

**GUIDELINES FOR THE SUCCESSFUL DEVELOPMENT OF
COMPUTERISED MANAGEMENT INFORMATION SYSTEMS
IN NON-PROFIT ORGANISATIONS**

By

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The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

ABSTRACT

It is axiomatic that the purpose of computerised Management Information Systems (MIS) is to provide accurate and timely information for use in managing activity within an organisation. In fact, management has accepted the reality of the MIS concept with open arms, trusting that the type of key decisions which have to be made daily will somehow be easier when the promised information appears in a precisely organised form. Interest in MIS is increasing, not waning, despite the development problems. The principal aim of this research study is to determine guidelines which will facilitate the successful development of computerised Management Information Systems (MIS) in non-profit organisations, for example, hospitals.

In profit-making organisations the elements employed for the justification of MIS are primarily directed to increased 'profit', however measured. For non-profit organisations providing services to the public, justification can be particularly difficult as no traditional 'profit' exists. A new approach to the successful development of MIS is presented in this thesis. The distinctive feature of this approach is the development of guidelines which consists of the following key elements: Determination of Corporate Needs; Management Commitment; Users Attitudes and Expectations; User Involvement; Performance Measurement and Measurement Techniques. This set of elements, believed to be appropriate for the large majority of non-profit making organisations, will enable them to make effective use of MIS.

Hospitals were chosen as an example of non-profit organisations and surveys were undertaken in the Yorkshire Region of the National Health Service in the UK and in Bahrain to assess the situation in relation to MIS in two different hospital management environments.

After determining the guidelines it was felt necessary to test potential management reaction to the proposed guidelines. A further survey was undertaken in Bahrain to gauge the likely management response and almost all of the managers were in favour of the proposed guidelines. A demonstration of the implementation of the guidelines in the Bahraini context is included.

Nowhere in the literature is the proposed combination of key elements offered as guidelines for the successful development of MIS. The focus of this research study is non-profit making organisations but it is clear that the guidelines are equally applicable to successful development even where 'profit' is the key criteria of successful installation.

DEDICATION

To my beloved parents, to my dear wife Latifa, and to my son Mish'al without whose patience and support this study would not have been possible.

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CHAPTER ONE

INTRODUCTION

1.1 Background

Historically, managers in any organisation have always used information to perform their tasks and duties as decision makers. The art of management is seen as making the best decision possible, given the incomplete nature of the underlying information. The organisational processing of information goes back many centuries (Sanders 1974). Unfortunately, management has historically suffered from a shortage of information. The term Management Information is not new. What is new to managers and specialists, is the availability of adequate, effective, economical, fast and better information. This is made possible by the 'computer', 'software' and 'communications'. Their value in the management of information has been recognised and appreciated. Information is the backbone of any organisation.

Recently, in the information industry, attention has shifted from administration, to helping executives, managers and professionals to achieve the objectives of their organisations. As a consequence, the problems of successfully implementing computerised Management Information Systems (MIS) and other changes in technology used by managers in organisations, have emerged. Research in MIS implementation has focused on the underlying properties of the organisation which seem to be conducive to either success or failure of system developments.

Mcleod (1983), stated that all people in non-profit organisations as well as in profit

making ones who have managerial responsibilities need more than computer literacy: they need MIS literacy. These people are the users of MIS. Davis and Olson (1985) defined a user of MIS as "any person responsible for entering input data, instructing the system, or utilizing the information output of the system". However, Barrett and Masters (1985) stated that, the development of management awareness may well not be achieved until the arrival of a new generation of managers who recognise the importance of information and are at ease with new technology.

Today, the state of the art of MIS has improved significantly. It is well recognised both in practice and in the literature that the capabilities of MIS presently offer management more choices in terms of alternatives than those previously available to organisations, and, as a consequence, offer new options to the managers. However, the design, implementation and operation of MIS is a complex task, which requires careful planning, commitment and involvement by appropriate managers and users. MIS fail or run into major problems for organisational, human and/or technical reasons. It follows that investigating the problems relevant to developing MIS is a worthwhile one. This research is a step in this direction and seeks to develop guidelines which contain a set of key elements to enable non-profit organisations to make effective use of MIS. No such guidelines are presently available.

1.2 Problems

In the literature there are a range of sources which address the criteria for the successful development of MIS within profit-making organisations. To date there is a lack of information on measuring or evaluating the successful development of MIS as

such in non-profit organisations. In profit-making organisations the criteria employed for justification of MIS are primarily directed to increased 'profit', however measured. For non-profit organisations providing services to the public, justification can be particularly difficult as no traditional 'profit' exists. The need is for a set of key elements for non-profit organisations to replace 'profit'.

As a testbed for the research programme, the use and justification of MIS in the specific field of hospital management was selected with fieldwork being undertaken in both the Yorkshire Region of the UK and Bahrain. Yorkshire was selected to gain knowledge about the state of the art of MIS in the National Health Service (NHS), and provide an understanding of the MIS situation in a developed country. It was also the most accessible Region in terms of location. Bahrain was selected because the author has easy access to the facilities there and personal contacts within the governmental organisations of that country.

A particular focus for this research is the needs of non-profit organisations in Bahrain. In Bahrain MIS has been the subject of much attention in the past several years. Increasingly professionals at the top level of management are interested in adopting MIS to increase their effectiveness; the demand for MIS has consequently increased dramatically. However, there are local problems which inhibit the development of appropriate systems additional to those covered by the issues to be considered later. The local problems are:

- shortage of trained personnel in the MIS field
- lack of managers trained in MIS
- lack of management appreciation of the role such systems can play in aiding forward planning and decision-taking

- lack of communication between departments within organisations
- lack of MIS literacy
- issues of tradition and resistance to change.

More details about the State of Bahrain, its health services and MIS in Bahrain, can be found in Appendix 1.

1.3 Motivation for Research

Non-profit making organisations have directed massive efforts to designing MIS. The results are, most of the time, unimpressive. Indeed, successful MIS are rare in real life. The principal aim of this research is to determine guidelines which will facilitate the successful development of computerised Management Information Systems (MIS) in non-profit organisations. Hospitals have been chosen as instances of such organisations for this research study. The research suggests that an appropriate set of key elements could include:

- The Determination of Corporate Needs;
- Management Commitment;
- User Attitudes and Expectations;
- User Involvement;
- Performance Measurement and
- Measurement Techniques.

The research study surveyed MIS in hospitals at different levels of management. The selected managerial groups asked to participate in this study are directly concerned with the introduction of MIS in their organisations.

1.4 Organisation of the Thesis

The thesis is divided into eight chapters. Chapter two reviews the relevant literature and covers an historical and general review of MIS and MIS in health care as well as a survey of MIS definitions. This chapter also covers the measurement of success in MIS. Chapter three is the central part of this study in which the proposed guidelines are introduced. Chapter four reports the survey methodology covering the data collection mechanisms, questionnaire design, procedures, pilot study and distribution. This chapter also identifies the organisations and participants chosen to take part in the study. Chapter five covers the initial survey, analysis of the data and the findings in relation to the key elements on which the guidelines are based. Chapter six reports some general conclusions on the key elements from the first study and tests management reaction to the proposed guidelines. Chapter seven examines the application of the proposed guidelines in the Bahraini environment. Chapter eight reviews the results of the research and offers recommendations for further work.

