%	%
Analytic	25	58	17	17	50	33
Heuristic	36	55	9	13	57	30
Chi-square		.84			.19	
Degrees of freedom		2			2	
Significance		.66			.91	

The findings presented in Table (8.35) were not in the predicted direction. Relatively, senior managers with analytic styles complained about "too much" information, more than senior managers with heuristic styles, while the latter complained about "too little" information, relatively more than the former. However, chi-square test indicates that the differences between the two groups of the decision-making styles are not statistically significant at the .05 or the .10 levels of significance. The likely explanation of these findings is that senior managers with analytic styles feel that they receive information which is irrelevant to the management of their functions. Indeed, evidence did not exist to support this explanation. However, as stated earlier, the findings should be interpreted with caution since the size of the sample of the analytic style is very small (12 senior managers), and this investigation is not a laboratory experiment.

8.3.4 The Decision-Making Style And The Design Of Management Accounting Systems

As stated in Chapter III, the psychological characteristic of the user of information was considered to be constant when an information system is designed. Indeed, much attention is paid to providing information suited to the managerial level of the user with less attention to the psychological characteristics of the user himself. Managers at the same organisational level, in the same job may be provided with the same type of information to suit their organisational level and the type of decisions that may be taken, with less attention to the differences among the managers who may have different decision-making styles. A participating respondent expressed the current practice by saying:

"Our management accounting system was drawn up to report to managers and not to take into account the particular whims of any individual. The system produces information required by all levels of management, but only the appropriate information is circularised at each level.

(by head of management accounting department)

In order to reveal to what extent the decision-making styles of senior managers participating in this study were taken into consideration in designing the management accounting systems, heads of management accounting departments of the participating organisations were asked to indicate to what extent the different decision-making styles affected the format and content of the internal accounting reports (see Appendix 6.5 : The Questionnaire of Head of Management Accounting Department, question No. 16). The responses of this enquiry are presented in Table (8.36).

TABLE (8.36)

The Effect Of The Decision-Making Styles Of Senior Managers
On The Design Of The Internal Accounting Reports

Frequency of Responses*							Mean	S.D.	Median	Skewness
1	2	3	4	5	6	7				
%	%	%	%	%	%	%				
27	15	19	35	4	-	-	2.73	1.31	2.90	-1.14

* A 7-point scale was used where 1 = not at all; 4 = somewhat; and 7 = substantial.

Table (8.36) shows that about one-quarter (27%) of heads of management accounting departments indicated that the decision-making styles of managers had not been considered at all in the designing of the internal accounting reports, while about one-third of them (35%) stated "somewhat", and only four percent gave a score slightly over "somewhat" (5 points on a 7-point scale). The responses of the last third (34%) were between "not at all" and "somewhat".

The conclusion to be drawn from the analysis of these findings is that the participating organisations did not give considerable attention to the differences in the decision-making styles in designing the management accounting systems.

It is not, of course, practical nor economical to design information systems which suit every decision-maker. This, in fact, means that there may be a need for as many information systems as there are decision-makers with different styles using these systems. In fact, the comments of two participating respondents pointed out this problem:

"Whilst it might conceivably be possible in a small firm to frame a management information system to suit the decision-making style of the top manager, I cannot see how this could be achieved in a large organisation."

(by manager)

"Certain questions infer that a manager's decision-making style should decide the format of reports. In an organisation providing a number of district managers with information, the format cannot be altered as between districts. Indeed, if it could, district information would need to be altered on the change of manager. This may be an ideal situation but not very practical."

(by management accountant)

The problem is, however, that if an information system is to be effective, it should be utilised by the decision-makers. The utilisation, in turn, means that the decision-maker includes the information provided by the system in his human information system. In other words, the reports generated by an information system should be congruent with the users' information processing capabilities. This means, again, that the decision-making styles of managers should be taken into consideration when an information system is designed.

To discuss this issue from a practical standpoint, all respondents were asked their views on taking into account the different styles (analytic-heuristic) of managers when reports are designed (see Appendices 6.5, 6.6, 6.7 and 6.8, questions No. 14-B, 20-B, 10-B, and 13-B, respectively). Respondents' views are shown in Table (8.37) and also in Figure (8.5) on pages 460 and 461, respectively.

The figures in Table (8.37) indicate that only 20 percent of heads of management accounting departments agreed that the decision-making styles should be taken into consideration when the internal accounting reports are designed, while 39 percent were neutral, and 42 percent did not agree. However, with the exception of heads of management accounting departments, in the opinion of over 40 percent of the respondents from the other groups, the differences in the decision-making styles should be considered when the reports are designed. It is interesting to note also that 52 percent of management accountants, as providers of information, agreed on the statement given. The conclusion to be drawn from the figures of this table is that there is a tendency, although it is not very strong, among senior managers, assistant managers and management accountants, to accept the differences in decision-making styles as determinants, among other things, of the design of an information system.

In fact, to take into account the decision-making style of each manager is not practical or economical, but by identifying the group of decision-makers possessing a few common characteristics, as opposed to the many differences possessed by individuals, information systems can be designed to support these common traits.

TABLE (8.37)

Respondents' Views On The Decision-Making Style As A Factor Which Should Be Taken Into Account When An Information System Is Designed

Group	Frequency of Responses †							Mean	S.D.	Median	Skewness
	1 %	2 %	3 %	4 %	5 %	6 %	7 %				
Senior Managers	3	16	8	30	21	13	9	4.25	1.59	4.28	-.10
Assistant Managers	8	20	6	24	16	18	10	4.12	1.83	4.21	-.12
Management Accountants*	2	9	17	21	23	21	8	4.45	1.51	4.54	-.20
Heads of M.A.D.**	4	15	23	39	12	8	-	3.62	1.24	3.70	-.01
All respondents*	4	15	12	27	19	16	8	4.19	1.60	4.21	-.09

F ratio*** = .55 ; degrees of freedom = (2,168); significance = .58

Chi-square*** = 1.96; degrees of freedom = 4; significance = .74

† A 7-point scale was used where 1 = strongly disagree; 4 = neutral; 7 strongly agree.

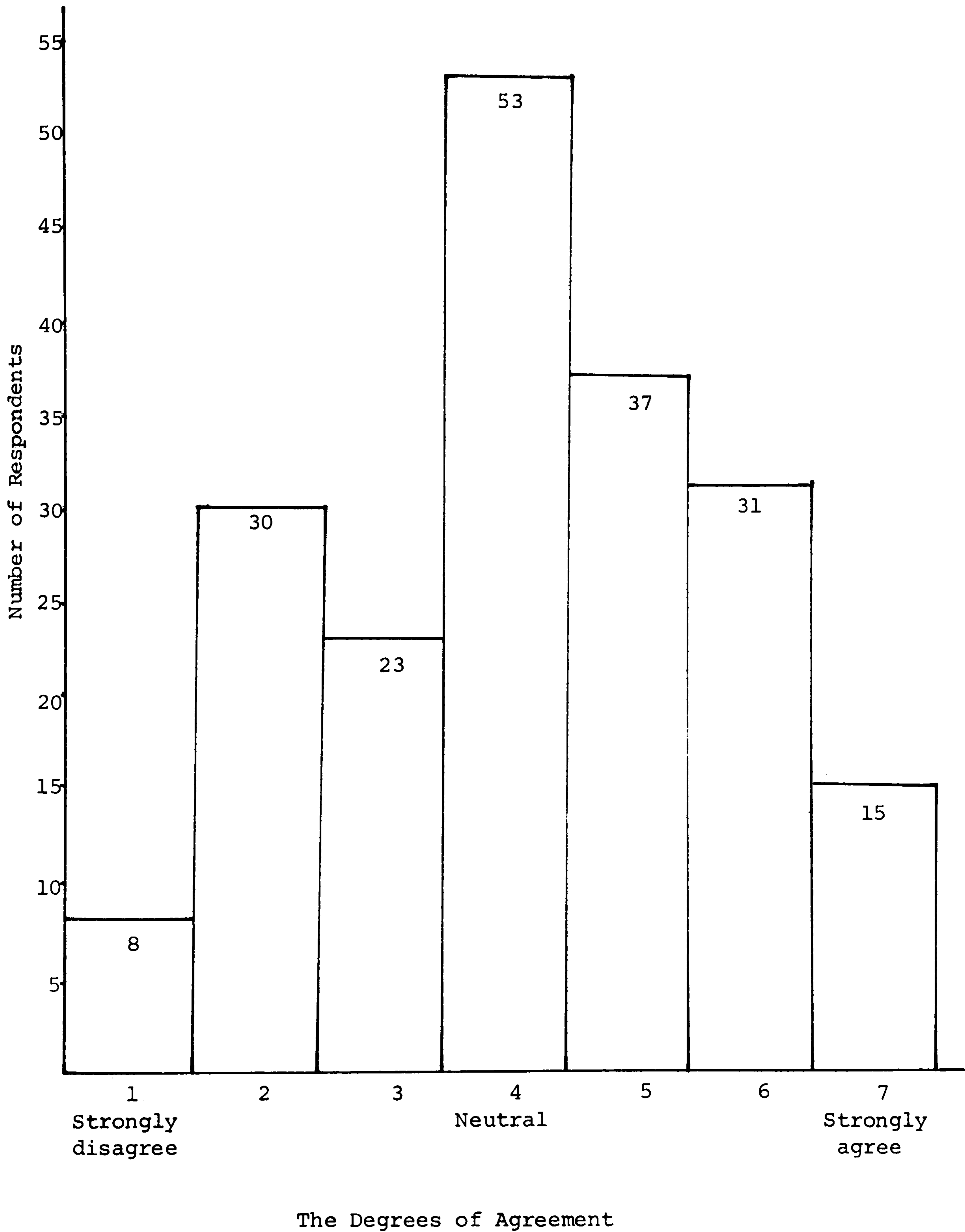
* 1 respondent (2% of 54 or 0.5% of 198) did not indicate his opinion.

** M.A.D. = Management Accounting Department

*** For three groups only, i.e. managers, assistants, and accountants

FIGURE (8.5)

Histogram Of Respondents' Views On The Decision-Making Style
As A Factor Which Should Be Considered in Designing The
Information Systems



Designing information systems to support the traits of each group of the decision-makers, obviously should reduce the amount of design features necessary to construct an information system which can support the differences among the decision-makers. Although this practice would be a compromise to designing information systems tailored to individuals characteristics, it is perhaps the more practical or economical approach to constructing a more effective system.

8.3.5 Use Of Psychological Tests In Identifying The Decision-Making Styles

The psychological tests were suggested, as stated in Chapter III, to be used in determining the decision-making styles of managers as users of information. The psychological tests, in fact, are not a substitute for the other methods applied in designing the information systems, e.g. interviews, and cannot be used solely. Since this approach is a relatively new area of interest in information system domain, it was not surprising to discover that none of the participating organisations had used them. However, an attempt was made to measure the respondents' attitude towards the psychological tests to determine whether these tests can be accepted if they were actually applied. All respondents were asked to indicate the degree of their agreement, on a seven-point scale, on using the psychological tests in determining the decision-making styles (see Appendices 6.5, 6.6, 6.7, and 6.8, questions No. 14-D, 20-D, 10-D, and 13-D, respectively). Table (8.38) on page 463 summarises the results obtained from all respondents on this issue, and Figure (8.6) on page 464 presents a histogram of the responses.

TABLE (8.38)

Respondents' Views on the Psychological Test

Group	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1 %	2 %	3 %	4 %	5 %	6 %	7 %				
Senior Managers	27	22	13	30	3	3	2	2.75	1.48	2.56	.50
Assistant Managers	26	16	12	37	10	-	-	2.90	1.40	3.25	-.18
Management Accountants	20	19	20	33	7	-	-	2.89	1.28	3.05	-.17
Heads of M.A.D.	27	39	12	19	-	4	-	2.39	1.30	2.10	.93
All Respondents	25	22	15	31	6	2	1	2.78	1.39	2.74	.22

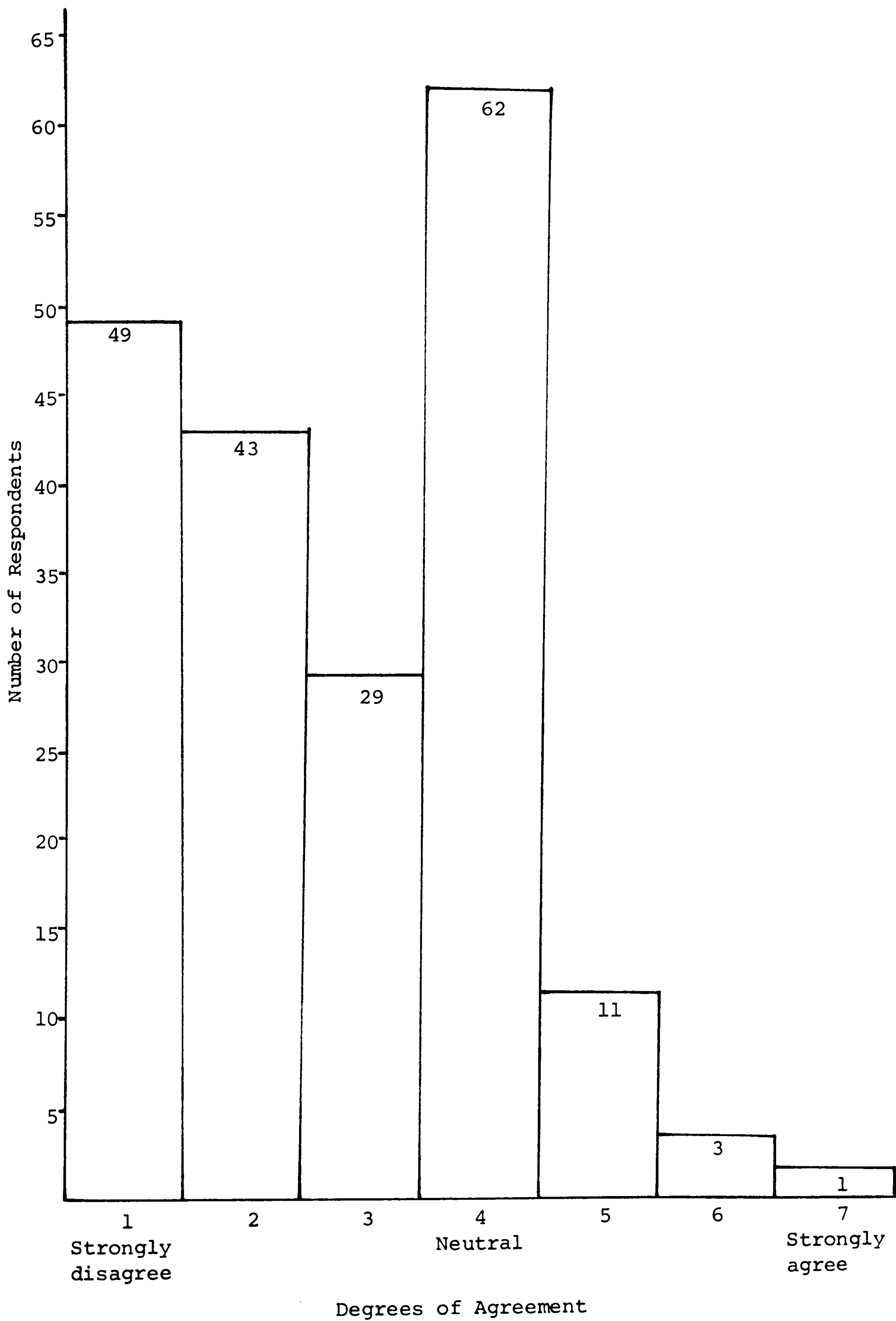
F ratio = .96; degrees of freedom = (3,194); significance = .41

Chi-square = 4.40; degrees of freedom = 6; significance = .62

* A 7-point scale was used where 1 = strongly disagree; 4 = netural; 7 strongly agree.

FIGURE (8.6)

Histogram Of The Respondents' Acceptance Of
The Psychological Tests



The figures of Table (8.38) indicate that a very small proportion of respondents (10 percent and less) as a whole and as groups accepted the psychological tests to be used in determining the decision-making styles and believed that these tests would be helpful in designing an information system, while 31 percent of all respondents were neutral, and the majority (62%), in fact, did not accept these tests and they did not conceive that using the psychological tests would be helpful in designing an information system. The conclusion to be drawn from the analysis of these findings is that the use of psychological tests in determining the decision-making styles of managers may fail to achieve their purpose, because of managers' opposition and unacceptance. A long time may be needed, however, to convince managers of the benefits of these tests. The problem, in fact, is that people tend to reject what they do not understand, and avoid what may expose their real personalities.

8.3.6 Summary and Conclusions

It was stressed in this section that as the managers differ in their organisational levels and in the type of the decisions which they may make, they may differ also in their decision-making styles, i.e. analytic and heuristic. The manager with analytic style, as explained earlier, tends to use more information, prefers detailed reports, while the manager with heuristic style uses less information and likes aggregated summary reports.

The purposes of this section were to ascertain whether or not the decision-making styles influence the managers' satisfaction, to test empirically the effect of the styles on the amount of information needed, and to reveal the respondents' views on taking into

consideration the managers' styles when an information system is designed and also their acceptance of the use of psychological tests in determining the decision-making styles.

The conclusions which can be drawn from the results of this section are:

- (1) It seems that the management accounting systems of the participating organisations were flexible to the extent that they satisfied the managers who had different decision-making styles.
- (2) A significant difference between the two styles of decision-making, analytic and heuristic, in their preferences of the amount of the detailed information to be used and the reports preferred to be received, was not proved empirically. The results obtained, in fact, contradicted each other. The analytic managers conducted expanded searches to obtain additional information more than the heuristic managers. On the other hand, the analytic managers complained, unexpectedly, about receiving too much information more than the heuristic managers did. However, the differences between the two styles in the two areas examined were not significant in the statistical sense. Further, the results obtained should be interpreted with caution, since this study was not a laboratory experiment, and the size of the sample of the analytic group (12 senior managers) relatively and statistically was small.
- (3) It seems that the differences in managers' decision-making styles were taken into consideration, in one way or another, when the management accounting systems of the participating organisations were designed. However, it did not appear that the decision-making styles were considered to a great extent.

(4) With the exception of heads of management accounting departments, considerable proportions of senior managers (43%), assistant managers (44%) and management accountants (52%) believed that when an information system is designed, the decision-making styles should be taken into consideration in addition to the managerial level of managers and the decisions which they may take.

(5) The use of psychological tests in determining the decision-making styles, indeed, did not gain the acceptance of the majority of all respondents.

SECTION 8.4 - THE RELATIONSHIP BETWEEN MANAGERS AND ACCOUNTANTS AND ITS EFFECT ON MANAGERS' SATISFACTION

The effectiveness of a management accounting system can be attributed, among other things, to the communications which exist between the managers, as users of information, and the management accountants, as providers of information. Obviously, the lack of communication between the management accountants and the managers may lead to providing information which will not be responsive to the managers' needs. Indeed, the relationship between those two parties can be examined in four areas: (1) the accountants' understanding of the evolving informational requirements of managers; (2) the accountants' co-operation with managers in determining the informational requirements of the latter; (3) the accountants' perception of the managers' decision-making style; and (4) the accountants' co-operation with managers in the interpretation of the information contained in the reports.

8.4.1 The Management Accountants' Understanding of the Managers' Evolving Informational Requirements

As stated in Chapter IV, the managers' environments are generally dynamic, they are constantly undergoing change. As the environments are dynamic, the situations confronting the managers are to be changing. Varying situations will bring out the need for different decisions. Different decisions will require different information from the management accounting systems. The management accounting system must change to meet the changing requirements of the dynamic situations. Thus, the management accounting systems should be adaptable if management needs change. On the other hand, management accountants by communicating with managers, will understand the evolving informational requirements of management. Indeed, the failure in providing useful information can be partially attributed to the lack of effective communication and relationship between the management accountants, as providers of information, and the managers, as users of information.

In order to examine the relationship between the two parties, senior managers were questioned on the accounting staff's understanding of the managers' evolving informational requirements (see Appendix 6.6 : Manager - Questionnaire, question No.12). Table (8.39) on page 470, summarises the results of this investigation.

As can be seen from the figures in Table (8.39) senior managers, generally, were happy with the accounting staff's understanding of the evolving informational requirements. The means of managers' assessment of accountants' understanding of the information needed for planning and control were 4.94 and 5.36 respectively.

Management accountants, on the other hand, were asked to

indicate to what degree managers explained their evolving informational requirements to accountants (see Appendix 6.8 : Management Accountants - Questionnaire, question No. 4). The results are presented in Table (8.40) on page 470.

Although senior managers were happy with the accountant's understanding of the evolving informational requirements, accountants, as can be seen from the figures in Table (8.40) were less satisfied with managers' explanation of their requirements, especially concerning the information needed for planning. This may indicate that accountants should ask managers to determine what they want more precisely. A participating respondent points this out by saying:

"One problem area is to find out from managers and directors exactly what they want to help them to plan and control, quite often a wealth of useful information is available, but no requests are made for it, even though management is told about it.