CHAPTER TWO

REVIEW OF THE LITERATURE

2.1 Introduction

This chapter serves two purposes. Firstly, it provides an historical overview of the research area and explores a range of definitions of Management Information Systems (MIS). Secondly, it reviews research conducted into the measures of success in MIS.

2.2. Review of Management Information Systems (MIS)

2.2.1 In General

There is still no consensus on what constitutes MIS, and the debate about the application area and its properties continues. An early description of the conceptual foundations of MIS as a coalition of material drawn from other areas, such as, management, operations research, computer science, is credited by Dickson (1981) to Leavitt and Whisler (1958). The statement of this conceptual definition is:

"It is composed of several related parts. One includes techniques for processing large amounts of information rapidly, and it is epitomized by the high-speed computer. A second part centers around the application of statistical and mathematical methods to decision-making problems, it is represented by techniques like mathematical programming, and by methodologies like operations research. A third part is in the offing, though its applications have not yet emerged very clearly; it consists of the simulation of higher-order thinking through computer programs".

Many fields of study have contributed to the development of MIS. In Swanson (1984) and Culnan (1986), three fields of study have been found to contribute to the foundation of MIS. These fields are Computer Science- 'Data, Software, and

Hardware', Management Science- 'Problems, Models', and Organisation Science- 'Individuals, Organisation, Institutions'. Each of these fields focuses upon foundational elements held to be fundamental to the study of the MIS field (Bariff and Ginsberg 1980, Hamilton and Ives 1980, Kendall and Kriebel 1980, Hamilton and Ives 1982, Davis and Olson 1985). Davis (1980) suggested that MIS represents the intersection of six fields of knowledge, drawing upon a diverse disciplinary base in mathematics, engineering, and the social sciences. These fields are, Computer Science, Behavioral Science, Decision Science, Organisation and Management, Organisational Function and Management Accounting. It has been suggested that other fields and disciplines have also contributed directly and indirectly to the development of MIS. For example, the field of economics has made an important contribution (Kriebel and Moore 1980) as well as the field of political science (Danziger 1977, Kling 1980, Northrop, Dutton and Kraemer 1982, Bozeman and Bretschneider 1986, Culnan 1986, Culnan and Swanson 1986). A detailed discussion of the evolution and status of MIS can be found in Dickson (1981).

In summary, it can be seen that MIS draws on a number of different disciplines. As a consequence it is difficult to define. In the last three decades, there has been an unmistakable trend among organisations to adopt computerised MIS, with the aim of improving their level of effectiveness. This has resulted in changes in the methods of management and also management is being offered more choices. The challenges MIS raises for non-profit making organisations and for hospitals in particular will be treated in some detail in what follows.

2.2.2 In Health Care

A hospital is a complex organisation and its function is to provide 'patient care'. The

state of the art of a fully integrated Hospital Information System (HIS) / Management Information System (MIS) has improved in recent years. However, there is still scope for large scale improvement in the development, implementation and applicability of MIS in health care. The term HIS will be used throughout the study to mean Hospital Information System. In the literature many publications have proposed concepts and suggestions for applying information technology to hospital administration (see, for example, Reichertz 1972, Shannon 1979, Ball 1988, Collen 1988, Ehlers 1989).

The methods of management in health services have been changed considerably by the spread of computerisation. In discussing the status of MIS in healthcare, many writers and researchers have described the slow progress in hospitals in accomplishing computerisation and have criticised the hospitals for their slowness in making effective use of information systems. Hoffman (1971) describes the progress as "painfully slow" and added that "hospitals are long overdue in examining the reasons for the slow development of hospital automation". In the last three decades, the challenges for MIS in organisations and particularly for hospitals have changed considerably (see, for example, Steinwachs 1985). In health care as elsewhere the requirement is to view information as a valuable resource.

In the literature there are no reports of computerised HIS in the 1950s but in the 1960s interest in the development of HIS increased in hospitals in the USA, where computers began to be used in the health sector. In the NHS (in the UK) computers have been used since the early 1960s for administrative, financial and paramedical purposes.

Singer (1969) in his paper, "Computer-Based Hospital Information Systems" on the

work done during the 1960's concluded as follows: "Highly developed computer-based hospital information systems are not currently in general use and will probably not be developed for general use within the next two or three years". He added that "The cost of developing an integrated system is high ... operational costs of on-line, real-time systems are high".

It became obvious that computerised management information systems were needed in the early 1970s to support planning, management and the operation of hospitals (Olson 1988). An example of this need in real life is that of El Camino Hospital where a computerised information system, Medical Record Keeper, has been in use since 1972. The reasons that triggered the need for such a system were growing clerical workloads and associated costs (Black and Nichol 1988).

The computerised HIS situation has improved as a result of work carried out during the 1970s when the market for HIS expanded substantially (Ball 1973). According to Mecklenburg (1981), the American Hospital Association Survey of 1975 mentioned that more than 80 per cent of hospitals in the USA were using some type of computer processing systems. A survey by the Hospital Financial Management Association (1976) evaluated the state of the art of HIS in 1976. Data from a sample of 2300 American hospitals showed that about 50 per cent of the hospitals had installed computers or had them on order and were well into the process of adopting HIS. Although 40 per cent of the responding hospitals had some kind of medical records information systems, at least 10 per cent of respondent hospitals had not installed or did not intend to install other clinical computer applications. The most common administrative applications in hospitals, according to the 1976 survey were: Payroll Accounting and Reporting (86%); Accounts Receivable (76%); Inpatient Billing (76%);

Emergency Room Billing (71%); Outpatient Clinic Billing (64%); Inpatient Daily Census (63%); and Account Payable Voucher and Payment (63%).

The view expressed in the literature published in the 1980s emphasises that HIS is a rapidly growing interest. Friedman (1982) stated "It is still a young field, and many of the problems ... are simply hallmarks of an industry that is changing so quickly- in terms of user and vendor alike- that no one could really be expected to keep up with everything that is going on". She added, however, most observers agree that HIS has now passed from the experimental stage to being an extremely helpful tool and may well be on its way to being indispensable.

The state of the art of HIS in the UK as described by Scholes, Abbott and Barber (1989), indicates that major hospital systems such as Patient Administration Systems and Patient Information Systems are essentially based on the concepts formulated in the late sixties, developed in the seventies and largely implemented in the eighties. They added that there seems to be very little new in the direction of the health care systems presently on offer. In the light of this, medical informatics professionals should again review the underlying purposes and direction of health care needs together with the latest potential of Information Technology to define the new systems that will be needed to meet the requirements of the late nineties.

Fairey, Director, NHS Management Executive and Chairperson of the Management Focus Group stated in Fairey (1987-88), that "Over the last two or three years, there has been a considerable upsurge of interest in, and expenditure on, information in the English Hospital and Community Health Service...".

Polacsek (1987) offers a list of more than 900 products marketed by about 400 vendors and estimates that these products represent about 85 per cent of the medical software on the market. According to Fedorowicz (1983) because of the advances in hardware and software technology it is possible for the smaller sized hospitals as well as the larger ones to adopt sophisticated information systems. New low cost HIS are available in the market for the smaller size hospitals that provide many of the same services that were affordable only by the large institution until recently.

Some observers of MIS in the hospital sector believe that hospitals are now moving from a position of inferiority to one of superiority in information systems development. Early studies such as that by the IBM hospital computer users organisation (Electronic Computer Health Oriented: ECHO) predicted rapid developments in computerised information systems in hospitals and the emergence of the hospital sector as a leader in the field of information system technology (see, for example, Violette 1980, Friedman 1982, Austin 1983).

According to Collen (1989) in the 1980s more computer technology was introduced and he stated that:

"The lesson of the first three decades indicated that problems of technology (computer hardware, software, communication) were most readily soluble in time. Less soluble problems, which will probably be as troublesome in the 1990s as they were in the 1980s, are those of a behavioral and sociological nature, such as winning the full support of health care professional users and achieving better standardization of medical practice and information".

Ball and Boyle (1980) in their paper "Hospital Information Systems: Past, Present and Future" place the emphasis on evolution and changing the state of the play and referred to three different classes of hospital information systems, Class A, Class B, and Class C.

- 1- Class A are individual stand-alone systems which address the specific requirements of single departments or specialties (for example, laboratory system, pharmacy system, accounting system.).
- 2- Class B is a type of HIS which crosses departmental and specialty boundaries. Its base is institutionally and administratively oriented and has a communications network superimposed on it. The network may extend to the transmission of orders between patient floors and departments. It also may include integrated ancillary application.
- 3- Class C is another type of HIS which is oriented to the patient medical record and the computer linkage of historical patient information is the foundation. When communication networks are superimposed on Class C systems they have many similarities to Class B systems. The major difference lies in structure. Class B systems use administrative or fiscal systems for a base, while Class C systems use the patient medical record as a base. Class C systems by design include fully integrated ancillary subsystems or applications.

However, Kim and Michelman (1990) reported that the present state of HIS is far from being the integrated system that has a full range of functionality across all application areas. Healthcare executives are becoming increasingly frustrated with the overwhelming abundance of isolated application systems and the independent departmental purchases of microcomputers throughout their organisations. Although the development of integrated HIS is the desired aim of many hospitals, very few hospitals have actually reached this stage.

In 1990s it can be expected that computer technology and communication systems will continue to improve to support MIS in hospitals. The capability and the reliability of

hardware, communication, and software will continue to improve and decrease in cost. More sophisticated HIS and inexpensive powerful systems will be available within the budgetary reach of many hospitals. The demand for personal computers (PCs) will continue as these PCs will increase in power and became essential tools for managers in hospitals. Weston (1980) predicted that, by the year 2000, the PC will have a major impact on health care delivery to the extent that these computers, linked to regional and national health data systems, will provide basic health information for the family. The author believes that this prediction could be achieved sooner than Weston predicted.

In summary, one can see that in the 1950s most HIS were completely manually oriented. The rapid development of computer technology during the 1960s, increased the hospital uses of computers with most systems designed to operate in batch processing mode. During the 1970s, attention shifted to online systems and interest in HIS increased. In the 1980s more integrated hospital information systems were introduced and further attention was given to microcomputers. During the 1990s more sophisticated low cost computerised HIS will be introduced.

2.3 Survey of Definitions of Management Information Systems (MIS)

This section serves two purposes. First, it provides a general definition of MIS and second, it reviews MIS definitions in the particular field of health care.

2.3.1 In General

The current position with MIS, as seen in the literature, is that there is no agreement on what comprises an MIS and how to define it. Head (1970), stated that "Our troubles

begin when we confront the question of what is an MIS. Definitions abound, but there is no consensus among the numerous contributors to the literature as to what really constitutes an MIS". Keen and Scott Morton (1978) stated that "Management Information Systems (MIS) is a prime example of a 'content-free' expression. It means different things to different people, and there is no generally accepted definition recognized by those working in the field... It is equally unfortunate that data processing professionals often do not seem to have a clear perspective on what a MIS is or should be".

Set out below is a selection of views on how Management Information Systems (MIS) have been defined.

"... a system which provides the right information for the right people at the right time at the lowest possible cost... a system which provides historical, current status and projection information, appropriately summarized, for those having an established need-to-know, in a time-frame that permits meaningful decision-making, and at a non-prohibitive cost." (Spaulding, 1964).

"... a system which collects, processes, stores, and distributes information to aid in decision-making in the managerial functions of planning, organizing and allocating of an organization." (McDonough and Garrett, 1965).

"... very highly organized combination of personnel, equipment, and facilities performing data storage and retrieval, data processing, transmission, and display, all in response to the needs of decision-makers at all levels of the business." (Cross, 1967).

"... an information system which provides the manager with that information he needs to make decisions." (Aron 1969).

"A Management Information System is an organized method of providing past, present, and projection information relating to internal operations and external intelligence. It supports the planning, control, and operational functions of an organization by furnishing uniform information in the proper time-frame to assist the decision-making process." (Kennevan 1970)

"... an MIS is a system of people, equipment, procedures, documents, and communications that collects, validates, operates on, transforms, stores, retrieves, and presents data for use in planning, budgeting, accounting, controlling, and other management processes for various management purposes. The data concern people, money, physical assets (materials,

equipment, and plant), and other resources that are employed in the fulfilment of the organization's objectives. The operations and transformations include recording, comparing, reconciling, tabulating, summarizing, and mathematically analyzing. Information processing systems become management information systems as their purpose transcends a transactions processing orientation in favor of a management decision-making orientation." (Schwartz, 1970).

"An integrated, man/machine system for providing information to support decision-making functions in an organization. The system utilizes computer hardware and software, manual procedures, management and decision models, and a data base." (Davis 1974).

"Management Information Systems are networks of data processing procedures developed in the organization, and integrated as necessary for the purpose of providing managers with timely and effective decision-making information." (Sanders, 1974).

".. a system which provides each manager in the organization with the information he needs in order to take decisions, plan and control within his particular area of responsibility." (Higgins 1976).

"... a computer-based organizational information system which provides information support for management activities and functions. The term MIS is well accepted, but the MIS may also be called an organizational information system, a computer-based information system, or information system (IS)." (Ives, Hamilton and Davis 1980).

"MIS is an integrated, user-machine system for providing information to support operations, management, and decision-making functions in an organization. The system utilizes computer hardware and software; manual procedures; models for analysis, planning, control and decision making; and a data base." (Davis and Olson 1985).

"MIS is a formal system which enables organisation members to access and transform stored data so as to provide information that will support and assist the management process of planning, organising, directing and controlling the activities of the business. An MIS uses existing data to provide information which should assist policy 'formulation and decision-making'." (Morden, 1985).

"... system that monitors and retrieves data from the environment, captures data from transactions and operations within the firm, filters, organizes, and selects data and presents them as information to managers, and provides the means for managers to generate information as desired is called the Management Information System (MIS)." (Murdick and Munson 1986).