(by management accountant)

As stated in Chapter IV, for a manager to know what information he wants, he must be aware of each type of decision he would make and have an adequate model of each. In some cases, the manager may not be able to identify the important variables involved in decision-making and accordingly he is not sure of the information he needs. In such a case, the manager calls for more information than he would use. Also, accountants for their part, provide managers with every possible piece of information and give them the option of selecting the information the managers consider useful in making their decisions. This, in fact, may explain, partially, why managers were satisfied with accountants' understanding of the evolving informational requirements, while accoun-

TABLE (8.39)

Senior Managers' Views On The Accounting Staff's
Understanding Of The Evolving Informational Requirements

Information Needed	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
For Planning	3	6	11	17	25	16	22	4.94	1.66	5.06	-.48
For Control	2	4	6	15	21	22	30	5.36	1.53	5.60	-.77

* A 7-point scale was used where
1 = not at all; 4 = somewhat; 7 = substantial

TABLE (8.40)

Management Accountants' Views On The Senior Managers'
Explanation Of Their Evolving Informational Requirements

Information Needed	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
For Planning	7	17	18	24	15	13	6	3.83	1.65	3.81	.12
For Control	4	13	18	18	30	11	6	4.13	1.52	4.30	-.12

* A 7-point scale was used where
1 = not at all; 4 = somewhat; 7 = substantial

tants were less happy with the managers' explanation of their requirements.

The accountants' understanding of the evolving informational requirements of managers, obviously, has direct impact on the managers' satisfaction with the information provided by the management accounting systems. The Pearson's correlation coefficient was found to be .57 (significance = .00) between the scores of managers for the accountants' understanding and the score of the overall satisfaction with the information provided for planning. Concerning the understanding of the information needed for control and the satisfaction with this information, the correlation coefficient was found to be .53 (significance = .00). These correlation coefficients indicate that the relationship between accountants' understanding of the managers' evolving informational needs and the managers' satisfaction is strong and positive.

A stepwise multiple regression analysis was also used to reveal to what extent the managers' overall satisfaction with the information provided by the management accounting systems is determined by the degree of the accountants' understanding of the evolving informational requirements of managers. The dependent variable was the managers' overall satisfaction. Two independent variables were included in the regression equation: (1) a variable for managers' assessing of the accountant's understanding of the managers' informational requirements; and (2) dummy variables representing the degrees of consultation on the reports design. The independent variable representing the accountants' understanding explained 36 percent of the managers' satisfaction and it was significant at a level less than .001 (F ratio = 35.80; α = .000). This, in fact,

indicates to what extent the mutual understanding between accountants and managers concerning the evolving informational requirements is very important in determining the managers' satisfaction.

8.4.2 Accountants' Co-operation With Managers In Specifying The Informational Requirements

The relationship between managers, as users of information, and management accountants, as providers of information, can be examined in the area of specifying the managers' informational needs. Both senior managers and management accountants were asked whether or not accountants co-operate with managers in determining the managers' informational requirements (see Appendices 6.6 and 6.8 : Manager and Management Accountants - Questionnaires, questions No.13 and 5, respectively). The results of this investigation are shown in Table (8.41).

TABLE (8.41)

Accountants' Co-operation With Senior Managers In Determining The Informational Requirements

	Do accountants co-operate?					
	Yes		No		Total	
	n	%	n	%	n	%
Managers	61	91	6	9	67	100
Accountants	47	87	7	13	54	100

Chi-square = .17; degrees of freedom = 1;
significance = .68

From the results presented in Table (8.41), it is clear that senior managers and management accountants did not differ significantly in their responses to the enquiry about the accountants' co-operation with managers in determining the informational requirements of the latter. The Table shows also that the vast

majority of managers (91%) and accountants (87%) indicated that co-operation between the two parties had existed. However, the reasons mentioned for lacking such co-operation were completely different. Management accountants (7 respondents) stated the reason "managers do not ask for accountant's co-operation", while none of the senior managers (6 respondents) mentioned this reason.

Indeed, there is no reason to believe that senior managers or management accountants gave false answers. Both answers could be true, and both indicated that managers perhaps do not ask for accountants' co-operation because they determine their informational needs precisely with the assistance of their principal subordinates or other specialists.¹⁹

Management accountants' co-operation with managers in determining their informational requirements, in fact, will lead to more mutual understanding between the two parties. Accountants will know more about the managers, their decisions, and how they use the information. This, in turn, will result in providing managers with what they actually need, not what the accountants think the managers need. This point was summarised by a respondent participating in this study when he said:

¹⁹ Of the fifty-one assistant managers, forty-five (88 percent) stated that their superiors (i.e. senior managers) had discussed their informational requirements with their principal assistants (see Appendix 6.7 : Assistant Managers - Questionnaire, question No.7). Assistant managers were also satisfied with the managers' reliance on the views of their principal assistants in determining the information needed for planning and control, the mean scores of their satisfaction were 4.55 (standard deviation = 1.27) and 4.18 (standard deviation = .84).

"I find talking to managers about their requirements helps to clarify what is needed. It also ensures that requirements are adapted to what is a sensible price for the benefits received from information provided."

(By management accountant)

Another respondent went beyond the formal relationship between managers and accountants, he stated:

"My accountants and I find it valuable to have a close informal relationship."

(By manager)

As stated in Chapter IV, the major aim of the staff of an information department is to keep managers relying on the formal information system and to enhance continuously their favourable attitudes towards the system's credibility. The accountants' co-operation with managers in determining the informational requirements can be conceived as a factor influencing managers' attitudes towards the management accounting systems. It is assumed that such co-operation may contribute to managers' satisfaction, thus the following hypothesis is proposed for testing:

H11 : Senior managers who determine their informational requirements without the co-operation of management accountants are less satisfied with the information provided by the management accounting systems than those who determine their requirements with the co-operation of management accountants.

The results obtained from the testing of this hypothesis are presented in Table (8.42) on page 475.

Table (8.42) shows that the mean scores of the overall satisfaction of the managers who determined their informational requirements without the co-operation of accountants had been less than the mean scores of the satisfaction of the managers who did. These results, in fact, are supportive of Hypothesis Eleven but not at

TABLE (8.42)

The Effect Of Accountants' Co-operation In Determining
The Informational Requirements On Senior Managers' Satisfaction

Group	The Overall Satisfaction†					
	Planning		Control		Overall	
	Mean*	S.D.	Mean*	S.D.	Mean**	S.D.
Accountants who did not co-operate	3.67	1.29	3.83	1.76	3.75	1.50
Accountants who co-operated	4.31	1.12	4.62	1.29	4.44	1.12
T value	1.32		1.38		1.40	
Degrees of freedom	63		65		63	
Significance***	.10		.09		.08	

† A 7-point scale was used.

* The mean scores of the five information attributes

** The mean scores of managers' satisfaction with the
attributes of both the information provided for
planning and control.

*** One-tailed test.

the .05 level of significance. However, at the .10 level of significance, this hypothesis could be accepted.²⁰ The demographic characteristics of the two groups of managers tended to be similar and consequently they had no effect on the results associated with Hypothesis Eleven. Appendix (8.9) presents comparison between the characteristics of the two groups and the results of the statistical tests used in examining the differences between those characteristics.

8.4.3 Accountant's Perception of Managers' Decision-making Styles

The accountants' perception of managers' decision-making styles is another area which was investigated with respect to management accountants - managers relationship. The participating senior managers and management accountants were asked for their views on the extent the latter perceived the decision-making styles of the former (see Appendices 6.6 and 6.8 Manager and Management Accountant - Questionnaires, questions 26 and 6, respectively). The results are shown in Table (8.43), on page 477.

From examining the figures in Table (8.43) it can be seen that 40 percent of senior managers believed that accountants had perceived the managers' decision-making styles to a considerable extent (more than 4 points on a 7-point scale), while 61 percent of accountants had the same opinion. Further, 39 percent of

²⁰ The results obtained from applying a stepwise multiple regression analysis indicate that accountants' co-operation with managers in determining the informational requirements explains only about 3 percent (change in $R^2 = .025$) of the variation in the managers' overall satisfaction. However, it was not significant at the .05 or the .10 level of significance (F ratio = 1.70, $\alpha = .20$). The regression equation included the managers' satisfaction as dependent variable, and degrees of consultation on reports design and accountants' co-operation as independent variables.

TABLE (8.43)

Accountants' Perception Of The Senior Managers'
Decision-Making Styles

Group	Frequency of Responses*							Mean	S.D.	Median	Skew- ness
	1 %	2 %	3 %	4 %	5 %	6 %	7 %				
Managers	12	15	12	21	16	12	12	3.99	1.89	4.04	-.01
Accountants	4	9	11	15	30	18	13	4.65	1.63	4.88	-.45
T value	= 2.04; degrees of freedom = 119; significance = .04										
Chi-square	= 5.23; degrees of freedom = 2; significance = .07										

* A 7-point scale was used where 1 = not at all; 4 = somewhat; and 7 = substantial.

senior managers appeared dissatisfied with accountants' perception of the managers' decision-making styles (their scores were less than 4 points on the scale used), while only 24 percent of accountants admitted that their knowledge about managers' styles had not been enough (less than 4 points). However, the views of both, accountants and managers, on the accountants' perception of the managers' decision-making styles did not differ significantly at the .10 level of significance. Generally, it seems that both managers and accountants believed that the latter had perceived the decision-making styles of the former somewhat but not substantially. This may indicate that there is still need for more understanding of the managers' decision-making styles and their effects on the providing of information.

In fact, the association between the managers' mean scores of the accountants' perception of the decision-making styles and the managers' overall satisfaction was not strong. The Pearson

correlation coefficients between managers' ratings of the accountants' perception and the managers' overall satisfaction with the information provided for planning, control, and the overall satisfaction with both together were found to be .23 ($\alpha = .04$), .28 ($\alpha = .01$) and .25 ($\alpha = .02$), respectively.

The stepwise multiple regression analysis reveals also that only 6 percent ($R^2 = .06$) of the variations in the managers' overall satisfaction was determined by the independent variable representing managers' ratings of the accountants' perception of the decision-making styles. This variable was significant at the .05 level of significance (F ratio = 4.27; $\alpha = .04$). The regression equation used included the managers' overall satisfaction as a dependent variable, and degree of consultation on the reports design and accountants' perception as independent variables.

8.4.4 Accountants' Co-operation With Managers In Interpreting Information

As stated in Chapter III, the information produced by an information system and transmitted to managers should affect their behaviour, i.e. decisions. Obviously, the information provided would not influence the actions of managers, as intended by the providers of information, if information were not perceived and comprehended as the providers actually intended. Thus, the providers of information must always consider the meaning which the managers, as receivers of information, may deduce from the message contained in the reports. The problem, in fact, is that the message communicated may have three different meanings: (1) the meaning intended to be sent by the providers of information; (2) the meaning actually contained in the message; and (3) the

meaning which the manager, as receiver, perceives.

In fact, the problem of correspondence in meaning is influenced by differences in perception between the providers of information and the managers. The same stimulus may be perceived in two different ways because of the way the individuals are set to perceive. Therefore, mutual understanding between the provider of information and the managers must occur so that the messages contained in the reports are perceived and interpreted in the manner intended. This, indeed, depends on how closely the providers of information work with managers, particularly in interpreting the information.

This area of the relationship between the providers of information and the users of it was also investigated in the organisations participating in this study. Both senior managers and management accountants were asked to indicate how often the former asked for the co-operation of the latter in the interpretation of the information contained in the internal accounting reports, and how often the management accountants actually co-operated (see Appendices 6.6 and 6.8 : Managers and Management Accountant - Questionnaires, questions No.9 and 7, respectively). The results of this investigation are shown in Table (8.44) on page 480.

The results presented in Table (8.44) indicate that management accountants worked closely to senior managers in the area of interpretation of the information provided. The majority of senior managers (85%) stated that they had asked occasionally or frequently for accountants' co-operation in this matter. Also, the vast majority of accountants (93%) mentioned that they had co-operated occasionally or frequently with managers in the interpretation of

the information provided. A significant difference between the answers of the two groups did not exist.

TABLE (8.44)

Accountants' Co-operation With Senior Managers In
The Interpretation Of The Information Provided

Group	How Often								Total	
	Never		Seldom		Occasionally		Frequently		n	%
	n	%	n	%	n	%	n	%		
Managers	1	2	9	13	47	70	10	15	67	100
Accountants	-	-	4	7	22	41	28	52	54	100

Chi-square = 1.00; degrees of freedom = 1*; significance = .32

* Never and seldom were combined in one group, and occasionally and frequently in another group, so that the chi-square test can be used.

For the purpose of further analysis of the interpretation of information as an area of the relationship between accountants and managers, both were asked how closely they felt the managers' interpretation of the information provided coincides with what accountants actually intended to communicate (see Appendices 6.6 and 6.8: Manager and Management Accountant - Questionnaires, questions Nos. 10 and 9, respectively). Table (8.45) on page 481 presents the results of this investigation.

From an examination of the figures in Table (8.45), four observations can be drawn. First, while 22 percent of managers claimed that their interpretation of the information provided had been very close to what was intended to be communicated by the accountants, only 11 percent of accountants agreed. Secondly, a small proportion of managers and accountants (14% and 15%,

TABLE (8.45)

How Closely Senior Managers Interpreted The Information
Provided As The Accountants Had Intended

Group	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1 %	2 %	3 %	4 %	5 %	6 %	7 %				
Managers	-	2	12	12	21	31	22	5.36	1.36	5.62	-.56
Accountants	-	6	9	35	22	17	11	4.69	1.33	4.50	.60

T value = 2.74; degrees of freedom = 119; significance = .00
Chi-square = 10.13; degrees of freedom = 2; significance = .00

* A 7-point scale was used where 1 = not at all; 4 = somewhat closely; and 7 = very closely.

respectively) considered that the managers' interpretation of the information provided was not close to what accountants had intended to communicate. Thirdly, a very large proportion of managers (74%) believed that their interpretation of the information provided could be evaluated as more than "somewhat closely" to what accountants had intended to communicate, while only 50 percent of accountants agreed with their belief. Lastly, the mean scores of the managers' ratings of the closeness of their interpretation to what accountants intended to communicate was 5.36 (standard deviation = 1.36), while the mean scores given by accountants was 4.69 (standard deviation = 1.33). The two means indicate that the managers' interpretation of the information provided was close to what accountants intended to communicate. Indeed, accountants indicated that the interpretation was less close than managers did. The difference between the projections of the two groups as to the closeness of the interpretation was significant at less than .01 level of significance.

Although the information provided should be understandable and interpreted in the manner intended, accountants' co-operation with the managers in the interpretation of the information received, obviously, is still needed. Senior managers and management accountants were asked to indicate their views with respect to this area of managers - accountants relationship (see Appendices 6.6 and 6.8: Managers and Management Accountants - Questionnaires, questions No. 11 and 8, respectively). The results obtained, in fact, were not unexpected. Both senior managers and management accountants stressed the necessity of accountants' co-operation in the interpretation of the information provided. This can be seen from the figures in Table (8.46).

TABLE (8.46)

Need For Accountants' Co-operation In The
Interpretation Of The Information Provided

Group	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
Managers	2	4	6	9	15	18	46	5.70	1.50	6.29	-1.13
Accountants	-	4	6	7	20	26	37	5.70	1.38	6.00	-1.01
T value = .01; degrees of freedom = 119; significance = .99											
Chi-square = .35; degrees of freedom = 2; significance = .84											

* A 7-point scale was used where 1 = not at all; 4 = somewhat; and 7 = very necessary.

8.4.5 Summary and Conclusions

The purpose of this section was to investigate the relationship between senior managers, as users of information, and management accountants, as providers of information. The significance of this investigation, in fact, is based on the theme that close relationship and good communication between users of information and providers of information, lead to mutual understanding between the two parties. The lack of such mutual understanding will result in providing information which may not be responsive to the users' needs.

In fact, the relationship between senior managers and management accountants may be studied from different aspects. However, in this section four areas were investigated with respect to managers-accountants relationship which were conceived as the most important aspects: (1) accountants' understanding of the evolving informational requirements of managers; (2) accountants' co-operation with managers in determining the informational requirements; (3) accountants' perception of managers' decision-making styles; and (4) accountants' co-operation with managers in the interpretation of the information provided.

From the evidence presented in this section, it was concluded that:

(1) The evidence in this section indicates that senior managers were satisfied with accountants' understanding of the evolving informational requirements. This, in fact, influenced managers' overall satisfaction with the information provided by the management accounting systems. The correlation between managers' satisfaction with accountants' understanding of the evolving informational

requirements and the overall satisfaction with the management accounting system was found to be significant, strong, and positive. It was perhaps more interesting to note that 36 percent of the variation in managers' satisfaction was determined by this variable, i.e. accountants' understanding of the evolving informational requirements of managers.

(2) It appears that management accountants were not quite happy with managers' explanation of their informational requirements, particularly as to the information needed for planning. However, it seems this was a minor problem and did not affect managers' satisfaction.

(3) The evidence in this section indicates also that the vast majority of senior managers (91%) and management accountants (87%) believed that an effective co-operation between the two parties had existed in the area of determining the informational requirements of managers. Also, this co-operation influenced managers' satisfaction with the information provided.

(4) It seems that the different decision-making styles of senior managers were perceived by management accountants but not substantially. Both managers and accountants confirmed that belief. A strong relationship was not found, indeed, between managers' ratings of accountants' perception of the decision-making styles and the managers' overall satisfaction with the information provided by the management accounting systems.

(5) The evidence in this section points out that management accountants worked very closely with senior managers in the area of interpretation of the information provided. The majority of both parties indicated there had been continuous co-operation in this matter. A problem in the interpretation of the information provided was not found.

Both managers and accountants believed that the information provided had been interpreted in the manner intended. In a sense, what was intended to be communicated by accountants was more or less perceived by managers. Also, the two parties stressed the necessity of accountants' co-operation in the interpretation of the information provided. In fact, this was not unexpected.

(6) The overall conclusion to be drawn from the analysis of the results presented in this section is that good relationships, effective communication and mutual understanding existed between senior managers, as users of information, and management accountants, as providers of information.

SECTION 8.5 - THE EFFECT OF EVALUATING THE EFFECTIVENESS OF THE MANAGEMENT ACCOUNTING SYSTEMS ON MANAGERS' SATISFACTION

The objective of an information system within an organisation is to provide managers with their informational needs as and when required. As stated in Chapter IV, an effective information system is one which achieves its objective, i.e. providing useful information. Thus, evaluating the effectiveness of an information system consists of comparing the attributes of the information needed with the attributes of the information provided to determine how well the system actually achieves the purpose for which it was designed.

As argued in Chapters III and V, users' satisfaction with the information provided by an information system indicates its effectiveness. Evaluating the systems, in fact, highlights the effective aspects of the reports produced by the systems so that the strengths can be stressed and reveals the aspects which may need to be improved. In fact, improvements in the reports produced are

a continuous process. As the managers' environments are generally dynamic, the information systems should change to meet the evolving informational requirements of managers. Therefore, regular evaluation of the information systems is needed.

The analysis of the data extracted from the questionnaires of heads of management accounting departments indicates that although in 87 percent of the participating organisations there were ways for making sure that the management accounting systems met managers' informational requirements, slightly over fifty percent (52%) of the organisations performed comprehensive evaluation of the effectiveness of the systems as a whole (see Table 7.21 on page 363). Therefore, this section is devoted to examining the effect of evaluating the effectiveness of the management Accounting systems on managers' satisfaction with the information provided by these systems.

8.5.1 Respondents' Perception Of The Actual Evaluation Of The Systems' Effectiveness

To examine to what extent respondents perceive that their organisations evaluate the management accounting systems to determine their effectiveness, senior managers, assistant managers, and accountants were asked to indicate their perception of this matter (see Appendices 6.6, 6.7 and 6.8: questions No.21, 11 and 14 respectively). The responses of this enquiry are presented in Table (8.47) on page 487.

Table (8.47) shows that on the whole, 60 percent of respondents stated that their organisations had evaluated the management accounting systems to determine their effectiveness. One-quarter of respondents mentioned that their organisations did not evaluate the systems, and 16% said that they did not know. From the examination

of this table it appears that while slightly over fifty percent of senior managers and assistant managers (53% and 51%, respectively) indicated that their organisations had evaluated the systems, the majority of management accountants (74%) did so. It is perhaps more surprising to find that a considerable proportion of assistant managers did not know whether or not their organisations had evaluated the management accounting systems to determine their effectiveness.