"A system to convert data from internal and external sources into information and to communicate that information, in an appropriate form, to managers at all levels in all functions to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible." (Lucey, 1987).

The MIS debate has produced two extreme points of view the 'Negativist' and the 'Positivist'. At the negativist extreme are those who identify with Dearden's view (Dearden 1966 and 1972) that there is no need for an MIS, there is no MIS in existence and that there will never be one. Dearden (1972) stated that "The whole MIS approach is fundamentally fallacious.". And at the positivist extreme are those who generally agree with Hanold (1972) that "... a management information system has become an absolute necessity for successful operation of a large and complex business enterprise". Kennevan's definition of MIS has been cited by both Hanold and Dearden (though Dearden's citation was inaccurate). Hanold, as the president of Pillsbury Corporation, has a substantial background of experience of an environment where Management Information Systems have penetrated all levels of the organisation and have proven their effectiveness in helping managers. Hanold accepted Kennevan's definition as a competent and sufficiently extensive description of an MIS while Dearden is not clear whether he liked the definition or not. Davis and Everest (1976) stated that, more than anyone else in the field of the MIS, Professor Dearden of Harvard University has played the role of the devil's advocate.

Between the negativist and positivist extremes there is a wide spectrum of ideas, definitions and terminologies related to MIS. There is a need for a review of the terms widely used and a good study of the terminology has been undertaken by Cresap, McCormick and Paget (1983). Their findings based on a survey of MIS terminology are given below:

<i>NAME</i>	<i>RESULT</i>
Management Information Systems (MIS)	33%
Information Services (IS)	17%
Information Systems (IS)	14%
Data Processing (DP)	12%
Information Resource Management (IRM)	3%
Others	21%

<i>TOTAL</i>	100%
	=====

2.3.2 In Health Care

As the health sector moved into the information era a range of systems were developed. Depending on the purpose, these systems have various names Management Information Systems (MIS) or Hospital Information Systems (HIS), and in addition, Health Information Systems (see, for example, Levey and Loomba 1973, Koza 1974, de Talens, Molino and Shires 1983), Medical Information Systems (see, for example, Collen 1970, Shieman 1971, Lindberg 1979, Counte, Kjerulff, Salloway, and Campbell 1983, Roberts 1988, Collen 1989), Hospital Management Information Systems (see, for example, Baoluo and Tung 1989), Computer-Based Hospital Information Systems (see, for example, Singer 1969, Thibodaux and Associates 1973), Total Hospital Information System (see, for example, Gall 1975, Williamson 1976), Computerised Hospital Information System (see, for example, Ball 1973, Schroeder and Pierpaoli 1986, Anderson, Jay, Perry and Anderson 1989). These systems are all designed to improve management and the delivery of health care.

According to Ehlers (1989), "The analysis of the history of HIS shows, that although the term 'Hospital Information System' is frequently used, there is no standardized definition". The term HIS seems to have the same problem as the term MIS. The term HIS may mean different things to different people.

Veazie and Dankmyer (1977) have suggested the following definitions to reduce the confusion surrounding terminology:

Management Information System:

"... the storage and processing of data to assist management in decision making, planning, and controlling hospital operations."

Hospital Information System:

"... an online communication vehicle for the entire hospital which is designed to facilitate day-to-day operations."

Medical Information System:

"... the collection and processing of medical data to produce various medical interpretations, including suggested diagnoses and possible treatments."

In addition to the above definition Hogarth (1978) chose to define Management Information Systems as a system designed to produce information to be presented to management to assist in decision-making and to enable it to ascertain the progress made by the health organisation in the achievement of its major objectives. He chose the following definition for Health Information Systems (HIS): "A mechanism for the collection, analysis and distribution of health statistical information required to enable health planners to assess priorities, and to assist them in deciding how to meet particular priority needs and finally to enable health administrators to measure their achievements".

A Hospital Information System is not an isolated system. Most of its data are 'common' in the sense that they are used for different purposes by a number of individual people throughout the hospital or even at another hospital. Integration of data and functions are consequently the main characteristics of a HIS (see, for example, Bakker and Mol 1984, Olson 1988).

It could be said that Hospital Information Systems (HIS), Health Information Systems, Medical Information Systems are the 'Management Information Systems' to some degree for health care facilities. The ideology, the methods, the principles, the tools, and the techniques for developing and implementing hospital information systems and management information systems are the same. The emergence of a terminology for MIS in health care is probably due to the health organisations pioneering work in information systems.

2.4 Working Definition of Management Information Systems (MIS)

Since there is no universal definition of MIS, a great deal of confusion may result when research is being carried out in this field. Therefore, there is a need for a working definition of MIS and such a definition is given below.

This definition is based on a tabular analysis (Table 2.1) of the many definitions cited earlier. It underlines the key features of MIS which are universal and independent of the particular situations in which MIS can be used. These features are not present in every definition reviewed. The approach in constructing the working definition is

based on analysing the previous definitions, pointing out the relevant aspects of MIS and putting them together in a new definition. Take, for instance, Sanders's (1974) definition; according to the analysis Sanders's does not believe that MIS is a system, however, he agrees that MIS provides managers with timely and effective decision-making information. This an extreme case. In other instances there is much greater agreement. From the analysis, it appears that Kennevan (1970) and Lucey (1987) provide definitions that are the most complete, but still not entirely accurate. The definition presented here is based upon previous definitions and seeks to strengthen them.

The Definition:

MIS is a system which provides historical, present and predictive information derived from both the internal operation of the organisation and the external environment. MIS supplies accurate, selective and timely information and supports the information needs of management at all levels of management activity to assist in decision-making.

The author's working definition of management information system will apply to both profit making organisations as well as non-profit organisations as it provides and supplies all different types of information for all levels of management activity in order to help them in their decision-making.

Table 2.1 Tabular Analysis of MIS Definitions

No.	Author/s	MIS is a System	Which Provides Historical and Predictive Information	Derived from Internal Operations of the Organisation and the External Environment	MIS Supplies Accurate Selective and Timely Information	Supports the Information Needs of Management	At All Levels of Management Activity	Assists In Decision Making
1	Spaulding (1964)	OK	OK		OK			OK
2	McDonough & Garrett (1965)	OK					OK	OK
3	Cross (1967)	OK				OK		
4	Aron (1969)	OK			OK			OK
5	Kennevan (1970)	OK	OK	OK	OK			OK
6	Schwartz (1970)	OK			OK		OK	OK
7	Davis (1974)	OK			OK			OK
8	Sanders (1974)				OK			
9	Higgins (1976)	OK				OK	OK	OK
10	Ives, Hamilton and Davis (1980)	OK					OK	
11	Davis and Olson (1985)	OK				OK	OK	OK
12	Morden (1985)	OK				OK		OK
13	Murdick and Munson (1986)	OK		OK				
14	Lucey (1987)	OK		OK	OK		OK	OK
15	Al-Alawi (1991)	OK	OK	OK	OK	OK	OK	OK

2.5 Measures of Success in Management Information Systems (MIS)

There are a variety of sources addressing the evaluation of MIS within profit making organisations, for example, Carlson (1974), King and Rodriguez (1978), Hamilton and Chevancy (1981a and 1981b), Miller and Doyle (1987), Baronas and Louis (1988). Hirschheim and Smithson (1988) cited Keen and Scott Morton (1978) and offered the following four reasons why evaluation is problematic:

- "(1) Systems do not have an initial adequate definition of objectives and criteria for 'success' and 'failure'.
- (2) Evaluation must take into account social (qualitative) aspects, yet most attempts at assessment only include efficiency oriented and easily quantifiable aspects, i.e, technical objectives.
- (3) Because of what evaluation must embrace, it is intrinsically subjective, based on individual value judgments which will differ from one person to the next.
- (4) Even if initial system objectives could be set, they would be considerably different from the final objectives due to the fact that user requirements evolve and change over time."