TABLE (8.47)

Respondents' Perception Of The Evaluation Of The Management Accounting Systems To Determine Their Effectiveness

Group	Responses							
	Yes		No		D.N.*		Total	
	n	%	n	%	n	%	n	%
Managers	35	53	22	33	9	14	66 [†]	100
Assistants	26	51	7	14	18	35	51	100
Accountants	40	74	14	26	-	-	54	100
All Respondents	101	59	43	25	27	16	171 [†]	100

Chi-square = 7.40; degrees of freedom = 2;
significance = .03

*D.N. = Do not know. It was believed that management accountants should know whether or not their organisations evaluate the systems to determine their effectiveness, accordingly this alternative (i.e. D.N.) was not included in the accountant's questionnaire.

† 1 senior manager (1.5% of 67 or 0.6% of 172) did not answer the question concerned.

Indeed, further analysis of the responses of the participating respondents who were aware that their organisations evaluate the management accounting systems to determine their effectiveness resulted in some interesting observations, as can be seen from the figures in Table (8.48) on page 488.

TABLE (8.48)

Actual Evaluation and Perceived Evaluation Of The Effectiveness Of The Management Accounting Systems

Group	The Organisation Actually Evaluates The System*		The Organisation Does Not Actually Evaluate the System*		Total %
	Yes %	No or D.N.** %	Yes %	No or D.N.** %	
Managers	53	47	57	43	100
Assistant Managers	65	35	43	57	100
Accountants	81	19	68	32	100
All Respondents	65	35	55	45	100
Chi-square	4.84		3.41		
Degrees of freedom	2		2		
Significance	.09		.18		

* It was extracted from the questionnaires of heads of management accounting departments.

** D.N. = D not know

Table (8.48) points out that 35 percent of the respondents who fall into the group of the organisations which actually evaluate the system's effectiveness, did not feel that their organisations had evaluated the systems (answers to the question concerned were 'no' or 'do not know'). More significant perhaps, is that a considerable proportion of senior managers (47%) fell into this group. These results may indicate lack of consistency between the responses of heads of management accounting departments who stated that their organisations evaluated the systems' effectiveness, and the responses of the other groups participating in this study. Indeed, there is no reason to believe that either the heads of the departments or the other groups would give false answers to the questions concerned.

The most likely explanation of the above results is that some senior managers and assistant managers may not have been involved in evaluating the system's effectiveness and/or were not affected by direct benefits of the evaluation. Another possible explanation is that this group of respondents did not believe that the procedures applied in their organisations could lead to actual evaluation of the system's effectiveness.

On the other hand, an examination of Table (8.48) also shows that, not surprisingly, more than half of the respondents (55%) representing organisations which did not actually evaluate the system's effectiveness, believed that their organisations did so. In fact, this can be attributed to the procedures applied in these organisations for making sure that the systems met the informational requirements of managers. A further analysis of this group of respondents indicated that 69% of senior managers, 62% of assistant managers, and 71% of accountants representing organisations used one approach

or another to make sure that the systems had met the informational requirements of managers. The overall conclusion to be drawn from the previous results is that not all respondents considered their organisations evaluate the effectiveness of the management accounting systems while their organisations actually did. On the other hand, some respondents believe that their organisations evaluated the system's effectiveness while they actually did not evaluate.

8.5.2 The Effect of Evaluating the System's Effectiveness On Managers' Satisfaction

Although senior managers appeared to be satisfied, but not highly satisfied, with their management accounting systems, evaluating/not evaluating the system's effectiveness may still have an effect on managers' satisfaction with the information provided.

Therefore, the following hypothesis is proposed for testing:

H12 : Senior managers in organisations which actually evaluate the system's effectiveness are more satisfied with the information provided than those in organisations which do not actually evaluate the system's effectiveness.

Table (8.49) on page 491, presents the results of testing this hypothesis.

As can be seen from the figures in Table (8.49) the difference between the satisfaction of the two groups of managers (i.e. those who knew their systems were not evaluated and those who knew their systems were evaluated) were not statistically significant at the .05 level of significance. The t-test statistic could not be used at all to reject the null hypothesis that there was no difference in managers' satisfaction between the organisations actually evaluating their management accounting systems and those not evaluating their systems. The results of the chi-square test were also not signi-

TABLE (8.49)

The Effect Of The Actual Evaluating Of The System's Effectiveness
On Senior Managers' Overall Satisfaction

Group	The Overall Satisfaction†					
	Planning		Control		Overall	
	Mean*	S.D.	Mean*	S.D.	Mean**	S.D.
(1) Their organisations did not evaluate the system	4.21	1.05	4.45	1.21	4.33	1.03
(2) Their organisations evaluated the systems	4.25	1.10	4.54	1.36	4.35	1.19
T value	.14		.29		.09	
Degrees of freedom	57		59		57	
Significance***	.44		.39		.47	
Chi-square	4.69		3.19		5.81	
Degrees of freedom	2		2		2	
Significance	.10		.20		.06	

† A 7-point scale was used.

* The mean scores of the five information attributes.

** The mean scores of managers' satisfaction with the attributes of both the information provided for planning and control.

*** One-tailed test.

ficant at the .05 level of significance. However, the difference between managers' satisfaction was in the predicted direction although it was not as significant as mentioned above.²¹ The most likely explanation of this situation is that although only slightly over fifty percent (52%) of the organisations actually evaluate their systems' effectiveness, the majority of these organisations (87%) had at least an approach for making sure that the systems had met the informational requirements of managers.

8.5.3 The Effect Of The Periodical Evaluation Of The System's Effectiveness On Managers' Satisfaction

The management accounting systems can be evaluated to determine their effectiveness periodically and/or when special circumstances arise such as changing operations and activities, and computerisation of the current system, or part of it, or using a new model of computer. In fact, the current practice revealed that a large proportion of the participating organisations (69%) had evaluated the effectiveness of their systems only under special circumstances such as mentioned above. Also, 55 percent of the organisations which had one approach or another for making sure that the systems met the informational requirements of managers used these approaches only under the special circumstances described previously.

To examine whether or not the regularity in evaluating the effectiveness of the management accounting systems affected managers' satisfaction with the information provided, the following hypothesis is suggested for testing:

²¹ The demographic characteristics of the two groups of senior managers tended to be similar. The differences between the characteristics of the two groups were not statistically significant and accordingly these characteristics had no impact on the results presented above (see Appendix 8.10).

H13 : Senior managers in organisations which periodically evaluate the system's effectiveness are more satisfied with the information provided than those in organisations which do not periodically evaluate the system's effectiveness.

The results of testing this hypothesis are shown in Table (8.50).

TABLE (8.50)

The Effect of Periodical Evaluation Of The System's Effectiveness
On Senior Managers' Overall Satisfaction

Group	The Overall Satisfaction†					
	Planning		Control		Overall	
	Mean*	S.D.	Mean*	S.D.	Mean**	S.D.
(1) Their organisations did not periodically evaluate the systems	4.12	1.11	4.52	1.46	4.27	1.23
(2) Their organisations periodically evaluated the systems	4.88	.92	4.63	.96	4.76	.98
T value	1.44		.18		.84	
Degrees of freedom	28		30		28	
Significance***	.08		.43		.21	

† A 7-point scale was used.

* The mean scores of the five information attributes.

** The mean scores of managers' satisfaction with the attributes of both the information provided for planning and control.

*** One-tailed test.

The figures in Table (8.50) indicate that senior managers in organisations which periodically evaluated the effectiveness of the management accounting systems were more satisfied with the information provided by these systems than those in organisations which did not periodically evaluate the effectiveness of their systems.

This result is supportive to Hypothesis Thirteen, but not in fact, at the .05 level of significance.²² In fact, senior managers in organisations which periodically evaluated the systems' effectiveness were only six, representing 19 percent of senior managers working in organisations actually evaluating the effectiveness of their systems. By employing a large sample, the differences in the satisfaction may be statistically significant.

8.5.4 Summary and Conclusions

The major purpose of evaluating the effectiveness of the management accounting systems is to make sure that the systems keep pace with the evolving informational requirements of managers. It highlights the effective aspects of the systems, so that the strengths can be stressed, and those aspects which may need to be improved, and accordingly the systems can continue to provide useful information for managers. Therefore, the effects of evaluating the effectiveness of the management accounting systems were investigated in this section. Three areas were examined in this section: (1) respondents' perception of the actual evaluation of the systems' effectiveness; (2) the effect of evaluating the systems' effectiveness on managers' satisfaction with the information provided; and (3) the effect of the periodical evaluation of the systems' effectiveness on managers' satisfaction.

The conclusions which can be drawn from the analysis of the results presented in this section are as follows:

²² The two groups of senior managers tended to be similar since significant differences between the demographic characteristics did not exist and accordingly these characteristics had no impact on the results presented above (see Appendix 8.11).

(1) The evidence in this section indicates that not all respondents (senior managers, assistant managers, and management accountants) considered their organisations evaluated the effectiveness of the management accounting systems while the organisations actually did. The implications of this conclusion is that those respondents were not involved in evaluating the systems' effectiveness and/or were not affected by direct benefits resulting from the evaluation. Also, in the opinions of those respondents, the procedures applied in their organisations might not lead to actual evaluation of the systems' effectiveness.

(2) It seems that the actual evaluation of the effectiveness of the management accounting systems in the participating organisations had a weak effect and was not statistically significant on senior managers' satisfaction with the information provided. Although no certain explanation exists for this situation it could be that the majority of the participating organisations had at least an approach for making sure that the systems had met the informational requirements of managers and accordingly a statistically significant effect did not exist.

(3) Regular evaluation of the effectiveness of the management accounting systems, however, appears to have effect, although it was not statistically significant, on senior managers' satisfaction with the information provided. The evidence in this section indicates that senior managers in organisations which periodically evaluated the systems' effectiveness were more satisfied with the information provided by these systems than those in organisations which did not periodically evaluate the effectiveness of the systems.

SECTION 8.6 - THE MODIFIED SEMANTIC DIFFERENTIAL TECHNIQUE AS
A DEVICE FOR EVALUATING THE APPROACH OF
MANAGERS' SATISFACTION

8.6.1 Introduction

As stated in section one in this chapter, two techniques were used to measure the satisfaction with the information provided by the management accounting systems. The first one was a direct measure which consisted of a sole criterion, i.e. the criterion of usefulness, and a set of five criteria, i.e. relevance, reliability, sufficiency, understandability, and timeliness. The results produced by this measure were already presented in the previous sections. The other measure employed in this study was the semantic differential technique. Using two different techniques to measure the same aspects of management information reporting, in fact, offers the opportunity to check the results produced. Correlation among the results produced by the two measures gives confidence in the conclusions drawn from these results if a cross-check leads to similar conclusions.

The semantic differential used in this study was a modified one. As discussed in Chapter V, no common methods were employed in previous studies to extract new scales for a modified semantic differential. The subjective evaluation based upon past experience or intuitive familiarity with the subject area are generally used. The scales selected for use in this study were based on the judgment of a sample of users of information, and management accountants as individuals involved in the preparation of management information. The approach employed, however, was described in detail in Chapter VI. This approach yielded a list of eleven bi-polar adjectives, i.e. scales, which were divided into five groups. Each group of

scales represented a criterion, i.e. information attribute, of the five criteria mentioned previously. The scales used in this study were as follows:

- | | |
|--|---|
| <p>(1) <u>Relevance</u></p> <p>Essential/Non-essential</p> <p>Required/Not required</p> <p>Relevant/Irrelevant</p> | <p>(2) <u>Reliability</u></p> <p>Accurate/Inaccurate</p> <p>Unbiased/Biased</p> |
| <p>(3) <u>Sufficiency</u></p> <p>Complete/Incomplete</p> <p>Adequate/Inadequate</p> | <p>(4) <u>Understandability</u></p> <p>Ordered/Disordered</p> <p>Simple/Complex</p> |
| <p>(5) <u>Timeliness</u></p> <p>Well-timed/Ill-timed</p> <p>Current/Out-dated</p> | |

8.6.2 Measuring Managers' Satisfaction By The Modified Semantic Differential

As previously stated, the modified semantic differential was used in this study as another device to measure senior managers' satisfaction with the information provided by the management accounting systems. This technique was used also to reveal how assistant managers feel, as persons responsible for carrying out, and affected by, the decisions taken, about the information provided to their superiors, i.e. senior managers. In addition, the semantic differential technique was employed to elicit how management accountants, as providers of information, evaluate the information as specified by managers in its relation to the decisions which the managers take (see Appendices 6.6, 6.7, and 6.8: questions 17, 9, and 10, respectively).

In scoring the semantic differential, the following scale assignments were used:

	<u>Unfavourable</u>						<u>Favourable</u>	
	<u>Very</u>	<u>Quite</u>	<u>Slightly</u>	<u>Neutral</u>	<u>Slightly</u>	<u>Quite</u>	<u>Very</u>	
Adjective X	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Adjective X

8.6.2.1 Managers' Overall Satisfaction

All senior managers but one (1.5% of 67) completed the eleven bi-polar adjectives of the semantic differentials used to measure managers' satisfaction with the information provided for planning. Two senior managers (3% of 67) did not complete the eleven bi-polar adjectives employed to measure the satisfaction with the information provided for control. Table (8.51) presents the statistical results of senior managers' overall satisfaction, measured by the semantic differential, with the information provided for planning and control.

TABLE (8.51)

Senior Managers' Overall Satisfaction Measured
By The Semantic Differential

Information Provided For:	Semantic Differential Scores			
	Mean	S.D.	Median	Skewness
Planning*	5.24	.95	5.23	-.19
Control**	5.24	1.04	5.43	-.48

T value = .02; degrees of freedom = 64;
significance = .99

* 1 respondent (1.5% of 67) did not complete the scales used

** 2 respondents (3% of 67) did not complete the scales used

As can be seen from the figures in Table (8.51) senior managers were satisfied with the information provided for use in planning and

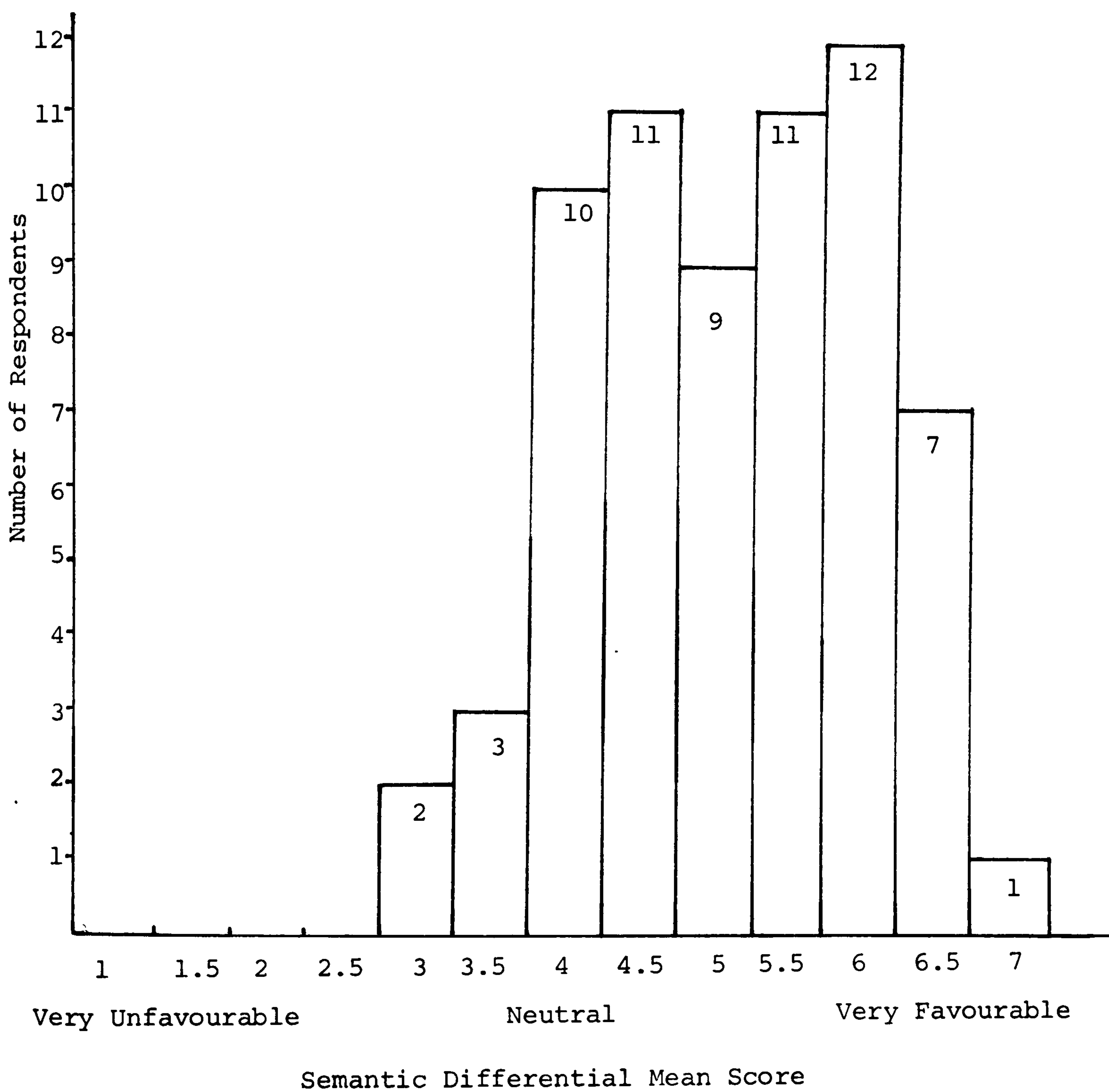
control, but not highly satisfied. The mean lies between the descriptions of slightly favourable and quite favourable, being closer to the former. This is supported by Figures (8.7) and (8.8) on pages 500 and 501 which show the frequency distribution of respondent mean scores. Indeed, this result is consistent with senior managers' satisfaction measured by the suggested approach as presented in section one in this Chapter (see Table 8.1 on page 374). Table (8.51) shows also that a difference did not exist between managers' satisfaction with the information provided for planning and control. Again, this result is consistent with the results presented in section one of this Chapter (see Table 8.1 on page 374).²³

Senior managers' overall satisfaction with the information provided by the management accounting systems as a whole was found to lie also between slightly favourable and quite favourable, being closer to the former, since the mean was 5.24 (standard deviation = .93), and the median was 5.40 (skewness = -.33). The frequency distribution of respondent mean scores is presented in Figure (8.9) on page 502. The above result and the result presented in section one of this Chapter were compatible. Both indicated that managers were satisfied by the accounting information systems as a whole, but not highly satisfied.

²³ The modified semantic differential was used also to measure assistant managers' satisfaction with the information provided to their superiors, i.e. senior managers. The mean scores of the assistants' overall satisfaction with the information provided for planning and control are presented in Appendix (8.12). The means of satisfaction with the information provided for planning and control were 4.90 and 4.94 respectively. That is they lay between neutral and slightly favourable, being closer to the latter. These results, in fact, are consistent with the results produced by the direct approach as presented in section one of this Chapter (see Table 8.3 on page 380).

FIGURE (8.7)

Histogram Of Senior Managers' Overall Satisfaction With
The Information Provided For Planning Measured
By The Semantic Differential



8.6.2.2 Managers' Satisfaction With The Information Attributes

8.6.2.2.1 The Attributes Of The Information Provided For Planning

As stated earlier, the modified semantic differential used in this study was based on eleven bi-polar adjectives i.e. scales. The bi-polar adjectives were divided into five groups, each group represented an information attribute. Respondents, however, were given these scales non-grouped and their order of presentation in the questionnaires was at random. Table (8.52) on page 504 presents managers' scores for the eleven scales used in measuring the satisfaction with the information provided for planning. To examine managers' satisfaction at a relatively detailed level, the scales were placed into the five groups representing the information attributes.

Table (8.52) presents the five information attributes and the eleven bi-polar adjectives, i.e. scales, representing these attributes. The first attribute, relevance, was represented by three scales: essential/non-essential, required/not required, and relevant/irrelevant. The three scales were selected to measure the extent to which the management accounting systems satisfied managers' need for relevant information required for planning. Collectively, the mean score of the three scales was 5.85 which falls between slightly favourable and quite favourable, being closer to the latter. The mean score of each scale falls into the same category. This indicates that senior managers were satisfied with the attribute of relevance of the information provided for planning.

The next attribute, reliability, includes two scales, accurate/inaccurate and unbiased/biased. The scales representing this attribute were selected to measure the degree of satisfaction of

TABLE (8.52)

Senior Managers' Satisfaction With The Attributes Of The Information Provided For
Planning Measured By The Semantic Differential

Attributes-Scales	Semantic Differential Score				
	Mean	S.D.	Median	Skewness	
(1) <u>Relevance</u> Essential/Non-essential Required/Not required Relevant/Irrelevant	5.85	1.28	6.26	-1.23	-1.41 -1.15 -1.01
(2) <u>Reliability</u> Accurate/Inaccurate Unbiased/Biased	5.30	.96	5.31	-.32	-.78 .04
(3) <u>Sufficiency</u> Adequate/Inadequate Complete/Incomplete	4.96	1.59	5.35	-.46	-.82 -.18
(4) <u>Understandability</u> Ordered/Disordered Simple/Complex	4.98	1.11	4.88	.05	-.96 -.09
(5) <u>Timeliness</u> Well-timed/Ill-timed Current/Out-dated	4.93	1.42	4.81	-.19	-.40 -.31

senior managers regarding the credibility of the information provided. The collective mean score of this attribute (5.30), and the means of the two scales (5.35 and 5.24) indicate that managers' evaluation of the reliability of the information provided tends to be slightly favourable.

The third attribute, sufficiency, was represented by two scales, adequate/inadequate and complete/incomplete. The scales were selected to measure the extent to which the management accounting systems fulfil each manager's need for a sufficient amount of detailed information. Collectively, the mean score of these scales (4.96) lies between neutral and slightly favourable, being closer to the latter. This may indicate that senior managers were relatively less satisfied with the amount of the detailed information provided for planning.

The fourth attribute was understandability or quality format and included two scales, ordered/disordered and simple/complex. The two scales were selected to measure managers' satisfaction with the manner in which the information was presented in the internal accounting reports. The collective mean score of the two scales (4.98) tends to be slightly favourable. The mean score of the scale ordered/disordered was 5.68 which is closer to quite favourable, while the mean score of the scale simple/complex was 4.27, being less than slightly favourable. The difference between the two means, indeed, was significant at a level of significance less than .001 (t value = 5.75; degrees of freedom = 65; significance = .00). Further, this scale, i.e. simple/complex, had the lowest mean score compared with the mean scores of the other attributes (see Appendix 8.13).

The comparatively low mean score of the scale simple/complex tends to indicate a need for more simplified information. This, indeed, was supported by the results of further analysis. Senior managers were divided into two groups, those who had unfavourable scores on the scale simple/complex, and those who had favourable scores. The examining of their satisfaction with the attribute of understandability measured by the direct approach, as presented in section one, indicates that the first group was not satisfied with the attribute of understandability (the mean = 3.80; standard deviation = 1.36, on a 7-point scale), while the second was satisfied (the mean = 4.59; standard deviation = 1.34, on a 7-point scale). The difference between the two means was significant at the .05 level of significance (t value = 1.99; degrees of freedom = 45; significance = .03, of the one-tailed test).

The last attribute, timeliness, was represented by two scales, well-timed/ill-timed and current/out-dated. These scales measure the degree of satisfaction of managers concerning the time status of the information contained in the internal accounting reports as well as the distribution frequency of the reports. Collectively, the mean score of the two scales can be described as slightly favourable (the mean was 4.93). The mean scores of the two scales were comparatively different. The mean score of the scale well-timed/ill-timed was above the collective mean score (5.08) lying between slightly and quite favourable, being closer to the former. The mean score of the scale current/out-dated was lower than the collective mean score (4.79).

A further analysis of the results of the current/out-dated scale revealed that senior managers who had unfavourable ratings on this

scale indicated dissatisfaction, measured by the direct approach, with the attribute of timeliness (the mean = 3.52, standard deviation = 1.25, on a 7-point scale), while those who had favourable scores of the scale were satisfied with the timeliness of the information provided (the mean = 4.56; standard deviation = 1.54). A significant difference between the satisfaction of the two groups did exist at the .01 level of significance (t value = 2.61; degrees of freedom = 55; significance = .00, of the one-tailed test).

In fact, the comparatively low ratings on the current/out-dated scale, would indicate a desire to receive the reports sooner than current distribution times. A further analysis partially supported this possible reason. Only 40% of senior managers who gave unfavourable scores on the scale current/out-dated were satisfied with the frequency of all of the internal accounting reports which they receive. In comparison, 76% of senior managers who had favourable scores on the scale were satisfied with the frequency of all of the reports received. A significant difference did exist between the two groups at the .05 level of significance (chi-square = 6.58; degrees of freedom = 2; significance = .04).

The overall conclusion which can be drawn from the preceding analysis of the figures in Table (8.52) on page 504 is that, generally, there was consistency between the results produced by direct approach presented in section one and the results generated by the modified semantic differential. The results of both techniques indicated that comparatively, more attention should be devoted to the timeliness of the information provided for planning

(see Table 8.5 on page 385).²⁴ However, the consistency between the results produced by the two techniques will be examined statistically later in this section.

8.6.2.2.2 The Attributes of the Information Provided for Control

The modified semantic differential was used also to measure managers' satisfaction with attributes of the information provided for control. Table (8.53) on page 509 presents the results.

Table (8.53) shows that, with the exception of the attribute of timeliness, the collective mean scores of the information attributes lie between the descriptions of slightly favourable and quite favourable. The collective mean scores of the scales representing the attribute of timeliness was comparatively low. Further the mean lies between neutral and slightly favourable. Both the scales of well-timed/ill-timed and current/out-dated had relatively low mean scores which fell into the same range.

The relatively low mean scores of the scale of well-timed/ill-timed needs to be explained. It would indicate a desire to improve the punctuality of the reports used in control. In other words, to minimise the length of time between the end of the reporting period and the date at which the information is available for managers. A further analysis of the result of this scale indicated that senior managers who rated unfavourably the information provided on this scale, indicated dissatisfaction, measured by the direct approach, with the attribute of timeliness (the mean = 2.82,

²⁴ The results produced by the modified semantic differential indicated that assistant managers were also less satisfied with the attribute of timeliness of the information provided for planning as well as with the attribute of reliability (see Appendix 8.14). These results, indeed, were consistent with the results produced by the direct approach as presented in section one of this Chapter (see Table 8.8 on page 389).

TABLE (8.53)

Senior Managers' Satisfaction With The Attributes Of The Information Provided
For Control Measured By The Semantic Differential

Attributes-Scales	Semantic Differential Score				
	Mean	S.D.	Median	Skewness	
(1) <u>Relevance</u> Essential/Non-essential Relevant/Irrelevant Required/Not required	5.76	1.28	6.09	-1.30	-1.48 -1.41 -1.01
(2) <u>Reliability</u> Accurate/Inaccurate Unbiased/Biased	5.46	1.07	5.71	-.66	-1.29 -.17
(3) <u>Sufficiency</u> Adequate/Inadequate Complete/Incomplete	5.12	1.45	5.33	-.46	-.65 -.51
(4) <u>Understandability</u> Ordered/Disordered Simple/Complex	4.99	1.18	4.97	-.20	-.82 .05
(5) <u>Timeliness</u> Well-timed/Ill-timed Current/Out-dated	4.62	1.69	4.31	-.06	-.23 -.11

standard deviation = 1.07, on a 7-point scale). Conversely, senior managers who rated favourably the information on the scale were satisfied with the attribute of timeliness (the mean = 4.33; standard deviation = 1.49). The difference between the two means was remarkable and statistically significant at a level less than .01 ($t = 3.49$, degrees of freedom = 36; significance = .00, one-tailed test).

The mean scores of the other scale, i.e. current/out-dated, representing the attribute of timeliness was also relatively low. This mean was compatible with the mean scores of managers' satisfaction, measured by the direct approach, with the attribute of timeliness. Unfavourable scores on this scale were associated with dissatisfaction with timeliness (the mean = 3.35; standard deviation = 1.50), while favourable scores on the scale were correlated with satisfaction with the attribute (the mean 4.24, standard deviation = 1.44). The difference between the two means was statistically significant at the level of .05 ($t = 1.94$; degrees of freedom = 41; significance = .03, one-tailed test). A further analysis of the results of this scale indicated also that while 77 percent of managers who had favourable scores on the scale were satisfied with the frequency of all the reports received, only 50 percent of managers who had unfavourable scores were satisfied with the frequency of all of the reports ($\chi^2 = 5.47$; degrees of freedom = 2; significance = .06). This result may indicate a desire to receive the reports more frequently than the current distribution times.

In fact, the results of the semantic differential discussed above and presented in Table (8.53) on page 509 tend to be

consistent with the results produced by the direct approach as presented in section one of this chapter (see Table 8.6 on page 385).²⁵ Again, this will be examined statistically later in this section.

8.6.3 Profiles Analysis: Comparison Between Managers' and Assistant Managers' Satisfaction

As defined in Chapter V, the semantic profile of the information provided (as a concept) for senior managers and/or assistant managers is the set of the averaged scores of the scales representing each information attribute across all individuals in the group. The semantic profiles can also be represented by the averaged scores of all individuals on each scale. Profile analysis is applied to reveal the similarity and difference in evaluating the information provided as indicated by senior managers, as users of information, and assistant managers, as persons responsible for carrying out, and being affected by, the decisions taken by their superiors, i.e. senior managers. As previously stated, two approaches can be used in analysing the difference between managers' and assistants' satisfaction: (1) comparing managers' and assistants' collective mean scores of the scales representing each information attribute; (2) comparing managers' and assistants' scores on each single scale. Both approaches, in fact, were applied.

The modified semantic differential was used also in this study

²⁵ A similar conclusion was drawn concerning assistant managers' satisfaction with the attributes of the information provided for control measured by the modified semantic differential. In fact, it was interesting to note that the collective mean scores of the two scales representing the attribute of timeliness was also comparatively low (the mean = 4.37; standard deviation = 1.45; median = 4.56; skewness = -.31), see Appendix 8.15 and for comparison with the results produced by the direct approach, see also Table 8.9 on page 389.

to reveal the profile of the information required by managers as viewed by management accountants, as providers of information. In fact, comparing the difference between senior managers and management accountants concerning the evaluation of the information provided is not logical. This, obviously, because managers were asked to indicate how they felt about the internal accounting reports which they received (see Appendix 6.6: question No. 17), while accountants were asked to indicate their views on managers' specifying the information required (see Appendix 6.8 : question No. 10). It is clear that the concept, i.e. the information provided/required, used in the semantic differential was different so that measuring the difference between the two profiles was not possible. In fact, the results produced by the modified semantic differential will be compared with accountants' views elicited by the direct approach which was used in section one in this chapter.

Table (8.54) on page 513 presents a comparison between senior managers' and assistant managers' scores on each scale used in the measurement of the satisfaction with the information provided for planning.

As can be seen from the figures in Table (8.54) both senior managers and assistant managers were satisfied, but not highly satisfied with the attributes of the information provided for planning. The mean scores of the scales representing each attribute lie between neutral and quite favourable. Table (8.54) shows also that senior managers and their assistants were compatible in their evaluation of the usefulness of the information provided on almost all scales except those related to the scales representing the attribute of reliability. On the scales of unbiased/biased and

TABLE (8.54)

Comparison Between Senior Managers' And Assistant Managers' Satisfaction With
The Information Provided For Planning (Semantic Differential)

Attributes/Scales	Managers		Assistants		Statistical Test*		
	mean		mean		t	d.f.	α
(1) <u>Relevance</u> Essential/Non-essential Relevant/Irrelevant Required/Not required	5.85		5.64		.85	110	.40
	6.00		5.65		1.27	110	.21
	5.67		5.50		.57	110	.57
	5.88		5.78		.34	110	.73
(2) <u>Reliability</u> Unbiased/Biased Accurate/Inaccurate	5.30		4.47		4.19	110	.00
	5.24		4.37		3.22	110	.00
	5.35		4.57		2.77	110	.01
(3) <u>Sufficiency</u> Complete/Incomplete Adequate/Inadequate	4.96		4.69		.93	110	.36
	4.77		4.63		.45	110	.65
	5.14		4.74		1.28	110	.20
(4) <u>Understandability</u> Ordered/Disordered Simple/Complex	4.98		4.75		1.09	110	.28
	5.68		5.22		1.84	110	.07
	4.27		4.28		.03	110	.97
(5) <u>Timeliness</u> Current/Out-dated Well-timed/Ill-timed	4.93		4.59		1.24	110	.22
	4.79		4.65		.42	110	.68
	5.08		4.52		1.92	110	.06

* t = t value; d.f. = degrees of freedom; α = significance

accurate/inaccurate senior managers' evaluation of this dimension is more favourable than the assistant managers' evaluation. The difference between the mean scores of the two groups on the two scales used was statistically significant at a level less than the .05 level. This result, in fact is consistent with the results produced by the direct approach as presented in section one in this chapter (see Table 8.10 on page 390 and Appendix 8.1).

Likewise, the results of the modified semantic differential indicate that, again with the exception of the mean scores on the scales representing the attribute of reliability, senior managers and their assistants were compatible on their scores on the scales representing the other four attributes of the information provided for control. This can be seen from the figures of Table (8.55) on page 515.

The t-test used to examine the differences between senior managers' and assistant managers' scores on the eleven scales presented in Table (8.55) indicates that the differences between the scores of the two groups on the scales unbiased/biased and accurate/inaccurate were significant at a level less than .01 level of significance. This result is consistent with that produced by the direct approach as presented in section one in this chapter (see Table (8.10 on page 390 and Appendix 8.2).

The overall conclusion which can be drawn from the analysis of the preceding results is that senior managers were more satisfied with the information provided by the management accounting systems for planning and control than assistant managers. In fact, with the exception of the attribute of reliability, significant differences

TABLE (8.55)

Comparison Between Senior Managers' And Assistant Managers' Satisfaction With
The Information Provided For Control (Semantic Differential)

Attributes/Scales	Managers		Assistants		Statistical Test*		
	mean		mean		t	d.f.	α
(1) <u>Relevance</u> Essential/Non-essential Relevant/Irrelevant Required/Not required	5.76		5.79		.10	110	.92
		5.97		5.85	.46	110	.65
		5.71		5.64	.26	110	.80
		5.62		5.87	.87	110	.39
(2) <u>Reliability</u> Unbiased/Biased Accurate/Inaccurate	5.46		4.49		4.77	110	.00
		5.37		4.57	4.57	110	.00
		5.55		4.40	4.09	110	.00
(3) <u>Sufficiency</u> Complete/Incomplete Adequate/Inadequate	5.12		4.78		1.23	110	.22
		5.03		4.70	1.06	110	.29
		5.20		4.85	1.17	110	.25
(4) <u>Understandability</u> Ordered/Disordered Simple/Complex	4.99		4.92		.37	110	.71
		5.66		5.40	1.09	110	.28
		4.32		4.43	.33	110	.74
(5) <u>Timeliness</u> Current/Out-dated Well-timed/Ill-timed	4.62		4.37		.82	110	.41
		4.46		4.17	.83	110	.41
		4.79		4.57	.67	110	.50

* t = t value; d.f. = degrees of freedom; α = significance.

between the satisfaction of the two groups were not found at the .01 or at the .05 levels of significance. However, Figures (8.10) and (8.11) on pages 517 and 518 present additional illustrations of the comparison between the profiles of the information provided, from senior managers' and assistant managers' perspectives.

8.6.4 The Modified Semantic Differential And The Direct Approach: Consistency and Inconsistency In Results

It was concluded in various parts of this section, that the results produced by the semantic differential were compatible with that produced by the direct approach. Such conclusion, indeed, was not drawn from a statistical test as stated earlier. In order to ascertain whether or not the results produced by the two approaches were statistically consistent, Pearson's correlation test was used. Table (8.56) presents the correlation coefficients between the mean scores of each information attribute produced by the semantic differential and the mean scores produced by the direct approach.

TABLE (8.56)

The Correlation Between The Mean Scores Of Each Information Attribute Produced By The Semantic Differential And Those Produced By The Direct Approach

	Relevance		Reliability		Sufficiency		Understandability (Format)		Timeliness	
	r	α	r	α	r	α	r	α	r	α
<u>Information Provided For Planning</u>										
Managers	.60	.00	.36	.00	.61	.00	.45	.00	.55	.00
Assistants	.27	.04	.35	.00	.41	.00	.29	.03	.40	.00
<u>Information Provided For Control</u>										
Managers	.59	.00	.35	.00	.53	.00	.36	.00	.59	.00
Assistants	.29	.03	.32	.01	.39	.00	.40	.00	.42	.00

r = Pearson's correlation coefficient;

α = level of significance

FIGURE (8.10)

The Profile Of The Information Provided For Planning

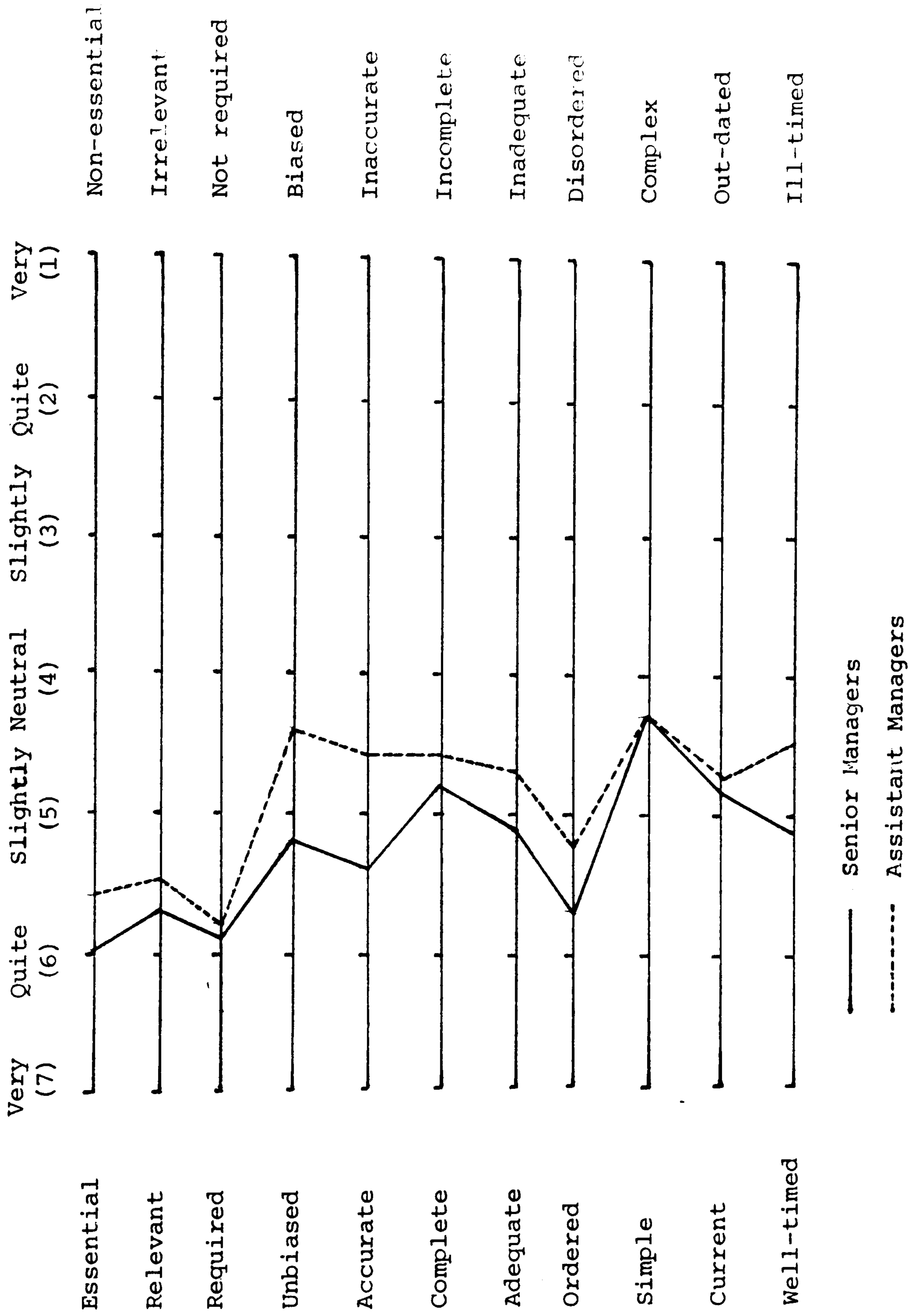
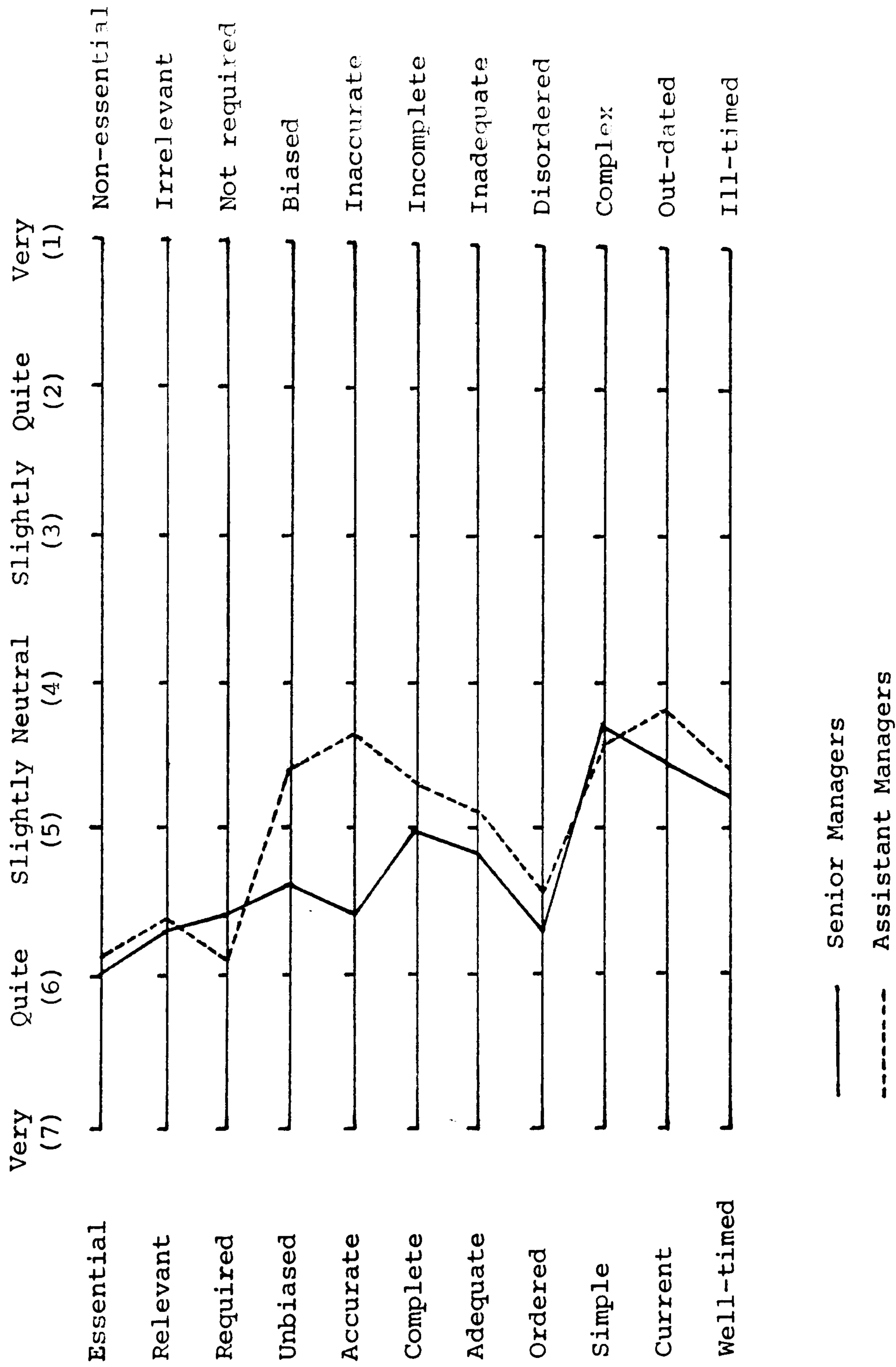


FIGURE (8.11)

The Profile Of The Information Provided For Control



Three observations are apparent from examining Table (8.56). First, the results produced by both the semantic differential and the direct approach were more consistent for senior managers than for assistant managers. Secondly, the results produced by the two approaches tended to be more compatible for the information provided for planning than for control. Lastly, the correlation between the results related to some attributes was somewhat substantial, while it was a modest correlation for others.