Iivari (1988) stated that there is a pressing requirement for evaluation or quality criteria for facilitating the understanding, communication and measurement of the different consequences of information systems and their development. It is clear that many consequences of information systems are qualitative and intangible, and consequently difficult to measure. According to Murdick and Munson (1986) in order to evaluate MIS it is necessary to identify objectives, to establish criteria for measuring the achievement of these objectives, and to measure performance in terms of the criteria. They added that the aim is to measure the effectiveness and efficiency of total MIS performance. Effectiveness is the degree to which system objectives are satisfied. Efficiency is a measure which minimises utilisation of resources to achieve an objective. However, Murdick and Munson added that efficiency could achieve the

wrong goals at low cost. It is better to be effective but inefficient than to be highly efficient in reaching the wrong objectives. Hirschheim and Smithson (1988) concluded their work by illustrating that the evaluation of MIS was fundamentally technical rather than social. They suggested that MIS evaluation must take into consideration both the technical and the social aspects of a system.

It is imperative to consider means of evaluating an MIS. After all, if one cannot do this, then it is not possible to know whether MIS is a success or a failure. Several factors go into the complicated process of such an evaluation.

In profit making organisations it has been found that monetary savings are obviously a very important and worthwhile rationale for the development of computerised information systems. Therefore, it is necessary to go through the motions of presenting cost-benefit techniques before proceeding with the development of the systems. This measurement technique seems to be a main concern of managers in public and private organisations using computers and computer-based management information systems. The most commonly claimed benefits of computing in profit making organisations result from reduced or avoided costs, and better utilisation of assets (see, for example, Alter 1976, King and Schrems 1978). However, King and Schrems (1978) and Ginzberg (1978) have illustrated the problems and limitations of cost-benefit analysis. Land (1976) addressed the fact that if the cost saving equation indicated an adequate return on capital, well and good. If the return was inadequate then either the project was not proceeded with, or a list of intangible factors such as: better information, improved customer services, improved control, or more accuracy were introduced. Sometimes these intangible factors were given monetary value to make the cost-benefit analysis equation look better. But more often they were simply

listed so as to make the project seem sounder.

Parker, Benson, and Trainor (1988) found that very little work had been done by others extending either economic theory or cost-benefit concepts to the problems in strategic planning and enterprise-wide information management. They introduced 'Information Economics' as a tool for defining the value of MIS to the enterprise. Their goal was to focus on ways and means to improve the contribution of the information systems to the organisation and they believe that Information Economics is a good step towards their goal. Kleijnen (1979) studied the evaluation of the economic benefit of MIS based on the following theories and tools: Control Theory, System Dynamics, Simulation and Gaming. Control Theory was also used by Politzer and Wilmes (1977) to evaluate management information systems. Kamoji (1986) stated that the development of MIS must organise the project according to time and budget criteria. Failure to get the first stages right will result in the development of poor systems.

MIS application in most 'non-profit' organisations is at an early stage (see, for example, DeGroff 1981, Fairey 1986, Sowerbutts 1986, Royce 1987, Collen 1989). There is limited experience of the justification of MIS in non-profit organisations (see, for example, Carlson 1967, Hearle 1968, DeGroff 1981, Hughes 1984, England, Hudson, Masters, Powell and Shortridge 1985, Baronas and Louis 1988).

Baronas and Louis (1988) conducted a study of the implementation of a computer-based payroll and personnel Management Information Systems in 35 state government agencies. Their key conclusion was that special training would restore a sense of control during the implementation experience and reduce the threatening quality of the system. They added that the user involvement in systems installation is

effective because it restores or increases users' perceived control over their function within the organisation. For the variety of managers in non-profit organisations, the implementation of MIS frequently demands major changes in job function. A variety of forms of resistance are often shown in the early stages of MIS implementation, ranging from naive complaints to actual sabotage (see, for example, Hoffman 1971, Hodgdon and Hutchinson 1979, Dowling 1980).

Researchers in non-profit organisations have been examining the need for Management Information Systems (MIS), testing alternative system designs, and assessing their impact. Much of the development and evaluation of MIS has addressed more practical concerns about what type of information the manager wants or needs and how MIS can be developed such that it is utilised to the full (Steinwachs 1985).

Research in the field of measures of success of MIS has been done mainly for 'profit' organisations. In terms of 'non-profit' organisations, activity in this area is very limited. For 'profit' organisations measurement of success may often be seen as a fairly straightforward cost-benefit analysis. During the early stages of MIS use, measures of success/evaluation did not seem to be a problem due to the limitation of available systems where the majority of the applications were aimed at automating existing procedures, for example, accounting systems and payroll systems. The costs of developing such systems were easily identifiable as well as the benefits. Most often the benefits of the system were in terms of clerical cost displacement.

2.6 Management Information Systems (MIS) Evaluation Dimensions

There are two types of evaluation dimension: firstly, performance evaluation of system efficiency; and secondly, the evaluation of the impact of the information systems on the organisation it serves. Each of these types of evaluation will be discussed below.

2.6.1. Performance Evaluation

It is generally claimed that most evaluations of information systems are performance evaluations which focus on the computer system's efficiency (see, for example, Statland 1964, Anacker and Wang 1967, Calingaert 1967, Knight 1968, Drummond 1969, Sharpe 1969, Carlson 1974, Kobayashi 1978, Kleijnen 1979, McFarlan and McKenney 1983, Berry 1985, and Batiste 1986). Lucas (1971), stated that there are three main purposes of performance evaluation, as follows:-

Selection Evaluation: "... in which the evaluator plans to include performance as a major criterion in the decision to obtain a particular system from a vendor is the most frequent case. The procedure includes both hardware and software evaluation."

Performance Projection: "... is oriented toward designing a new system, either a hardware component or a software package. The goal here is to estimate the performance of a system that does not yet exist."

Monitoring: "... provides data on the actual performance of an existing system. These data can be used to forecast the impact of changes in the system, such as a reconfiguration of the hardware or an improvement in the frequently executed software modules."

There are a range of metrics for evaluating information systems performance. For instance, Lucas discussed the eight techniques that have been used or suggested for the general purposes of computer performance evaluation based on performance criteria. The eight major evaluation techniques discussed by Lucas are: Cycle and Add Times, Instruction Mixes, Kernel Programs, Analytic Models, Benchmarks, Synthetic Programs, Simulation, and Performance Monitoring (hardware and software). Green

and Keim (1983) advocate the use of monitors, budget performance and post implementation review.

2.6.2. Impact Evaluation

On the other side of the coin is impact evaluation (see for example Hage and Aiken 1970, Farlee and Goldstein 1972, Carlson 1974, Quinn 1976, Counte, Kjerulff, Salloway and Campbell 1983, Saunders 1986). Carlson (1974) claims that impact evaluation of information systems has received less attention. Impact evaluation is concerned with those effects on the organisation which result from the development and use of information systems. Carlson stated that the major difficulty in evaluating the impact of information systems is the apparent lack of methods for evaluation.

Carlson aimed to mitigate these difficulties by introducing six evaluation methods that can be used for impact evaluations. These methods are: 1) event logging; 2) attitude survey; 3) rating and weighting; 4) system measurement; 5) system analysis; and 6) cost-benefit analysis. He suggested seventeen hypotheses concerning the impact of information systems.

In non-profit organisations, for example, Willcocks and Mark (1988) consider the impact of information technology in the NHS and they suggested that it has shown few short-term benefits whilst the sense of urgency from central government for its implementation has increased. They concluded that if computer systems are to be effective, managers need to concentrate more on the human aspects and new policies regarding their implementation need to be formulated.

So far, there are very few results concerning social impact evaluation. The whole

subject has the character of a difficult problem. Even available techniques for impact evaluation are not well understood. Despite its complexity, the benefit of impact evaluation cannot be underestimated. It can help in the design of future MIS; provide management with a better understanding of the results of investment in MIS.

MIS evaluation dimensions must take into account all factors that may have a role in the efficiency of a system. Note, however, that techniques for measuring the role and social impact of system are scarce and not well developed. There certainly is a need for evaluation techniques which can work in real situations. Nevertheless there are quite a variety of techniques found in the literature to cover the measures of success/evaluation of management information systems in 'profit' making organisations. It could be said that evaluation of MIS in 'non-profit' organisations is in its early stages and no such well constructed criteria are available to assess the successful development of MIS.

2.7 Conclusion

Throughout the literature survey, one thing cannot be ignored: there is no agreed definition of MIS. However, some features keep occurring in the many definitions reviewed. They form the basis of the Working Definition suggested in section 2.4.

It can be said that there is a lack of, or, perhaps, poorly developed, criteria for addressing the successful development of management information systems. Evaluation techniques which were adequate in the past may not be suitable today, due to the fact that the MIS today plays a larger role in organisations and its impact is likely

to be much greater.

There is a definite requirement for measuring the success of MIS. The process of measurement could focus on system performance and its impact on the organisation. However, adequate attention has not been given to the task of identifying characteristics needed for measurement. Furthermore, a well founded and investigated suite of measurement criteria has yet to be developed. This necessitates the development of thoroughly tested procedures for systems measurement suitable for differing situations. The systems designer cannot fail to sidestep the basic task of performance or impact measurement after the system has been implemented.

The current strategies for MIS development in non-profit organisations have been shown to be inadequate. This is because MIS has traditionally been oriented towards profit making organisations which are primarily geared towards increased 'profit' however gauged but MIS development for non-profit organisations is problematic as no traditional profit exists. In order to overcome problems in the development of management information systems for non-profit organisations, appropriate guidelines are put forward in chapter three.

CHAPTER THREE

PROPOSED GUIDELINES

3.1 Introduction

The principal aim of this research study is to determine guidelines for the successful development of computerised Management Information Systems (MIS) in 'non-profit' making organisations based on a set of key elements. These six key elements were identified from practical experience in the field and an analysis of the research literature. The author's findings were then checked in the field surveys reported in chapters five and six.

Although all six key elements are regarded as essential to the successful development and implementation of MIS in non-profit making organisations, they are different in kind. The first key element is the Determination of Corporate Needs and is a Process, the first step to be taken in MIS development. The second and third key elements, Management Commitment, and User Attitudes and Expectations, are both Conditions which must be satisfied if the MIS development cycle is to result in successful installation. The fourth key element is an Organisational Issue, User Involvement, the need to make appropriate organisational arrangements to ensure that potential MIS users play a full role in MIS development. The fifth and sixth key elements, Performance Measurement and Measurement Techniques, are Tools needed to enable management and users of MIS to judge the effectiveness of MIS when operational.

The proposed guidelines encompassing these six key elements are designed to produce

an MIS that meets the working definition developed in chapter two. This set of key elements is considered to be relevant to all 'non-profit' making organisations and will enable them to make effective use of management information systems. It is not suggested that the proposed guidelines are in themselves entirely comprehensive or sufficient to guarantee success but from the investigation it appears that the above key elements are all critical to the successful development of computerised MIS. Other aspects of MIS development, for example, the selection and application of software engineering tools have not been reviewed in this thesis as this is a research area in its own right. It could also be argued that, although very significant in the development of MIS, good software engineering practice is of secondary importance to the six key elements in the proposed guidelines.

In the following sections each key element will be considered in turn under the headings set out above. The discussion of each key element opens with a definition. These definitions were used in the second survey (see Appendix 6).

3.2 Process

Determination Of Corporate Needs is the first step to be taken in MIS development and provides the foundation for the rest of the development cycle.

3.2.1 Definition

Corporate needs are defined as the clear overall strategic goals and objectives of the organisation. Determination is concerned with establishing corporate needs and assessing how MIS can contribute to satisfying these needs.

3.2.2 Importance of Determination of Corporate Needs

The main objective of MIS is to improve the whole organisation and to provide accurate and timely information for use in managing activity within the organisation. Argyris and Schon (1978) stated that the purpose of the MIS is to generate valid and usable information that will help organisations detect and correct errors and plan future activities. This section discusses the importance of determining corporate needs and its relationship with strategic planning.

Determining corporate needs must be the first step in MIS development, as significant amounts of money and time will be wasted if the needs are not clearly determined. The determination of corporate needs to be met by MIS is of paramount concern to the organisation now and in the future.

If corporate needs are not identified at the outset and an MIS is developed which as a result does not satisfy the organisation's requirements, management will have to return to the starting point of the cycle until the corporate needs are properly defined.

The initial task of top management is to determine the overall goals and objectives of the corporation. If it is decided that there is a need for MIS, the top managers will want to know how MIS can fulfil the organisation's corporate needs and whether MIS investment and design will support corporate strategic goals. MIS can be seen as the backbone and blood supply of the organisation, hence the development of MIS should support the function of the organisation rather than just serving individual departments.

Keen and Scott Morton (1978) noted that defining corporate objectives implies an emphasis on analysing the organisation's environment. Determination of corporate

needs is usually a part of planning process specially at the strategic stages. The process of strategic planning typically involves top managers and analysts and often requires innovation and creativity.

It is crucial to ensure compatibility between corporate needs and MIS strategic planning. Ways of doing so differ in the different approaches to the strategic planning process. For instance, Anthony and Dearden (1976) suggest "strategic planning is the process of deciding on goals of the organisation, on changes in these goals, on the resources used to attain these goals, and on the policies that are to govern the acquisition, use and disposition of these resources". Hence determination of corporate needs (goals) is an explicit and first step in the planning process.