However, the correlation between the grand mean score (the overall score) produced by the modified semantic differential and the grand mean score generated by the direct approach was a somewhat substantial correlation as can be seen from the figures in Table (8.57).²⁶

TABLE (8.57)

The Correlation Between The Overall Scores Produced By
The Semantic Differential And The Overall Scores
Produced By The Direct Approach

Group	Information Provided For Planning		Information Provided For Control	
	r	α	r	α
Senior Managers	.65	.00	.61	.00
Assistant Managers	.58	.00	.55	.00

²⁶ Regarding management accountants' views on the information as required by senior managers, it was found that the results produced by the semantic differential and the direct approach were of a relatively low compatibility. The correlation coefficients between the grand mean scores (the overall appraisal) produced by the semantic differential and the grand mean score produced by the direct approach were .47 ($\alpha = .00$) and .61 ($\alpha = .00$) for the attributes of the information required for planning and control, respectively. In fact, the correlation coefficients between the mean scores produced by these two approaches for each information attribute were very small (see Appendix 8.16). However, the direct approach proved consistent in its results. A significant difference was not found at the .01 level of significance between the results produced by the sole criterion (overall ratings), and the average scores generated by the set of five criteria (see Section one of this chapter, footnote No.5 on page 392).

In fact, the selection of adjectives for the modified semantic differential and their grouping has only partial empirical support. However, as the selection was based on the judgement of a sample of users of information and individuals involved in the preparation of management information, it was believed that the scales used were suitable for the purpose of this study. An optimum set of scales, in fact, must await further empirical testing.

8.6.5 Summary and Conclusions

Two techniques were used in this study to measure the satisfaction of senior managers and assistant managers with the information provided by the management accounting system. One of the reasons for using two different techniques is that compatible results of both techniques mean support for one another. The two techniques were: (1) a direct approach which is based on a set of five criteria, i.e. relevance, reliability, sufficiency, understandability, and timeliness; and (2) a modified semantic differential.

The modified semantic differential used in this study was based on eleven bi-polar adjectives (scales) which were selected by a sample of users of information and individuals involved in the preparation of management information. The scales selected were divided into five groups based on their representation of the five information attributes (criteria) used in the direct approach. The scales were used to measure managers' and assistant managers' satisfaction with the information provided as well as accountants' views on the information required by managers. The results produced by this technique were compared between the groups and with the results produced by the direct approach.

From the analysis of the results presented in this section, the following conclusions are drawn:

- (1) Senior managers were satisfied with the information provided for use in planning and control, but not highly satisfied. Their ratings of the information provided can be described as slightly favourable. Also, assistant managers found the information provided slightly favourable. In fact, both results were consistent with the results produced by the direct approach.
- (2) Although senior managers were satisfied with the quality format of the reports received, it seems that a need existed for more simplified information. This, in fact, was not indicated by the direct approach.
- (3) The evidence in this section indicates that both senior managers and assistant managers were relatively less satisfied with the timeliness of the information provided for planning. In fact, the problem did not appear relative to the punctuality of the reports received. Rather, it was concerning the frequency. It seems that senior managers, and their assistants, feel that the reports should be received more frequently than the current distribution times. Regarding the information provided for control, both the punctuality and the frequency would need more attention. Assistant managers also indicated similar views of their superiors on this matter. The views of both groups, indeed, were compatible with that produced by the direct approach.
- (4) Generally, senior managers' and assistant managers' evaluation of the information provided by the management accounting systems was consistent. However, the attribute of reliability of the information provided was an exception. Assistant managers, as persons responsible for carrying out, and affected by, the decisions

taken by their superiors, were less satisfied with the accuracy of the information provided either for planning or for control.

(3) Statistically, the results produced by both the modified semantic differential and the direct approach were somewhat compatible. The correlation between the results related to some information attributes was found to be substantial, while it was a modest correlation for others. However, the overall results produced by both the modified semantic differential and the direct approach were strongly correlated.

SECTION 8.7 - MANAGERS' SATISFACTION AND THE EFFECTIVENESS OF THE MANAGEMENT ACCOUNTING SYSTEMS

8.7.1 Satisfaction and Effectiveness: A Problem of Weighting

8.7.1.1 The Relative Importance of The Attributes of The Information

The suggested framework of the information criteria used in this study was based on five criteria. They were: relevance, sufficiency, reliability, understandability and timeliness. Each criterion was assumed to measure a different dimension of the information. However, this does not mean that the criteria were equivalent. As discussed in Chapter II, the criteria may not be equally important in a particular use and to a particular user or group of users. Thus, it was necessary to develop weights which indicate the relative importance of each criterion. As the literature was not helpful in this matter, it was decided to determine the weights of the criteria from the perspective of users of information, providers of information, and the persons affected by the decisions taken based on the information provided for users.

Respondents were asked to indicate whether the five information criteria used in this study were unequally important, and if so, to rank them and give each a percentage so as to indicate its

relative importance (see Appendices 6.6, 6.7, 6.8 : questions No. 19, 6 and 12, respectively). Table (8.58) on page 524 presents the results of the first part of this enquiry; namely, were the information criteria equally important?

As can be seen from the figures in Table (8.58) more than 60 percent of all respondents indicated that the information criteria (attributes) were equally important. The majority of both senior managers (70%), as users of information, and management accountants (74%), as providers of information, believed that the attributes of the information provided for planning were equally important. In contrast, only 48 percent of assistant managers believed so. However, the differences between the three groups were not significant at the .01 level of significance. The situation regarding the attributes of the information provided for control did not differ from the results related to the attributes of the information provided for planning. It was noticeable, however, that while 74 percent of management accountants indicated that the attributes of the information provided for planning were equally important, a lesser proportion (64%) had the same opinion concerning the attributes of the information provided for control. A significant difference between the three groups did not exist at the .01 level of significance.

As stated previously, respondents who indicated that the information attributes (criteria) were not equally important, were again asked to rank and give each attribute a percentage so as to indicate its relative importance. The results of this inquiry are presented in Tables (8.59) and (8.60) on pages 525 and 526.

TABLE (8.58)

Comparison Between Senior Managers', Assistant Managers' And
Management Accountants' Views On The Relative Importance
Of The Information Criteria

Are The Information Criteria Equally Important?	Group						All	
	Management Accountants		Senior Managers		Assistant Managers		Respondents	
	n	%	n	%	n	%	n	%
<u>In Planning</u>								
Yes	39	74	47	70	24	48	110	65
No	14	26	20	30	26	52	60	35
	53*	100	67	100	50*	100	170*	100
<u>In Control</u>								
Yes	34	64	48	72	24	47	106	62
No	19	36	19	28	27	53	65	38
	53*	100	67	100	51	100	171*	100
	<u>Chi square</u>		<u>Degrees of freedom</u>		<u>Significance</u>			
In Planning	8.81		2		0.012			
In Control	7.58		2		0.023			

* A number of respondents did not complete a part of the question concerned: 1 management accountant (2% of 54), and 1 assistant manager (2% of 51) did not complete the part of planning, they representing 1% of the whole respondents (172), and 1 accountant did not complete the part of control (2% of 51), that is 0.6% of the whole respondents.

TABLE (8.59)

Comparison Between Senior Managers', Assistant Managers' And Management Accountants' Views
On The Relative Importance Of The Attributes Of The Information Provided For Planning

Attributes	Group									Statistical test**								
	Mean			S.D.			Median			Skewness			F	d.f.	α			
	MGR	ASM	ACC	MGR	ASM	ACC	MGR	ASM	ACC	MGR	ASM	ACC	MGR	ASM	ACC	F	d.f.	α
Reliability	.30	.28	.21	.15	.07	.06	.25	.26	.20	.91	.33	.05	3.83	(2,54)	.03			
Relevance	.27	.24	.28	.13	.11	.09	.28	.21	.30	.13	1.33	-.37	.83	(2,54)	.44			
Sufficiency	.16	.17	.14	.07	.09	.08	.18	.18	.15	-.28	.43	.27	.45	(2,54)	.64			
Timeliness	.13	.17	.14	.11	.11	.06	.11	.15	.13	2.03	.73	.17	.68	(2,54)	.51			
Understandability	.13	.15	.23	.06	.07	.13	.11	.14	.20	.25	.60	1.64	6.20	(2,54)	.00			
	.99 [†]	1.01 [†]	1.00															

* MGR = Senior Managers; ASM = Assistant Managers; ACC = Management Accountants.

The number of respondents who indicated that the information attributes were not equally important and gave a weight for each criterion was as follows: 18 senior managers; 25 assistant managers, and 14 management accountants.

** F = F ratio; d.f. = degrees of freedom; α = significance

† Total is not 1.00 due to rounding.

TABLE (8.60)

Comparison Between Senior Managers', Assistant Managers' And Management Accountants' Views
On The Relative Importance Of The Attributes Of The Information Provided For Control

Attributes	Group*									Statistical test**							
	Mean			S.D.			Median			Skewness			F	d.f.	α		
	MGR	ASM	ACC	MGR	ASM	ACC	MGR	ASM	ACC	MGR	ASM	ACC	ASM	ACC			
Timeliness	.27	.26	.28	.16	.11	.12	.27	.25	.25	-.02	.26	2.31	.26	(2,58)	.78		
Relevance	.26	.18	.24	.14	.07	.10	.21	.18	.25	.64	.67	.10	3.68	(2,58)	.03		
Reliability	.23	.27	.17	.12	.10	.07	.20	.26	.16	1.98	.15	.55	5.22	(2,58)	.01		
Sufficiency	.12	.15	.11	.05	.08	.05	.10	.15	.10	.39	.93	-.08	2.21	(2,58)	.12		
Understandability	.13	.15	.19	.07	.07	.07	.10	.10	.20	.98	.40	.41	4.43	(2,58)	.02		
	$\overline{1.01}^+$	$\overline{1.01}^+$	$\overline{.99}^+$														

* MGR = Senior Managers; ASM = Assistant Managers; ACC = Management Accountants.

The number of respondents who indicated that the information attributes were not equally important and gave a weight for each criterion was as follows: 17 senior managers; 26 assistant managers; 18 management accountants.

** F = F ratio; d.f. = degrees of freedom; α = significance.

+ Total is not 1.00 due to rounding.

An examination of Table (8.59) shows that respondents weighted the attributes of reliability and relevance of the information provided for planning relatively higher than the other attributes. Concerning the attributes of the information provided for control, (see Table 8.60 on page 526), timeliness was conceived to be the most important attribute from managers' and accountants' perspectives. From assistant managers' point of view, the attribute of reliability was the most important attribute. However, the weights given to the attributes of timeliness, relevance and reliability were very close to each other.

A comparison of the figures tabulated in Tables (8.59) and (8.60) on pages 525 and 526 leads to the conclusion that, with the exception of the attributes of understandability of the information provided for planning, the users of information (senior managers), the providers of information (management accountants), and the persons affected by the decisions taken (assistant managers) had nearly identical views on the relative importance of the five information criteria used in this study. No significant differences between the three groups were found as the one-way analysis of variance indicated. However, the weights given by the respondents as a whole are presented in Table (8.61) on page 529.

8.7.1.2 The Relative Importance of The Reports Used In Planning and Control

As the information provided by the management accounting systems may differ in its significance for planning and control, it was decided to ask respondents to rate the internal accounting reports as an indicator of their relative importance for both functions (see Appendices 6.6, 6.7 and 6.8 : questions No. 18, 5 and 11, respectively). Of the 172 participating respondents, only seven (4%

of 172) did not answer the question concerned, they were as follows: two senior managers (3% of 67), three assistant managers (6% of 51), and two management accountants (4% of 54). An examination of the responses indicates also that the majority of senior managers, assistant managers and management accountants, 82%, 75% and 79% respectively found the internal accounting reports not equally important. Table (8.62) on page 529 shows the weights given for the reports by the respondents.

From an examination of the figures in Table (8.62) it can be seen that the internal accounting reports were mainly used as a control device. From the viewpoint of respondents as a whole, the mean relative importance of the reports as a control and planning device were .55 and .45, respectively. Further, there was consistency between senior managers, assistant managers and management accountants concerning the relative importance of the internal accounting reports. It is clear that no significant differences were found between the three groups of respondents.

8.7.1.3 Weighting of Satisfaction

It was stated in various parts of this study that managers' satisfaction with the information provided by the management accounting systems, indicates the effectiveness of these systems. This, in fact, does not mean that, in all cases, effectiveness equals satisfaction. As discussed in Chapters II and V, a specific attribute of information could be more important than others for a user or a group of users and to particular use (e.g. control) than another (e.g. planning). As presented previously, respondents indicated different weights for the attributes of the information provided by the systems. In such a case, satisfaction should be weighted by

TABLE (8.61)

Respondents' Views On The Relative Importance Of
The Information Attributes*

The Attributes of the Information Provided For:	Mean	S.D.	Median	Skewness
<u>Planning</u>				
Reliability	.27	.11	.25	1.34
Relevance	.26	.11	.25	.55
Understandability	.16	.10	.15	1.97
Sufficiency	.16	.08	.18	.27
Timeliness	.15	.10	.13	1.30
<u>Control</u>				
Timeliness	.27	.13	.25	.62
Reliability	.23	.10	.20	1.01
Relevance	.22	.11	.20	.98
Understandability	.15	.07	.15	.53
Sufficiency	.13	.07	.12	1.21

* The figures shown in this table represent the views of respondents who indicated that the information attributes were not equally important. The weights of the attributes of the information provided for planning and control were given by 57 and 61 respondents, respectively.

TABLE (8.62)

Comparison Between Senior Managers', Assistant Managers'
And Management Accountants' Views On The Relative
Importance Of The Internal Accounting Reports

Group	The Relative Importance Of The Reports							
	For Planning				For Control			
	Mean	S.D.	Median	Skew- ness	Mean	S.D.	Median	Skew- ness
Senior Managers	.44	.17	.40	.51	.56	.17	.60	-.51
Assistant Managers	.45	.17	.41	.27	.55	.17	.59	-.27
Management Accountants	.45	.16	.40	.29	.56	.16	.60	-.29
All respon- dents	.45	.17	.40	.38	.55	.17	.60	-.38

F ratio = .03; degrees of freedom = (2,127); significance = .97

these weights so that the actual effectiveness of the systems in providing the information needed for planning and control can be determined.

Respondents also indicated different weights of the reports used in planning and control. Thus, the overall effectiveness of the management accounting systems is the sum of the scores of effectiveness of the systems in providing the information needed for planning and control after each is weighted by its coefficient of the relative importance. As stated in Chapter V the coefficient weights determined by each respondents will be used in weighting his scores.²⁷

8.7.2 The Effectiveness of The Management Accounting Systems

8.7.2.1 The Effectiveness of The Systems in Providing The Information Needed For Planning

In order to determine the effectiveness of the management accounting systems in providing the information needed for planning, the score of satisfaction of each respondent with each information attribute is weighted by the coefficient of its relative importance given by the respondent. The results are presented in Table (8.63) on page 531.

As can be seen from the figures in Table (8.63) the management accounting systems were effective in providing the information needed for planning, but not highly effective. Table (8.63) shows also that the systems were not effective from the viewpoints of 24 percent and 28 percent of senior managers and assistant managers, respectively. This indicates that there was still room for improvement in these systems.

²⁷ This treatment was discussed in detail in Chapter V, see pp.245-248

TABLE (8.63)

The Effectiveness Of The Management Accounting Systems In Providing
The Information Needed For Planning

Group	Below Average		Above Average		Mean	S.D.	Median	Skewness
	%	Average†	%	Average				
Senior Managers**	24	46	30	30	21.30	5.99	19.81	.81
Assistant Managers**	28	34	38	38	20.70	4.77	20.38	-.31
Senior Managers and Their Assistants	26	41	33	33	21.05	5.48	19.97	.55

Frequency Distribution of The Respondents' Scores of The Effectiveness*

T value = .57; degrees of freedom = 108; significance = .57

Chi-square = .91; degrees of freedom = 2; significance = .63

* Minimum score (ineffective) = 5; maximum score (highly effective) = 35; average score (effective) = 18.22

** The data of 4 senior managers (6% of 67) and 4 assistant managers (8% of 51) was not available.

† Average score (18-22) was arbitrarily determined to represent a range instead of a sole score (20).

8.7.2.2 The Effectiveness of The Systems in Providing The Information Needed for Control

The management accounting systems in the participating organisations were effective in providing the information needed for control, but again not highly effective. This can be seen from the figures presented in Table (8.64) on page 533. However, it seems that the systems were more effective in providing the information needed for control than for planning.

8.7.2.3 The Overall Effectiveness of The Management Accounting Systems

As previously stated, the overall effectiveness of a management accounting system is the sum of the scores of the effectiveness of the system in providing the information needed for planning and control after each is weighted by the coefficient of the relative importance. Based on this treatment, the overall effectiveness of the management accounting systems was calculated and presented in Table (8.65) on page 534.

Table (8.65) shows that the mean scores of the overall effectiveness of the management accounting systems in the participating organisations were 44.39 and 41.87 from senior managers' and assistant managers' perspectives, respectively. This indicates that the systems were effective but not highly effective.²⁸ Some respondents pointed this out in their comments:

²⁸ A head of a management accounting department who participated in the pilot test stressed the resources allocated to the information systems as a major cause of low effective information systems: "If expense was not a major concern, we would all have the absolute and effective systems". This may be true, to some extent, but the effectiveness of the systems can be improved without increasing the resources allocated to the systems. This was indicated by the respondents participating in this study (see Appendices 6.5, 6.6, 6.7, 6.8: questions No. 14, 20, 10 and 13, respectively, see also Appendix 8.17)

TABLE (8.64)

The Effectiveness Of The Management Accounting Systems In Providing
The Information Needed For Control

Group	Frequency Distribution of The Respondents' Scores of The Effectiveness*		Mean	S.D.	Median	Skewness
	Below Average	Above Average †				
	%	%				
Senior Managers**	20	42	22.63	6.87	20.15	.58
Assistant Managers**	16	47	20.98	5.08	20.42	-.29
Senior Managers and Their Assistants	18	44	21.92	6.19	20.25	.49

T value = 1.42; degrees of freedom = 112; significance = .16
Chi square = .05; degrees of freedom = 2; significance = .97

* Minimum score (ineffective) = 5; maximum score (highly effective) = 35; average score (effective) = 18.22

** The data of 2 senior managers (3% of 67) and 2 assistant managers (4% of 51) was not available.

† Average score (18-22) was arbitrarily determined to represent a range instead of a sole score (20).