According to Nolan (1979) development of an effective strategy and plan is a process consisting of three steps:

1. Management should determine where the organisation stands in the evolution of an MIS function and should analyse the strengths and weaknesses that are in an MIS strategy.
2. An MIS strategy that fits in with the organisation's business strategy should be chosen.
3. It should outline an MIS growth plan for the next three to five years.

Nolan added that it is important to remember that the plan resulting from the above three steps is, for most organisations, an entry-level plan. However, the plan cannot and should not be too detailed. It should give the appropriate 'blueprint' and set goals for each growth process to enable the MIS to be more supportive of the overall business plan. Determination of corporate needs is embedded in the second step of the process.

Planning is a continuing process and deals with defining objectives and plans to satisfy the organisation's goals. These goals may be defined accurately or defined loosely as a range of alternative paths. At the strategic level it is necessary to have a framework for evaluating relationships between the solution(s), the internal framework of the organisation and its environment. Since the environment and these relationships are dynamic it requires the planning process to be likewise.

3.2.3 Methods of Determination

Considerable time, effort and money are expended in system planning when an organisation acquires computerised systems. In the course of systems planning a variety of methods have been developed to aid the MIS planner in making the necessary planning decisions and to facilitate the construction of these systems. There are several general approaches available, such as Soft Systems Methodology (SSM), Strategy Set Transformation (SST), Business System Planning (BSP), Critical Success Factors (CSF) and Robustness Analysis. These five approaches were chosen because of their relevance to this key element. It is not claimed that these are the only suitable methodologies.

In this section SSM will be examined in detail. Soft Systems Methodology was originally developed to be used in broad problem solving situations. It appears to be very relevant to this key element. SSM has now become widely known and is being applied increasingly by professionals in the field. In recent years a number of attempts have been made to apply SSM within industry, the UK National Health Service and elsewhere. SSM has been fruitful in determining corporate needs (see, for example, Galliers 1985, Le Fevre and Pattison 1986, Watson and Smith 1988, Checkland and Scholes 1990).

SSM was developed in the 1970s by Checkland and his colleagues at the University of Lancaster in the UK and it grew out of the failure of 'Systems Engineering' when faced with messy complex problem situations. SSM was developed expressly to cope with the more usual situation in which the people in a problem situation perceive and interpret the world in their own ways and make judgments about it using standards and values which may not be shared by others (see Checkland and Scholes 1990).

As the basic principles and steps included in the methodology are well documented in Checkland (1981), Checkland and Scholes (1990) and Wilson (1990), only a brief outline of some features of SSM and its use in non-profit organisations, such as health care systems is given here. Checkland and Scholes stated that it was clear to those developing SSM that SSM was "not necessarily the professional expertise of 'soft systems engineers' ". Rather it was simply an organised approach to tackling messy real-world problems which could in principle be used by anyone and it is based on system thinking, which enables it to be highly defined and described, but is flexible in use and broad in scope.

As opposed to scientific approaches based on 'hard system thinking', the soft system methodology involves the study of 'wholes' rather than 'parts', where the former is considered to be different to the sum of its parts. 'Hard' is structured while 'soft' is unstructured. Soft Systems Methodology views MIS as 'Human Activity Systems', constructed of managers and others with different and conflicting goals and attitudes. Human Activity Systems consist of problems that are unstructured or soft. They are difficult to gauge. Therefore, SSM is pointed towards analysing and understanding complicated, unstructured situations through carrying out debates with managers,

'actors', involved in the corporation. A feature of fluent users of SSM is that they will be observed throughout the work drawing pictures and diagrams as well as taking notes and writing prose, therefore, early emphasis is placed on the formulation of a 'rich picture' of the problem situation. The purpose of this is that human affairs reveal a rich moving pageant of relationships, and pictures are a better means for recording relationships and connection than is linear prose (see Checkland and Scholes 1990). The rich picture is accomplished in cooperation between the 'problem solver' (system builder), and 'actors' (the management team). It will usually show information about managers involved, problem situation, controlling bodies, and sources of conflict. Several 'relevant systems' will be recommended by the participants to support the perceived problems, based on the rich picture. 'Root definitions' will then be put forward for the relevant systems, using checklist techniques.

A 'root definition' expresses the core purpose of a purposeful activity system. That core purpose is always expressed as a transformation process in which some entity, the 'input', is changed, or transformed, into some new form of that same entity, the 'output' (see Checkland and Scholes 1990). A 'conceptual model' is developed illustrating what the system described by the 'root definition' will do after agreement has been reached regarding the 'root definition'. This model is then compared with the 'problem situation' analysed in the initial stages, resulting in a set of recommendations regarding change. What seems feasible and reliable is then discussed and may be accepted by the managers in the 'problem situation'. Action is therefore initiated, based on the approved recommendations. Soft Systems Methodology is an iterative and backtracking process with seven stages. It may be run many times especially during systems building phases. It can be described in the following sequence:

1. Problem situation considered problematic
2. Problem situation expressed
3. Root definitions of relevant purposeful activity systems determined
4. Conceptual models of the systems named in the root definitions developed
5. Comparison of models and real world undertaken
6. Desirable and culturally feasible changes determined
7. Action to improve the problem situation agreed or initiated.

Checkland and Scholes (1990) argue that the experiences have formed an interesting journey of discovery. "As a result of it, SSM is no longer perceived as a seven-stage problem-solving methodology, which is probably the form in which most people who know anything at all about it usually think of it. The seven-stage methodology is now seen as one option in a more general approach to trying to tackle coherently the problematical situations in which we find ourselves in professional or private life".

According to Watson and Smith (1988) Soft Systems Methodology has been found well suited by the Western Australia Health Department to the requirement of determining information systems based on functions needed to fulfil corporate objectives. The study determined the strategies necessary to provide an integrated hospital management information system for all public hospitals in Western Australia. SSM has been found able to translate the determination of corporate needs, via root definitions, into activity systems models from which categories of information required can be readily extracted (for more details, see Le Fevre and Pattison 1986, Watson and Smith 1988). Very recently Stowell, Holland, Muller and Prior (1990) identified two themes in their study of three different projects:

1. by using SSM one can best benefit by learning about methodology in terms of its applications and its limitations,
2. it is not necessary to be an expert in order to practise SSM.

One of the authors' three examples was using SSM to design an information systems for a medical general practice (GP). The above examples demonstrate the usefulness of the Checkland methodology in determining corporate needs.

Some of the advantages of utilising Soft Systems Methodology in comparison to other available methodologies for information system planning are:

- * SSM activity models can form a strong basis for information flow models upon which the information system design process itself can be based (see, for example, Checkland and Griffin 1970, Checkland and Scholes 1990, Wilson 1990).
- * SSM can be used both to clarify issues and define primary tasks (Mansell 1991).
- * SSM's primary task conceptual model may be used to obtain MIS requirements (Wilson 1990).
- * SSM is an organised approach to tackling real world problems which could in principle be used by anyone (Checkland and Scholes 1990).
- * Analysis of internal/external conditions affecting the problem, exploration of the different alternative versions of the system, and an analysis of the organisational activities are necessary for the proposed system to function.