TABLE (8.65)

The Overall Effectiveness Of The Management Accounting Systems

Group	Frequency Distribution of The Respondents' Scores of The Effectiveness*						Mean	S.D.	Median	Skewness
	Below Average		Average†		Above Average					
	%	Average	%	Average	%	Average				
Senior Managers**	20		43		37		44.39	12.28	40.06	.64
Assistant Managers**	22		40		38		41.87	9.39	40.75	-.18
Senior Managers and Their Assistants	21		42		37		43.32	11.16	40.23	.52

T value = 1.15; degrees of freedom = 104; significance = .25

Chi square = .12; degrees of freedom = 2; significance = .94

* Minimum score (ineffective) = 10; maximum score (highly effective) = 70; average score (effective) = 36.44

** The data of 6 senior managers (9% of 67) and 6 assistant managers (12% of 51) was not available.

† Average score (36-44) was arbitrarily determined to represent a range instead of a sole score (40).

On taking up my current appointment, I found the accounting information related to what was available in Head Office and unrelated to management. There were no management accounting reports in my view. This is now being thoroughly investigated by a combined management/accountants review.

(by manager)

For several reasons, but largely because information for control and planning is not effective nor collated, managers have little time for managing, but largely fulfil the roles of senior clerks.

(by assistant manager)

We have recently completed a review of our accounting arrangements for investment appraisal and control. However, certain weaknesses do still exist and those are being rectified as an ongoing process.

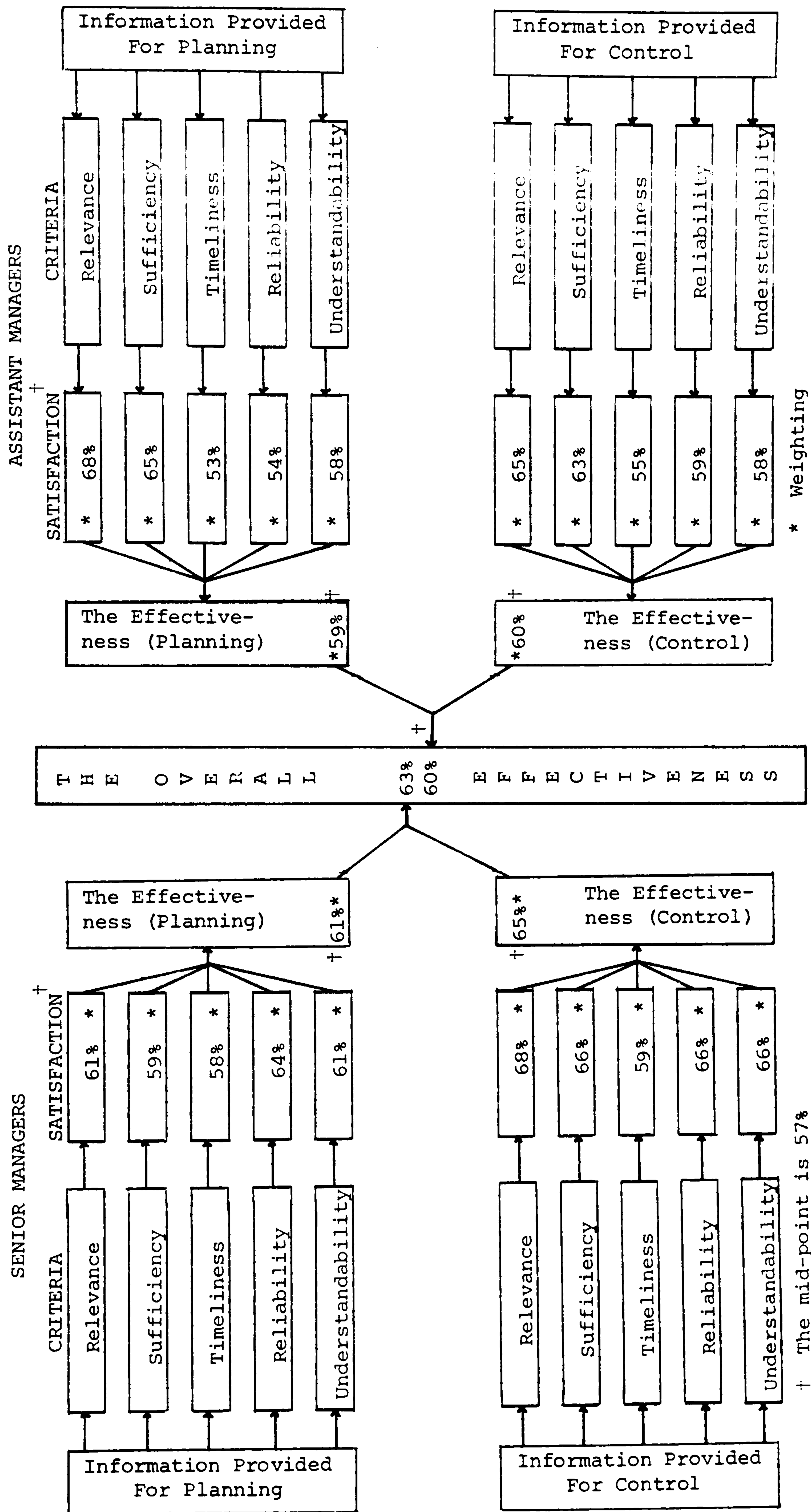
(by management accountant)

The figures in Table (8.65) on page 534 indicate also that the systems were more effective from senior managers' perspective, as users of information, than from assistant managers' viewpoints, as persons affected by the decisions taken. In fact, the difference between the scores of the effectiveness from the perspective of both groups was not significant. However, this comparison between the two groups is illustrated in detail in Figure (8.12) which shows senior managers' and assistant managers' satisfaction with each information attribute, and the degree of the effectiveness of the management accounting systems in providing the information needed for planning and control as well as the overall effectiveness from the perspectives of both groups. It is clear that the scores of satisfaction and effectiveness presented in Figure (8.12) are relative scores so that the comparison may become easier and more meaningful. The relative scores were computed as follows:

$$\frac{\text{The absolute score}}{\text{Maximum possible score}} \times 100$$

FIGURE (8.12)

The Overall Effectiveness of the Management Accounting Systems



+ The mid-point is 57%

Therefore, in the interpretation of Figure (8.12) it should be noted that the mid-point or level of satisfaction and effectiveness is equal to the relative score 57% not to 50%.²⁹

8.7.3 Comparison Between The Effectiveness of The Systems in Providing The Information Needed For Planning and Control

From the analysis of the results presented previously, it was concluded that the management accounting systems in the participating organisations were effective, but not highly effective in providing the information needed for both planning and control. However, a further analysis was needed to reveal in which function the systems were more effective. Table (8.66) on page 538 presents the results of this analysis.

As can be seen from the figures in Table (8.66), the management accounting systems, generally, were more effective in providing the information needed for control than for planning. However, a significant difference did not exist at the .01 level of significance.

8.7.4 The Effectiveness of The Management Accounting Systems Within The Different Industries

It was stated in Chapter VI that the organisations participating in this study came from a variety of nationalised industries. As

²⁹ A 7-point scale was used in measuring the satisfaction with each information attribute where 1 = dissatisfied; 7 = highly satisfied; and 4 = satisfied, which represented a relative score 57% ($\frac{4}{7} \times 100$). The relative score of the mid-point of the effectiveness in providing the information needed for planning and control was also equal to 57% ($\frac{20}{35} \times 100$). The mid-point of the overall effectiveness was equal to the same relative score 57% ($\frac{40}{70} \times 100$). However, the comparison illustrated in Figure (8.12) is presented in Appendix (8.18) in the absolute scores.

TABLE (8.66)

Comparison Between The Effectiveness Of
The Management Accounting Systems In Providing The Information
Needed For Planning And Control

Group	The Effectiveness Scores †		Statistical Test*		
	Mean	S.D.	t	d.f.	α
<u>Senior Managers</u>					
Planning	21.30	5.99	1.99	62	.05
Control	22.43	6.80			
<u>Assistant Managers</u>					
Planning	20.70	4.77	.12	46	.91
Control	20.77	5.08			
<u>Senior Managers and Their Assistants</u>					
Planning	21.05	5.48	1.68	109	.10
Control	21.72	6.15			

* t = t-value; d.f. = degrees of freedom; α = significance

† Minimum score (ineffectiveness) = 5;
Maximum score (highly effective) = 35.

shown in Table (6.1) on page 275, a relatively large number of the participating organisations (48%) were in the field of "transport and communication". "Gas, electricity and water" represented about 13% of the organisations sample, while the other industries were represented by proportions ranging from 3.2% to 6.5%. Tables (8.67), (8.68) and (8.69) on pages 540, 541 and 542, respectively present the results of a comparison between the effectiveness of the management accounting systems within these industries.

As can be seen from the figures in Tables (8.67), (8.68) and (8.69), the management accounting systems of the "transport and communication" organisations were more effective than the systems of the organisations representing the industries of "gas, electricity and water", and the other nationalised organisations. However, the results of both one-way analysis of variance and chi-square test did not prove that the difference in the effectiveness of the systems was statistically significant. The tables show also that the effectiveness of the management accounting systems were higher from the senior managers' perspective, as users of information, in each industry than from the assistant managers' viewpoint. In fact, the difference was not statistically significant (see Appendix 8.19).

8.7.5 Summary and Conclusions

The basic purpose of this section was to determine the overall effectiveness of the management accounting systems of the organisations participating in this study. Although the scores of the effectiveness are based totally on the satisfaction scores, both may not be equal in all cases. The relative importance of the attributes of the information and the reports produced by the system may alter the satisfaction scores.

TABLE (8.67)

The Effectiveness of the Management Accounting Systems By The Industrial Classification Of The Organisations
(From Senior Managers' Perspective)

Industrial Classification	The Effectiveness of The Systems											
	In Planning*				In Control*				Overall**			
	Mean	S.D.	Median	Skewness	Mean	S.D.	Median	Skewness	Mean	S.D.	Median	Skewness
Transport and Communication	22.23	6.78	20.00	.44	24.71	7.37	23.00	-.04	47.57	13.19	47.00	-.06
Gas, Electricity and Water	20.18	6.18	19.33	.94	21.55	5.87	19.00	1.39	41.55	12.20	38.33	1.14
Other	21.03	5.38	19.93	1.14	21.37	6.59	19.50	.92	43.17	11.55	39.63	1.10
F ratio												1.15
Degrees of freedom												60
Significance												.32
Chi square												3.30
Degrees of freedom												4
Significance												.51

* Minimum score (ineffective) = 5; maximum score (highly effective) = 35; average score (effective) = 18.22

** Minimum score (ineffective) = 10; maximum score (highly effective) = 70; average score (effective) = 36-44

TABLE (8.68)

The Effectiveness Of The Management Accounting Systems By The Industrial Classification Of The Organisations
(From Assistant Managers' Perspective)

Industrial Classification	The Effectiveness of The Systems									
	In Planning*			In Control*			Overall**			Skew-ness
	Mean	S.D.	Median	Mean	S.D.	Median	Mean	S.D.	Median	
Transport and Communication	21.05	5.31	21.00	21.63	6.32	21.50	43.00	11.84	44.00	- .48
Gas, Electricity and Water	19.17	6.37	16.00	20.50	4.03	19.00	40.00	9.59	33.50	.49
Other	20.80	3.72	20.17	20.43	3.88	20.20	41.17	5.70	40.00	.44
F ratio		.36			.33			.31		
Degrees of freedom		46			48			44		
Significance		.70			.72			.73		
Chi square		5.06			6.55			7.66		
Degrees of freedom		4			4			4		
Significance		.28			.16			.10		

* Minimum score (ineffective) = 5; maximum score (highly effective) = 35; average score (effective) = 18-22

** Minimum score (ineffective) = 10; maximum score (highly effective) = 70; average score (effective) = 36-44

TABLE (8.69)

The Effectiveness Of The Management Accounting Systems By The Industrial Classification Of The Organisations (From Senior Managers' and Their Assistants' Perspective)

Industrial Classification	The Effectiveness of The Systems									
	In Planning*			In Control*			Overall**			
	Mean	S.D.	Median	Mean	S.D.	Median	Mean	S.D.	Median	Skew-ness
Transport and Communication	21.65	6.06	20.33	23.24	6.99	22.75	45.29	12.59	44.50	-.17
Gas, Electricity and Water	19.82	6.06	19.33	21.18	5.19	19.00	41.00	11.06	38.33	1.08
Other	20.94	4.74	20.00	20.98	5.61	19.82	42.40	9.70	39.75	1.31
F ratio										1.18
Degrees of freedom										105
Significance										.31
Chi square										5.66
Degrees of freedom										4
Significance										.23

* Minimum score (ineffective) = 5; maximum score (highly effective) = 35; average score (effective) = 18-22

** Minimum score (ineffective) = 10; maximum score (highly effective) = 70; average score (effective) = 36-44

The overall effectiveness of a management accounting system is the sum of the scores of the effectiveness of the system in providing the information needed for both planning and control after each is weighted by its coefficient of the relative importance. The effectiveness of the system in providing the information needed for planning (or control); in turn, is the sum of the scores of the satisfaction with the attributes of information after each is weighted by its predetermined weight.

The results of the application of the approach mentioned above were presented in this section. The conclusions which can be drawn from these results are as follows:

- (1) The majority of both senior managers and management accountants indicated that the attributes of the information provided either for planning or for control were equally important. In contrast, less than fifty percent of assistant managers stated that the attributes were equally important.
- (2) From the points of view of the respondents who indicated that the attributes of the information were not equally important, the attributes of reliability and relevance were more important than the other attributes of the information needed for planning. Concerning the information needed for control, the attribute of timeliness was the most important, closely followed by relevance and reliability.
- (3) The majority of respondents indicated also that the reports produced by the management accounting systems were more important for control than for planning. However, the weights given for the reports in both functions, i.e. control and planning, were very close

to each other, 55% and 45%, respectively.

(4) The satisfaction weighted by the coefficient of the relative importance of the attributes of the information and the reports indicated that the management accounting systems in the transport and communication organisations were more effective than the systems of the organisations in the field of the industries of gas, electricity and water, and the other nationalised organisations.

(5) Generally, the management accounting systems in the participating organisations were effective in providing the information needed for planning and control, but not highly effective. The systems were more effective in providing the information needed for the latter function than for the former. With these results, it appeared that there was room for improvement in the management accounting systems in the participating organisations.

SECTION 8.8 - THE ACCEPTABILITY OF THE APPROACH SUGGESTED FOR EVALUATING THE EFFECTIVENESS OF MANAGEMENT INFORMATION SYSTEMS

As discussed in Chapter V, the approach suggested for evaluating the effectiveness of an information system considered user's satisfaction with the information provided the key factor. The approach also takes into account the view of the provider of information: did he really know the actual informational requirements of the decision-makers (users of information)? The view of the person affected by the decisions taken was also to be taken into consideration: did he agree that the decision-maker appeared to have all useful information? On the other hand, questionnaires circulated among the three groups mentioned above were suggested to be the instrument for gathering the data needed for evaluating the effective-

ness of the system. As the managers' environments are generally dynamic, the information systems should be evaluated continuously. Because of this, it was believed that the questionnaire could be a practical and economical instrument. It was suggested also that the evaluation of the effectiveness of the systems should be made periodically.

The acceptability of the approach described above is to be examined from the viewpoints of the respondents participating in this study. The results of this examination are presented in this section.

8.8.1 Respondents' Views On The Methods Used In Evaluating The Systems

It was stated in Chapter VII that slightly over fifty percent (52%) of the organisations participating in this study performed comprehensive evaluation of the effectiveness of their management accounting systems (see Table 7.21, on page 363). Further, in section V in this chapter, an analysis of the data obtained indicated that, on the whole, 60 percent of respondents perceived that their organisations had evaluated the management accounting systems to determine their effectiveness (see Table 8.47, on page 487).

In order to determine the methods used in evaluating the management accounting systems, respondents were asked to indicate how their organisations evaluated the systems (see Appendices 6.6, 6.7 and 6.8: questions No. 21, 11 and 14, respectively). The results of this investigation are presented in Table (8.70) on page 546.

As can be seen from the figures in Table (8.70) the most

TABLE (8.70)

Respondents' Perception Of The Methods Used In Evaluating The Effectiveness
Of The Management Accounting Systems

Method	Group						Statistical Test*				
	Managers (N = 35)		Assistants (N = 26)		Accountants (N = 40)			All Respondents (N = 101)			
	n	%	n	%	n	%	Chi	d.f.	α		
Questionnaires	7	20	3	12	5	13	15	15	1.13	2	.57
Interviews	20	57	10	39	22	55	52	52	2.41	2	.30
Managers' Complaints	14	40	12	46	21	53	47	47	1.17	2	.56
Review of the Reports	32	91	22	85	35	88	89	88	.69	2	.71
Other	3	9	3	12	8	20	14	14	2.08	2	.35

* Chi = chi-square; d.f. = degrees of freedom; α = significance.

widely applied method was "a review of the reports". Of the one hundred and one respondents, eighty-nine (88%) stated that their organisations reviewed the reports to evaluate the systems. This, in fact, was not surprising. Interviews and managers' complaints were used in a much less magnitude, according to the evidence shown in the table. Of the one hundred and one respondents, only fifteen (15%) claimed that their organisations were applying questionnaires in evaluating the effectiveness of the management accounting systems. A small proportion of respondents (14%) mentioned other methods such as continuing discussions between managers and management accountants, and the organisations' seminars.

A further analysis indicated also that sixty-five (64%) of respondents indicated that their organisations had applied more than one method. Twenty-nine of these respondents stated that their organisations had depended on interviews, managers' complaints, and a review of the reports in evaluating the management accounting systems. A smaller proportion of respondents (22%) mentioned interviews and reviews of the reports. Other combinations of methods were indicated by a much smaller proportion of respondents ranging from two percent to nine percent.

Respondents were asked also to indicate how satisfied they were with the methods used in their organisations in evaluating the management accounting systems. Table (8.71) on page 548 presents the results.

The analysis of the results presented in Table (8.71) indicates that, not surprisingly, the method of interviews was preferable to the other methods used in evaluating the effectiveness of the

TABLE (8.71)

Respondents' Satisfaction With The Methods Used In Evaluating The Effectiveness Of The Management Accounting Systems

Method/Group	Frequency of Responses		Mean	S.D.	Median	Skewness	Statistical Tests							
	Below the level of satisfaction of	The level of satisfaction					Above the level of satisfaction	Chi	d.f.	α	F	d.f.	α	
<u>Questionnaires</u>														
Managers	43	29	28	3.86	1.77	3.75	.62							
Assistants	33	67	-	3.67	.58	3.75	-.71							
Accountants	20	60	20	4.00	.71	4.00	.00							
All Respondents	33	47	20	3.87	1.25	3.86	.72	2.25	4	.69	.06	(2,12)	.94	
<u>Interviews</u>														
Managers	15	25	60	5.40	1.60	5.83	-.29							
Assistants	11	78	11	4.00	.50	4.00	.00							
Accountants	5	23	73	5.18	1.22	5.21	-.52							
All Respondents	10	33	57	5.06	1.38	4.89	.03	12.00	4	.02	3.73	(2,48)	.03	
<u>Managers' Complaints</u>														
Managers	15	21	64	5.14	1.46	5.00	.05							
Assistants	33	50	17	3.92	1.17	3.83	.53							
Accountants	38	38	24	3.81	1.37	3.81	.23							
All Respondents	30	36	34	4.23	1.45	4.06	.32	8.64	4	.07	4.56	(2,44)	.02	
<u>Review of the Reports</u>														
Managers	9	44	47	4.94	1.34	4.43	.36							
Assistants	36	55	9	3.59	1.05	3.75	-.37							
Accountants	8	26	66	4.25	1.58	4.50	-.44							
All Respondents	16	39	45	4.64	1.32	4.37	.05	20.70	4	.00	11.57	(2,86)	.00	

management accounting systems. Questionnaires, on the contrary, were accepted by the lowest proportion of respondents. However, not less than fifty percent of the respondents in each group were satisfied with questionnaires.

8.8.2 Respondents' Views On The Approach Suggested For Evaluating The Effectiveness Of An Information System

As previously stated, the approach suggested for evaluating the effectiveness of an information system considered users' satisfaction with the information provided the key factor in evaluating the system. The approach did not neglect also the views of both the providers of information and the persons affected by the decisions taken which were based, among other things, on the information provided by the system.

The state of practice in the organisations participating in the study indicated that the majority of organisations (85%) considered managers' satisfaction with the information provided by the management accounting systems as an indicator of the effectiveness of the systems (see Chapter VII, page 364). Accountants' views were also taken into consideration, but to a lesser extent (in 78 percent of the organisations encountered with managers' complaints - see Appendix 6.5: question No.12). Further, the investigation indicated that in only 62 percent of the participating organisations, the principal subordinates were asked their views on the information provided to their superiors (see Appendix 6.5: question No. 13).

However, to reveal to what degree respondents agree on taking into consideration the views of the users of information, the providers of information and the persons affected by the decisions

taken in evaluating the effectiveness of an information system, respondents were asked to indicate their opinions on this issue (see Appendices 6.5, 6.6, 6.7 and 6.8: questions No. 14, 20, 10 and 13, respectively). The results are shown in Tables (8.72), (8.73) and (8.74) on pages 551, 552 and 553, respectively.

The conclusions which can be drawn from the analysis of the figures presented in Tables (8.72), (8.73) and (8.74) is that, generally, respondents on the whole agreed on the approach suggested for evaluating the effectiveness of an information system that is, in addition to measuring users' satisfaction with the information provided by the system, the views of both the providers of information and the persons affected by the decisions taken should be taken into consideration. Although the one-way analysis of variance revealed that there was a significant difference among the four groups of respondents concerning the statement of the principal subordinates, i.e. the persons affected by the decisions taken, ($F = 7.39$; $\alpha = .00$), it was clear that this difference was in degree, not in direction.

8.8.3 The Frequency Suggested For Evaluating The Effectiveness Of The System

It was suggested in Chapter V that the management accounting systems should be periodically evaluated to determine their effectiveness. It was believed that annual evaluation would be practical and economical. However, respondents were asked to indicate their views on this matter (see Appendices: 6.5, 6.6, 6.7 and 6.8: questions No. 17, 22, 12 and 15, respectively). Table (8.75) on page 555 presents respondents' views on whether or not the management accounting systems should be periodically evaluated to determine their effectiveness.

TABLE (8.72)

Respondents' Views On The Statement Of "Users' Satisfaction As The Key Factor"

Group	Frequency of Responses*							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
Senior Managers	3	2	6	8	16	30	36 [†]	5.66	1.50	6.00	-1.32
Assistant Managers	2	-	4	4	20	35	35	5.86	1.25	6.08	-1.60
Management Accountants	4	6	7	7	28	33	15	5.09	1.56	5.43	1.56
Heads of M.A.D.	-	-	4	4	35	27	31 [†]	5.77	1.07	5.79	- .53
All Respondents	3	2	6	6	23	32	29 [†]	5.57	1.43	5.85	-1.27

Chi square = 6.09; degrees of freedom = 6; significance = .41

F ratio = 3.07; degrees of freedom = (3,194); significance = .03

* A 7-point scale was used 1 = strongly disagree; 4 = neutral; 7 = strongly agree.

† Total is not 100 due to rounding.

TABLE (8.73)

Respondents' Views On The Statement Of "The Providers Of The Information"

Group	Frequency of Responses†							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
Senior Managers	-	2	3	5	12	42	37*	6.02	1.09	6.20	-1.50
Assistant Managers	-	-	2	2	20	31	45	6.16	.95	6.34	-1.03
Management Accountants	2	2	4	6	15	35	37*	5.83	1.36	6.13	-1.57
Heads of M.A.D.	-	-	-	-	4	31	65	6.62	.57	6.74	-1.120
All Respondents	1	1	3	4	14	36	43*	6.08	1.11	6.30	-1.68

** Chi square = 2.79; degrees of freedom = 4; significance = .59

F ratio = 3.19; degrees of freedom = (3,194); significance = .03

† A 7-point scale was used. 1 = strongly disagree; 4 = neutral; 7 = strongly agree.

* Total is not 100 due to rounding

** All groups except heads of management accounting departments

TABLE (8.74)

Respondents' Views On The Statement Of "The Principal Subordinates"

Group	Frequency of Respondents†							Mean	S.D.	Median	Skewness
	1	2	3	4	5	6	7				
	%	%	%	%	%	%	%				
Senior Managers	-	3	-	10	31	24	31*	5.67	1.20	5.72	-.78
Assistant Managers	-	-	2	10	18	41	29	5.86	1.02	6.00	-.75
Management Accountants	2	2	7	22	33	28	6	4.89	1.22	5.00	-.72
Heads of M.A.D.	-	-	-	15	39	23	23	5.54	1.03	5.40	.12
All Respondents	1	2	3	14	29	29	23*	5.49	1.20	5.57	-.69

** Chi square = 11.08; degrees of freedom = 4; significance = .03

F ratio = 7.39; degrees of freedom = (3,194); significance = .00

† A 7-point scale was used. 1 = strongly disagree; 4 = neutral; 7 = strongly agree.

* Total is not 100 due to rounding.

** All groups except heads of management accounting departments.

As can be seen from the figures in Table (8.75), 60 percent of all respondents believed that the management accounting systems should be periodically evaluated. A large proportion of senior managers (62%), as users of information, felt that periodical evaluation was necessary. It is interesting to note also that the majority of management accountants (72%), as providers of information, agreed on this matter.

Respondents who stated that the systems should be periodically evaluated were asked to further specify what they meant by periodically: quarterly, twice a year, yearly, or other. The results are shown in Table (8.76) on page 555.

The figures in Table (8.76) indicate that the majority of senior managers (63%), as users of information, believed that the management accounting systems should be evaluated yearly. A similar proportion of heads of management accounting departments (62%) and a slightly smaller proportion of management accountants (58%) agreed on annual evaluation. Slightly less than fifty percent (48%) of assistant managers, as persons affected by the decisions taken, stated that the systems should be evaluated yearly. Table (8.76) show also that a considerable proportion of each group, ranging from 24% to 31%, indicated other cycles for evaluating the systems. The cycles mentioned were divided into two groups: (1) evaluating the systems every two-three years; and (2) every four-five years. Generally, from the practical and economical point of view, respondents believed that the management accounting systems should be evaluated every year to determine their effectiveness. This result is supported by Figure (8.13) on page 556. which shows the frequency distribution of respondents' views on the practical and economical frequency of evaluation of the systems.

TABLE (8.75)

Respondents' Views On Whether Or Not The Systems
Should Be Periodically Evaluated

Group	The Systems Should Be Periodically Evaluated			
	Yes		No	
	n	%	n	%
Senior Managers*	41	62	25	38
Assistant Managers	25	49	26	51
Management Accountants	39	72	15	28
Heads of M.A.D.	13	50	13	50
All Respondents*	118	60	79	40

Chi square = 7.12; degrees of freedom = 3; significance = .07

* 1 senior manager (1.5% of 67 of 5% 198) did not indicate his views on this matter.

TABLE (8.76)

The Frequency Suggested For Evaluating The Systems

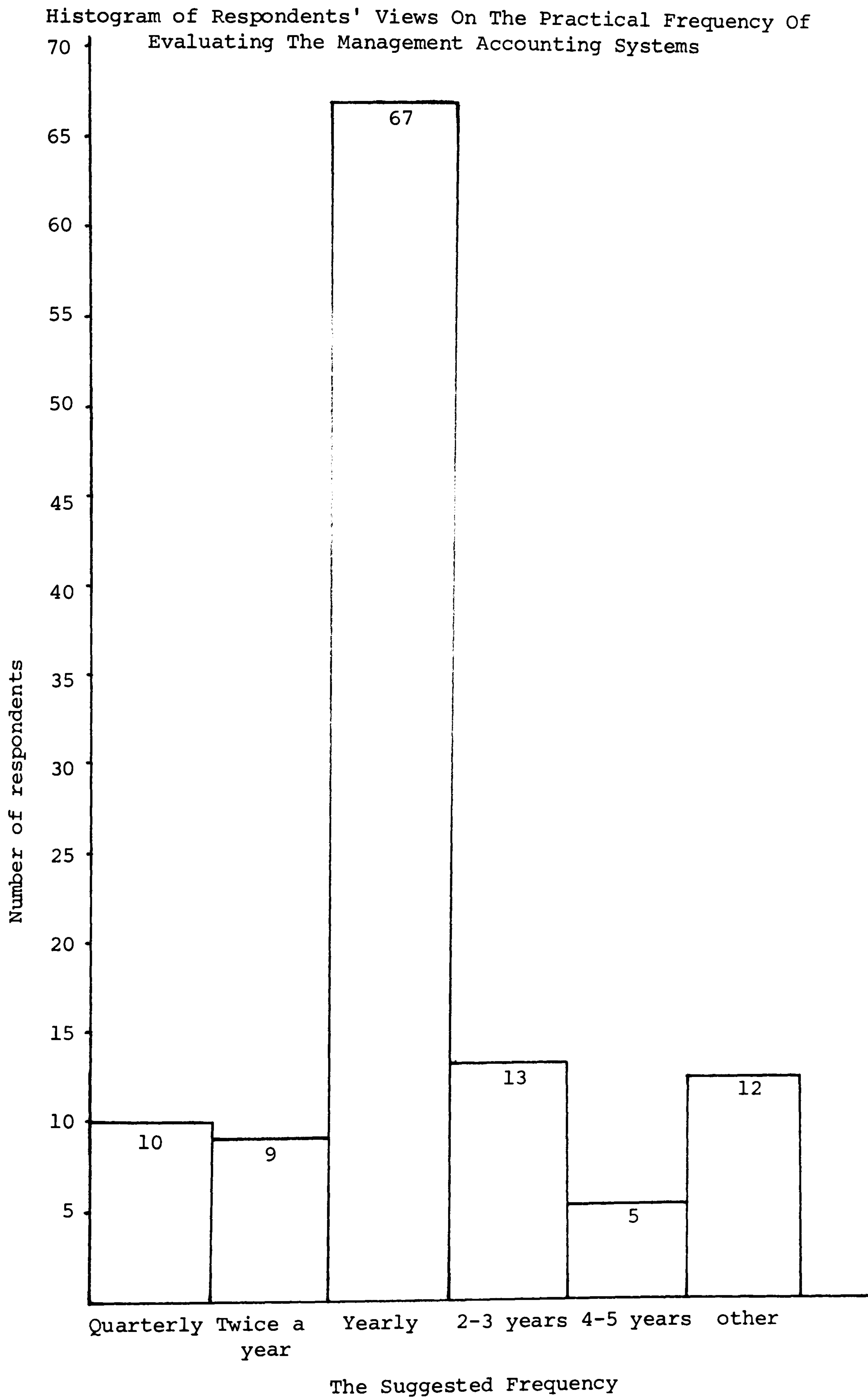
Group	Frequency of Evaluation				Total
	Quarterly	Twice a year	Yearly	Other	
	%	%	%	%	
Senior Managers	5	8	63	25	100*
Assistant Managers	16	8	48	28	100
Management Accountants	11	8	58	24	100*
Heads of M.A.D.	-	8	62	31	100*
All Respondents	7	8	58	26	100*

† Chi square = 2.65; degrees of freedom = 6; significance = .85

* Total is not 100 due to rounding.

† All groups except heads of management accounting systems

FIGURE (8.13)



8.8.4 Summary and Conclusions

The basic purpose of this section was to examine the acceptability of the approach suggested for evaluating the effectiveness of an information system. Three aspects were examined to determine the acceptability of the suggested approach, they were:

- (1) the main theme of the approach, i.e. taking into consideration the views of the providers of information and the persons affected by the decisions taken, in addition to the users of information;
- (2) the instrument which could be used in gathering the data needed, i.e. questionnaires; and (3) the frequency suggested for evaluating the system. The results of this investigation were presented in this section.

From the analysis of the results stated in this section, the following conclusions were drawn:

- (1) The majority of respondents agreed on the main theme of the suggested approach, that is in evaluating the effectiveness of an information system, three basic questions should be answered;
 - (i) were decision-makers satisfied with the information provided by the system?
 - (ii) did the providers of information really know the actual informational requirements of the decision-makers?
 - (iii) did the persons affected by the decisions taken agree that the decision-makers appeared to have all useful information?
- (2) Questionnaires as instruments for gathering the data needed for evaluating the effectiveness of the management accounting systems were accepted by more than fifty percent of the respondents who mentioned that their organisations used this technique.
- (3) The majority of respondents believed that the management

accounting systems should be periodically evaluated. From the practical and economical point of view, annual evaluation was stated as the appropriate cycle.

SECTION 8.9 - SUMMARY AND CONCLUSIONS

8.9.1 Summary

The purpose of the research project was to test the practicability and validity of the approach suggested for evaluating the effectiveness of management information systems. The approach was tested in evaluating the effectiveness of the management accounting systems of the public utilities and other organisations in nationalised industries. The technique used in the empirical study for collecting the data needed was mailed questionnaires. In this chapter the results of responses to questionnaires were tabulated, compared, and discussed. Some of the comments included on the questionnaires returned were incorporated into discussion.

The research question specifically addressed by this study was: what is an effective information system and how is effectiveness to be measured? An effective system is one which achieves its objective, i.e. providing the decision-makers with their informational needs as and when required. It was assumed in this research that measuring the decision-makers' satisfaction with the information provided was a feasible substitute for measuring the effectiveness of an information system. However, the suggested approach also takes into consideration the view of the providers of information: did they really know the actual informational requirements of the decision-makers (users of information)? The view of the persons affected by the decisions taken was also taken into account: did they agree that the decision-makers appeared to have all useful information?

Five criteria were used in measuring satisfaction, they were: relevance, reliability, sufficiency, timeliness, and understandability. In order to provide useful information, the five criteria should be fulfilled. Accordingly, an inclusive criterion was also used; namely, "usefulness". Obviously, both the set of the five criteria and the criterion of usefulness measured respondents' satisfaction. As previously stated, double measures allowed a check on consistency in responses.

In fact, the overall effectiveness of an information system is not necessarily the arithmetic average of the satisfaction with the five information attributes (criteria) mentioned above, specific attribute (or attributes) could be more important than others, and thus skew the overall rating representing the satisfaction. Also, the reports produced by the system for usage in planning and control could be unequally important. Therefore, the overall effectiveness of an information system is the sum of the scores of the system's effectiveness in providing the information needed for both planning and control after each is weighted by its coefficient of the relative importance. The effectiveness of the system in providing the information needed for planning (or control), in turn, is the sum of the scores of the satisfaction with the attributes of the information provided after each is weighted by its predetermined weight.

Two techniques were used in this study in measuring satisfaction, the first one was represented by direct questions on the respondents' satisfaction with each attribute of the information, the other one was based on the semantic differential technique. The semantic differential used in this study was constituted by

eleven bi-polar adjectives (scales) which were selected by a sample of users of information and individuals involved in the preparation of management information. The scales selected were divided into five groups based on their representation of the five information criteria (attributes) used in the direct approach. The scales were used to measure managers' and principal subordinates' satisfaction with the information provided, as well as the information providers' views on the information required by managers. In fact, one of the reasons for using two different techniques was that compatible results of both techniques detect support of the conclusions drawn from the data obtained.

As stated earlier, the decision-makers' satisfaction was the key factor in evaluating the effectiveness of an information system. Although the decision-makers' satisfaction is influenced by their perception of the usefulness of the information provided by the system, satisfaction may be affected also by some demographic characteristics of the decision-makers. In this study, the influence of four characteristics was examined: (1) participation in the design of the management accounting systems; (2) the previous experience in the design of information systems; (3) the background in accounting; and (4) the service period in present organisation and job.

The decision-making style might also affect the decision-makers' satisfaction with the information provided by an information system. Two extremes of decision-making styles were identified in this study; the analytic or systematic style, and the heuristic or intuitive style. The decision-maker with analytic style reduces a problem to a set of causal relationships and tries to

find a solution by using formulae and models. We have at the other extreme, the decision-maker with heuristic style who solves problems through intuition and relies more on feedback. Obviously, the decision-makers were not expected to be at the extremes in terms of this classification but they tended towards one style or the other. According to the conclusions of previous works on human information processing, the two styles process the same information differently, and can be more effective with different types of information. The analytic decision-maker tends to use more information, prefers detailed reports, while the heuristic decision-maker prefers to use less information and likes aggregated summary reports.

The effectiveness of an information system can be attributed, among other things, to the communication which exists, and the mutual understanding between the decision-makers, as users of information, and the providers of information. Obviously, the lack of good communication between the two groups may lead to providing information which is not to be responsive to the decision-makers' needs. In this study four areas of the communication and mutual understanding between managers and management accountants were examined: (1) accountants' understanding of the evolving informational requirements of managers; (2) accountants' co-operation with managers in determining the informational requirements; (3) accountants' perception of managers' decision-making styles; and (4) accountants' co-operation with managers in the interpretation of the information provided.

Managers' satisfaction with the information provided by an information system could also be affected by the policies of their

organisations in evaluating the systems. The problem is that managers' environments are generally dynamic and constantly undergoing change. Accordingly the situations confronting the managers are to be changing. Varying situations, in turn, will bring out the need for different decisions. Different decisions will require different information from the information systems. The information systems, therefore, must change to meet the changing requirements of the dynamic situations. This means that a regular evaluation of the systems may be needed to highlight the effective aspects of the reports produced by the systems so that the strengths can be stressed, and reveal the aspects which may need to be improved and accordingly the systems can continue to provide useful information for managers. Thus, it was assumed in this study that evaluating the effectiveness of the management accounting systems of the participating organisations would influence managers' satisfaction with the information provided by the systems.

8.9.2 Conclusions

From the analysis of the replies to the research questionnaires the following were the major findings:

(1) Generally, the management accounting systems of the participating organisations were perceived by the majority of respondents to be more important in providing the information needed for control than for planning. The average weights given to indicate the relative importance of the systems for both functions were, however, very close to each other, 55% and 45%, respectively. Also, the majority of both senior managers and management accountants believed that the attributes of the information provided either for planning or for control should be equally important.

Less than fifty percent of assistant managers (48%, 47%) however agreed on this opinion. From the points of view of the respondents who indicated that the attributes of the information should not be equally important, the attributes' relevance and reliability were more important than the other attributes of the information provided for planning. Concerning the information needed for control, the attribute of timeliness was the most important, closely followed by relevance and reliability.

(2) From the perspective of both senior managers, as users of information, and assistant managers, as persons participating in and affected by the decisions taken, generally, the management accounting systems of the organisations participating in this study were effective, but not highly effective, in providing the information needed for planning and control. However, the systems were more effective in the latter function than in the former. With this result it appeared that there was still room for improvement in the management accounting systems of the participating organisations.

(3) A further analysis of the effectiveness of the management accounting systems indicated that a considerable proportion of senior managers (34%) felt that the amount of detailed information provided for planning was less than the right quantity. Also, twenty-seven percent of assistant managers stated that the amount of detailed information provided to their superiors, i.e. senior managers, was less than the right quantity. Concerning the information provided for control, thirty percent of senior managers stated that the amount of detailed information was more than the right quantity. It was interesting to discover that a considerable

proportion of assistant managers (32%), as persons affected by the decisions taken, believed that the amount of information provided to their superior for control was less than the right quantity. Only fifty-six percent and fifty percent of senior managers and their assistants, respectively, indicated that the amount of the information provided for planning was about right, while fifty-six percent and forty-six percent of the two groups, respectively, did so, regarding the information provided for control.

(4) A considerable proportion of both senior managers (39%) and assistant managers (41%) were dissatisfied with the attribute of timeliness of the information provided for planning and control. The analysis of senior managers' and assistant managers' responses indicated also that only sixty-four percent and forty-two percent were satisfied with the frequency of all of the internal accounting reports.

(5) It was interesting to note that a large proportion of assistant managers (46%) as persons participating in and responsible for carrying out the decisions taken by their superiors, indicated dissatisfaction with the attribute of the reliability of the information provided to their superiors for planning. Also, a considerable proportion of assistant managers (41%), as persons affected by the decisions taken by their superiors, were dissatisfied with the same attribute, i.e. reliability, of the information provided to senior managers for control.

(6) The majority of senior managers (81%) did not use all the informational elements in the internal accounting reports. Irrelevance of some items was the most common reason for non-use of all the information in the internal accounting reports. Ninety-one

percent of senior managers who stated they did not use all the information, mentioned that reason.

(7) Slightly over fifty percent (52%) of senior managers occasionally conducted expanded searches to obtain relevant accounting information needed for planning, while 72% conducted such searches to obtain information needed for control which had not been contained in the accounting reports.

(8) Senior managers' satisfaction with the information provided by the management accounting systems might be influenced by some factors other than the usefulness of information. The degree of prior consultation on the design of the accounting reports influenced managers' satisfaction. On the contrary, sufficient evidence did not exist to support that previous experience in information system design influenced managers' satisfaction. Senior manager's background in accounting did not also influence their satisfaction. The analysis of the results indicated, however, that there was a negative relationship, but not statistically significant, between the service period in the present job and satisfaction with the information provided. On the other hand a statistically significant relationship was not found between the service period in the present organisation and senior managers' satisfaction.

(9) From the evidence presented in this chapter it seems that the management accounting systems of the participating organisations were flexible to the extent that they satisfied senior managers who had different decision-making styles. In fact, a significant difference between the two styles of decision-making, analytic and heuristic, was not proved empirically concerning their preferences of the amount of detailed information to be used and the reports

preferred to be received. In fact, this conclusion was questionable. This was because of the sample size of the analytic group (12 senior managers), which was, relatively and statistically, small. However, a considerable proportion of senior managers (43%), assistant managers (44%) and management accountants (52%) believed that the decision-making styles should be taken into consideration in designing an information system in addition to the management level of managers and the decisions which may be taken. The use of psychological tests in determining the decision-making styles, did not gain the acceptance of the majority of all respondents.

(10) The analysis of respondents' replies indicated that not all respondents, i.e. senior managers, assistant managers and management accountants, perceived that their organisations were evaluating the effectiveness of the management accounting systems while their organisations actually did. The implication of this conclusion was that those respondents might not be involved in evaluating the effectiveness of the systems and/or were not affected by direct benefits resulting from the evaluation. Also, in the opinion of those respondents, the procedures applied in their organisation might not lead to actual evaluation of the effectiveness of the systems. In fact, the actual evaluation of the effectiveness of the management accounting systems of the participating organisations had a weak effect on senior managers' satisfaction with the information provided. The most likely explanation of this surprising result was that the majority of the participating organisations had at least an approach for making sure that the systems had met the informational requirements of managers. However, a further analysis

of the effect of evaluating the effectiveness of the systems indicated that regular evaluation appeared to have effect, although it was not statistically significant, on senior managers' satisfaction with the information provided.

(11) Concerning senior managers-management accountants relationship, the evidence in this chapter indicated, not unexpectedly, that effective communication, good relationships, and mutual understanding existed between senior managers, as users of information, and management accountants, as providers of information. The analysis of responses revealed that management accountants and senior managers were being, in general, in the same line regarding the different aspects of accounting information reporting covered in this study. The vast majority of management accountants indicated that, on the whole, the levels required by senior managers for the attributes of the information needed for planning were attainable and practicable. Concerning the levels of the attributes of the information required for control, eighty-four percent of management accountants expressed the same opinion. On the other hand, senior managers were satisfied with accountants' understanding of the managers' evolving informational requirements. The correlation between senior managers' overall satisfaction with the management accounting systems and satisfaction with accountants' understanding of the informational requirements was found to be significant, strong, and positive. Furthermore, the vast majority of both senior managers (91%) and management accountants (87%) believed that an effective co-operation between the two groups had existed in the area of determining the informational requirements of senior managers. It appeared also that the decision-making

styles of senior managers were perceived by management accountants but not substantially. The evidence in this chapter indicated also that management accountants were working very closely to senior managers in the area of the interpretation of the information provided. The majority of both groups indicated that there had been continuous co-operation in this matter.

(12) The empirical evaluation of the approach suggested for evaluating the effectiveness of management information systems indicated that the approach was valid, practicable, and acceptable. Statistically, the results produced by both the modified semantic differential and the direct approach were somewhat compatible. The correlation between the results related to some information attributes was found to be substantial, while it was modest correlation for others. However, the overall results produced by both techniques were strongly correlated. On the other hand, the majority of respondents indicated their approval of the main theme of the suggested approach, that is in evaluating the effectiveness of an information system, three basic questions should be answered:

(1) were decision-makers satisfied with the information provided by the system? (2) did the providers of information really know the actual informational requirements of the decision-makers; and (3) did the persons affected by the decisions taken, agree that the decision-makers appeared to have all useful information? The majority of respondents (60%) agreed that the management accounting systems should be periodically evaluated. From the practical and economical point of view, annual evaluation was suggested as the appropriate cycle.

CHAPTER IX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

9.1 - SUMMARY

An organisation consists of three systems: one concerned with decision making, another with operations, and a third with information, all of which are interdependent and work in conjunction with others. The purpose of the third system, i.e. the information system, is to produce information which is useful to management in planning and controlling the activities of the organisation. The success of the organisation depends on, among other things, how its management information system is efficient and effective.

Generally, effectiveness is not efficiency. Effectiveness refers to success in achieving objectives, as contrasted with efficiency, which is a minimisation of resources used in achieving objectives and/or maximisation of outputs (objectives). More specifically, the effectiveness of a management information system is concerned with providing managers with useful information, while the efficiency of the system concentrates on processing the data; that is, operating the management information system. Furthermore, a management information system may be both effective and efficient, but either condition can occur without the other, that is, high efficiency does not indicate the system is effective and vice versa. Finally, in the measurement of the effectiveness of a management information system, operating costs are not taken into account, while the economic efficiency cannot be measured without considering these costs.

This study was concerned with the measurement of the effective-

ness of management information systems, which is distinct from other measurements; namely, the economics of information, the economics of computers, and the economics of management information systems. The measurement of information economics tackles the problem of non-programmed decisions and deals with the economic value of having or not having, some informational elements. The measurement of economics of computers is concerned with selection, financing, and use of computers. The measurement of the economics of a management information system deals with the costs and benefits of the system as a whole.

The objective of this study was not to study the economics of information, or to suggest an approach for measuring the economics of computers, as a component in a modern information system, or the economics of an information system as a whole. The objectives of this study were:

- (1) To develop a practical approach for evaluating, periodically and in quantitative terms, the effectiveness of management information systems. This major objective was divided into three sub-objectives:
 - (a) to determine a set of criteria which were used in evaluating the effectiveness of the systems;
 - (b) to develop a point scoring model in order to express the effectiveness in quantitative terms;
 - (c) to determine procedures to be applied in evaluating the effectiveness.
- (2) To develop an evaluative device to check the results produced by the suggested approach. A modified semantic differential was developed and used for this purpose. This major objective was divided into two sub-objectives:

- (a) to specify an appropriate set of factors of the modified semantic differential;
 - (b) to determine a set of relevant scales (bi-polar adjectives).
- (3) To test the practicability and validity of the suggested approach by applying it on a sample of organisations for evaluating the effectiveness of their management information systems. This major objective was divided into two sub-objectives:
- (a) to develop an operational framework of the suggested approach;
 - (b) to apply the operational framework on a sample of organisations in nationalised industries.

In order to construct an approach for evaluating, periodically and in quantitative terms, the effectiveness of management information systems, a review of the current literature of management information systems was undertaken to determine the approaches of evaluation which have already been used. They provided a point of departure for designing the suggested approach. The review of the literature indicated that in evaluating the performance of management information systems, much attention has been paid to efficiency and more specifically, computer efficiency, while relatively less attention has been paid to effectiveness. On the other hand, the current literature indicated also that the information system design/redesign and an overall evaluation of the effectiveness of information systems have not been considered separately. In other words, an overall evaluation of the effectiveness of a management information system is accomplished as a sub-objective of systems analysis

and by the same techniques. Accordingly, the effectiveness of a management information system is expressed in qualitative terms rather than in quantitative terms. Further, if the evaluation is performed on a periodical basis, it is likely that the results may not be comparable from period to period.

Therefore, a systematic and an inexpensive approach was needed for evaluating the effectiveness of management information systems, periodically and in quantitative terms so that the results can be compared from one period to the next. The approach suggested in this study was based, to some extent, on the behavioural aspects of management information reporting. Management information systems, in fact, are not solely technical systems, in the sense that they are designed only for collecting, processing data and generating information. The systems are carried out by people and influence the behaviour of people. In relatively simple information systems, all significant functions may be performed by persons and the output of the systems received and used by persons. Even in highly automated systems, the human element is essential, it includes the designer, programmer, operator and the ultimate recipient of the systems' output. All individuals involved in the preparation of management information, use the information provided by the system, and affected by the decisions taken, which are based on information, are psychologically different in their perception, motives, and decision-making style.

The suggested approach was based on views of three groups of individuals:

- (1) The users of information. Are they satisfied with the information provided by a management information system?

- (2) The systems' personnel. Do they know the actual informational requirements of the users?
- (3) The persons affected by the decisions taken. Do they agree that the users of information, as decision-makers, appeared to have all useful information?

In fact, users' satisfaction has been recognised as the major purpose of management information systems, and as an indicator of the effectiveness of these systems. In the psychological sense, satisfaction occurs when frustration is reduced or avoided. From the standpoint of management information reporting, if an information system supplies information to a decision-maker as and when required, he will be satisfied with the system, and accordingly frustration will not occur. Therefore, satisfaction with the information provided indicates that the information is useful and the system is effective.

To measure users' satisfaction and to reveal the views of both the providers of information and the persons affected by the decisions taken, five criteria were suggested. They were as follows: relevance, reliability, sufficiency, timeliness, and understandability. Each criterion was selected to measure an aspect of the effectiveness of the systems which was not measured by the other criteria. A point scoring model was used to express the effectiveness in quantitative terms so that the results could be compared from one period to another.

A modified semantic differential was also used to gather the same data collected by the suggested approach. Using two different techniques to measure the same aspects allowed a check on the results produced. The modified semantic differential was based

on five evaluative factors, they were: (1) relevance; (2) reliability; (3) sufficiency; (4) timeliness; and (5) understandability. The five factors were represented by eleven bi-polar adjectives. The adjectives selected were as follows: essential, required, relevant, accurate, unbiased, complete, adequate, simple, ordered, well-timed, and current.

The suggested approach was designed to be relatively simple, can be carried out in a short time and consequently at a reasonable cost. Because of this, it was believed that the most appropriate tool would be a questionnaire. In fact, the approach suggested for evaluating the effectiveness of management information systems was designed to determine the location and the nature of problems of an information system, but was not designed to specify a cure for these problems. To redesign the information system and/or to achieve some improvements, the information systems analysts and organisational personnel who are in charge of maintaining the information system should perform additional detailed examinations. In fact, the suggested approach aimed to simplify the analyst's task by ascertaining the locations of a relative system's ineffectiveness as well as delineating the unsatisfactory information attributes. If redesign is not necessary, this approach makes it apparent with minimum effort, time and consequently cost.

9.2 - CONCLUSIONS

9.2.1 Conclusions Regarding The Management Accounting Systems In Nationalised Industries

The approach suggested for evaluating, periodically and in quantitative terms, the effectiveness of management information systems should be practicable. Therefore, the approach was tested

empirically. As no similar research conducted on the effectiveness of management information systems in nationalised industries was found, it was decided to test the suggested approach in this field.

The empirical study was undertaken to achieve two purposes:

(1) primarily, to test the practicability and validity of the approach; and (2) to fill a gap in knowledge concerning the effectiveness of management information systems in nationalised industries. The findings of this empirical study were based on the views of 198 respondents (response rate of 82%).

9.2.1.1 Limitations

The primary source of data for this study was the responses of four groups of participants (67 senior managers; 51 assistant managers; 54 senior management accountants; and 26 heads of management accounting departments) to four different mailed questionnaires. These data were not subject to sampling bias. The tests used (t-test and chi square) did not reveal that there were significant differences between respondents and non-respondents. However, the findings of this study should be interpreted and evaluated in the light of the following three limitations:

- (1) The sample used may not be described as fully representative of the population, since some nationalised industries were not represented. Furthermore, the industries of "transport and communications", and "gas, electricity and water" were over-represented in the sample.
- (2) Not every participating organisation was represented in the sample of each group (i.e. senior managers, assistant managers, accountants, and heads of management accounting departments). This was attributed to two reasons; first,

all individuals of a certain group did not return the questionnaires concerned and/or the questionnaires returned were not usable. Second, some organisations did not provide the names of individuals of the four groups, or provided the names under two titles; users of information and providers of information.

- (3) The findings and the conclusions drawn from the empirical study were based on respondents' views and limited only to the effectiveness of management accounting systems of the participating organisations. No other information systems were evaluated.

9.2.1.2 Conclusions

From the analysis of the replies to the research questionnaires, the following major findings were drawn:

- (1) Generally, the management accounting systems of the participating organisations were perceived by the majority of respondents to be more important in providing the information needed for control than for planning. The average weights given to indicate the relative importance of the systems for both functions were, however, very close to each other, 55% and 45%, respectively. Also, the majority of both senior managers and management accountants believed that the attributes of the information provided either for planning or for control should be equally important. Less than fifty percent of assistant managers (48%, 47%), however, agreed on this opinion. From the points of view of the respondents who indicated that the attributes of the information should not be equally important, the attributes' relevance and reliability were more important than the other attributes of the information provided for planning. Concern-

ing the information needed for control, the attribute of timeliness was the most important, closely followed by relevance and reliability.

(2) From the perspective of both senior managers, as users of information, and assistant managers, as persons participating in and affected by the decisions taken, generally, the management accounting systems of the organisations participating in this study were effective, but not highly effective, in providing the information needed for planning and control. However, the systems were more effective in the latter function than in the former. With this result it appeared that there was still room for improvement in the management accounting systems of the participating organisations.

(3) A further analysis of the effectiveness of the management accounting systems indicated that a considerable proportion of senior managers (34%) felt that the amount of detailed information provided for planning was less than the right quantity. Also twenty-seven percent of assistant managers stated that the amount of detailed information provided to their superiors, i.e. senior managers, was less than the right quantity. Concerning the information provided for control, thirty percent of senior managers stated that the amount of detailed information was more than the right quantity. It was interesting to discover that a considerable proportion of assistant managers (32%), as persons affected by the decisions taken, believed that the amount of information provided to their superior for control was less than the right quantity. Only fifty-six percent and fifty percent of senior managers and their assistants, respectively, indicated that the amount of the

information provided for planning was about right, while fifty-six percent and forty-six percent of the two groups, respectively, did so, regarding the information provided for control.

(4) A considerable proportion of both senior managers (39%) and assistant managers (41%) were dissatisfied with the attribute of timeliness of the information provided for planning and control. The analysis of senior managers' and assistant managers' responses indicated also that only sixty-four percent and forty-two percent were satisfied with the frequency of all of the internal accounting reports.

(5) It was interesting to note that a large proportion of assistant managers (46%) as persons participating in and responsible for carrying out the decisions taken by their superiors, indicated dissatisfaction with the attribute of the reliability of the information provided to their superiors for planning. Also, a considerable proportion of assistant managers (41%), as persons affected by the decisions taken by their superiors, were dissatisfied with the same attribute, i.e. reliability, of the information provided to senior managers for control.

(6) The majority of senior managers (81%) did not use all the informational elements in the internal accounting reports. Irrelevance of some items was the most common reason for non-use of all the information in the internal accounting reports. Ninety-one percent of senior managers who stated they did not use all the information, mentioned that reason.

(7) Slightly over fifty percent (52%) of senior managers occasionally conducted expanded searches to obtain relevant accounting

information needed for planning, while 72% conducted such searches to obtain information needed for control which had not been contained in the accounting reports.

(8) Senior Managers' satisfaction with the information provided by the management accounting systems might be influenced by some factors other than the usefulness of information. The degree of prior consultation on the design of the accounting reports influenced managers' satisfaction. On the contrary, sufficient evidence did not exist to support the proposition that previous experience in information system design influenced managers' satisfaction. Senior managers' background in accounting also did not appear to influence their satisfaction. The analysis of the results indicated, however, that there was a negative relationship, but not statistically significant, between the service period in the present job and satisfaction with the information provided. On the other hand, a statistically significant relationship was not found between the service period in the present organisation and senior managers' satisfaction.

(9) The empirical study indicated also that the management accounting systems of the participating organisations were flexible to the extent that they satisfied senior managers who had different decision-making styles. In fact, a significant difference between the two styles of decision-making, analytic and heuristic, was not proved empirically concerning their preferences of the amount of detailed information to be used and the reports preferred to be received. In fact, this conclusion was questionable. This was because of the sample size of the analytic group (12 senior managers), which was, relatively and statistically, small. However, a considerable proportion of senior managers (43%), assistant managers (44%) and management accountants (52%) believed that the decision-

making styles should be taken into consideration in designing an information system in addition to the management level of managers and the decisions which may be taken. The use of psychological tests in determining the decision-making styles did not gain the acceptance of the majority of respondents.

(10) The analysis of respondents' replies indicated that not all respondents, i.e. senior managers, assistant managers and management accountants, perceived that their organisations were evaluating the effectiveness of the management accounting systems while their organisations actually did. The implication of this conclusion was that those respondents might not be involved in evaluating the effectiveness of the systems and/or were not affected by direct benefits resulting from the evaluation. Also, in the opinion of those respondents, the procedures applied in their organisation might not lead to actual evaluation of the effectiveness of the systems. In fact, the actual evaluation of the effectiveness of the management accounting systems of the participating organisations had a weak effect on senior managers' satisfaction with the information provided. The most likely explanation of this surprising result was that the majority of the participating organisations had at least an approach for making sure that the systems had met the informational requirements of managers. However, a further analysis of the effect of evaluating the effectiveness of the systems indicated that regular evaluation appeared to have effect, although it was not statistically significant, on senior managers' satisfaction with the information provided.

(11) Concerning senior managers-management accountants relationship, the analysis of the participants' responses indicated, not

unexpectedly, that effective communication, good relationships, and mutual understanding existed between senior managers, as users of information, and management accountants, as providers of information. In other words, management accountants and senior managers were being, in general, in the same line regarding the different aspects of accounting information reporting covered in this study. The vast majority of management accountants indicated that, on the whole, the levels required by senior managers for the attributes of the information needed for planning were attainable and practicable. Concerning the levels of the attributes of the information required for control, eighty-four percent of management accountants expressed the same opinion. On the other hand, senior managers were satisfied with accountants' understanding of the managers' evolving informational requirements. The correlation between senior managers' overall satisfaction with the management accounting systems and satisfaction with accountants' understanding of the informational requirements was found to be significant, strong, and positive. Furthermore, the vast majority of both senior managers (91%) and management accountants (87%) believed that an effective co-operation between the two groups has existed in the area of determining the informational requirements of senior managers. It appeared also that the decision-making styles of senior managers were perceived by management accountants but not substantially. The analysis of responses indicated also that management accountants were working very closely to senior managers in the area of the interpretation of the information provided. The majority of both groups indicated that there had been continuous co-operation in this matter.

9.2.2 Conclusions Regarding The Suggested Approach

9.2.2.1 Limitations

The suggested approach was tested on a relatively small sample of organisations, and on the management accounting systems. The approach was not used to evaluate the effectiveness of each system separately, but rather, it was employed to determine the effectiveness of the management accounting systems in the participating organisations, in general. Furthermore, the approach was not applied to evaluate specific sets of reports, but rather to determine the effectiveness of the systems as a whole. It is perhaps worth restating here, the limitation made in the introductory chapter, that as the suggested approach was concerned with the measurement of effectiveness, this empirical study did not include any analysis of costs of the management accounting systems or matching costs with the related benefits. This area is included in evaluating the efficiency of the systems. Therefore, all results must, necessarily, be limited by the boundaries mentioned above.

9.2.2.2 Conclusions

The empirical evaluation of the approach suggested for evaluating the effectiveness of management information systems indicated that the approach was valid, practicable, and acceptable. Statistically, the results produced by both the modified semantic differential and the direct approach were somewhat compatible. The correlation between the results related to some information attributes was found to be substantial, while it was a modest correlation for others. However, the overall results produced by both techniques were strongly correlated. On the other hand, the majority of respondents indicated their approval of the main theme of the

suggested approach, that is in evaluating the effectiveness of an information system, three basic questions should be answered:

(1) were decision-makers satisfied with the information provided by the system? (2) did the providers of information really know the actual informational requirements of the decision-makers; and (3) did the persons affected by the decisions taken, agree that the decision-makers appeared to have all useful information? The majority of respondents (60%) agreed that the management accounting systems should be periodically evaluated. From the practical and economical point of view, annual evaluation was suggested as an appropriate cycle.

9.3 - RECOMMENDATIONS FOR FURTHER RESEARCH

From the research findings, some recommendations for further research are presented:

(1) Further research is needed to provide additional tests of the suggested approach used in this study and to improve upon it. Case studies should be conducted to test the suggested approach in evaluating the effectiveness of a specific information system at each management level in an organisation. Such testing under a variety of conditions would provide a basis for another evaluation of the practicability and validity of the suggested approach. The operational framework used in this study (survey) can be employed in case studies with some minor modifications.

(2) The five criteria of measurement utilised in this study (i.e. relevance, reliability, sufficiency, understandability, and timeliness) were extracted from the literature available. They lacked empirical evidence as to whether or not they are better than any other combination. Thus a survey should be conducted on

a larger sample of users and providers of information. This may or may not result in some modification of this set of criteria.

(3) As the modified semantic differential used in this study proved partial validity, further research may be needed to identify a set of bi-polar adjectives which can provide more representative data so that the modified semantic differential can be used as a reliable evaluative device for the results produced by the suggested approach.

(4) The findings of this study indicated that the cognitive styles of users of information did not affect their preferences of the amount of detailed information to be used and the reports preferred to be received. Further empirical studies in this particular area may also be necessary. From a practical standpoint, the studies should examine the potential influence of the cognitive styles of users of information on the design of their information systems.

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