- * Consideration of all types of information required and an emphasis on information content rather than data are also necessary.
- * SSM is easy to learn (Stowell, Holland, Muller and Prior 1990) and has been successfully used in industry and health care services (Galliers 1985, Le Fevre and Pattison 1986, Checkland and Scholes 1990, Wilson 1990).

Dickson and Wetherbe (1985) have reviewed several of the most publicised planning methodologies. Amongst these methodologies are Strategy Set Transformation (SST), Business System Planning (BSP), and Critical Success Factors (CSF) which provide useful suggestions on how to determine corporate needs. Strategy Set Transformation is a methodology primarily for describing organisation level informational requirements (King 1978) from the objectives of the organisation (Davis and Olson 1985). Business System Planning is based on the corporation processes, for example, the groups of decisions and activities required to manage each of the resources of the organisation. It is based on the assumption that these processes remain relatively constant (see Friedman 1989). Edwards, Ward and Bytheway (1991) defined Critical Success Factors as "those things which must go right if the objectives are to be achieved". Critical Success Factors will highlight specific information needs and identify the critical areas of corporation activity where improved systems will have the most benefit (Rockart 1979).

A particular difficulty with the determination of corporate needs is that it is dealing with future uncertainties. A methodology which is directly addressed to the issue of future uncertainty is Robustness Analysis (see Gupta and Rosenhead 1968,

Rosenhead, Elton and Gupta 1972, Rosenhead 1980, Rosenhead 1989a, Rosenhead 1989b). Robustness Analysis focus on uncertainties and ways of managing them. The approach adopts a 'satisficing model' which involves the development of all possible scenarios that the organisation might face and then chooses a solution that can satisfy as many scenarios as possible. Robustness Analysis provides a method for the structuring of a problem situation in which uncertainty is high, and where decisions can or must be staged sequentially. Its characteristic thrust is to identify decisions early in the sequence which will keep open a range of options for the future. The future, it has been suggested, is a combination of the knowns and unknowable (Rosenhead 1989a). Robustness Analysis contributes a method for developing strategies aimed at the preservation of potentially fruitful future decision options. At the strategic level, complexity arises less from sheer number of options than from interactions between different decision makers and from compounded uncertainties. However, these two sources of complexity produce different challenges to the technique, which are reflected in particular problem structuring methodologies. The Robustness Analysis technique is used to engage with complex interactions between possible combinations of interventions in the system under study, and the uncertainties which surround them. Best, Parston and Rosenhead (1986) reported that Robustness Analysis may be appropriate where there is a high level of uncertainty about future environmental conditions, about the decisions to be made by related agencies which will affect the future performance of the system, or about how alternative system configurations or performance will be evaluated in the future. They discussed a case study of the application of the methodology to the regional planning of health services in Canada.

As already noted there are a range of methods and techniques available for determining corporate needs and clearly the choice of approach will be determined by what is

appropriate to the organisation in its cultural context. Although prominence has been given in this discussion to SSM it is not the only choice available, although it clearly has the many strengths already outlined. Since the focus of this research is non-profit organisations, it is interesting to note the successful applications of SSM to determining corporate needs in healthcare organisations. SSM has been selected for the demonstration of the application of the proposed guidelines in Bahrain (see chapter seven).

3.3 Conditions

Management Commitment is one of two key conditions which need to be satisfied to ensure MIS success.

3.3.1 Definition

This key element is directed to the level of management commitment to the MIS and the importance attached to MIS by management at different levels.

3.3.2 Importance of Management Commitment

The key to capturing the corporate benefits of an MIS is the commitment of managers and their acceptance of responsibility for the management of information resources. Management commitment is important to the success of any management information system (see, for example, Schultz and Slevin 1975, Robey 1979, Alter 1980, Ein-Dor and Segev 1981, Ginzberg 1981, Multinovich and Vlahovich 1984). Studies also show that many MIS fail or incur major problems due to the lack of management commitment during the planning and design phases.

Top management commitment is important because it is the responsibility of top management to define the responsibilities of the user and the information systems builder and to adjudicate on differences, to allocate resources and to assign priorities where resources are insufficient. Hence, effort is needed to ensure 'true' commitment rather than 'lip-service'.

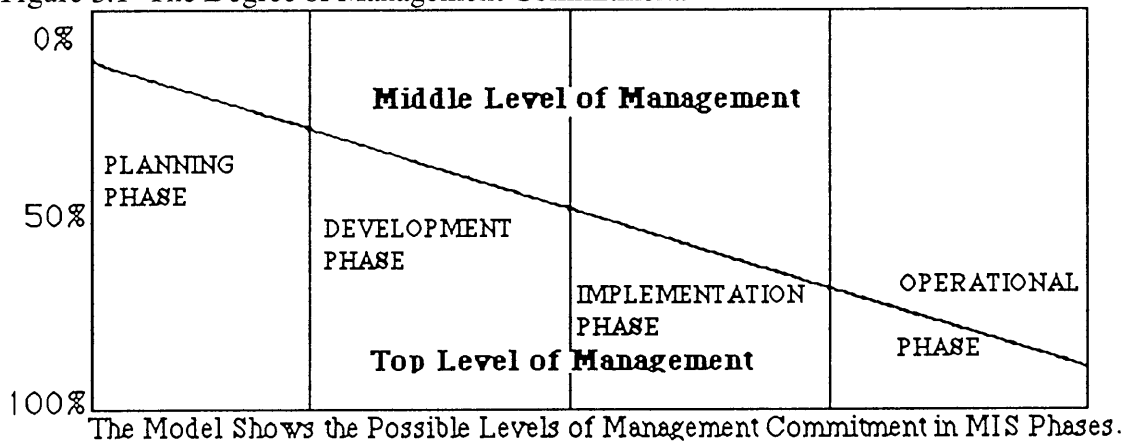
The literature demonstrates a relationship between success or failure and management commitment to MIS development (Power and Dickson 1973, Bean, Neal, Radnor, and Tansik 1975, Keen and Scott Morton 1978, Houdeshel and Watson 1987). As early as 1969, for example, Diebold (1969) in a survey of some 2500 senior managers stated that the technicians, not the management, were setting the goals and objectives for computers. This lack of commitment is one of the main reasons why these companies failed to realise the true potential from their data processing investment. As recently as 1990, Emery (1990) in the "Editor's Comments Page" of MIS Quarterly illustrated the importance of management support and commitment for successful MIS with an example of how two different financial services companies set about developing an important 'mainline' system to provide online support of their principal transaction processing activities. The implementation tools, methodology, programming language and the technical team in both companies were very similar. The only thing that differed in any substantial way was the management of the two companies. One of the companies achieved an outstanding success while the other failed completely, abandoning the implementation after spending a great deal of effort and time. The examination of the two companies shows just how important management is to a project's success. The top management of the successful company played an extremely important role throughout the entire process and were responsible for the choice of hardware vendor and implementation tools.

A survey conducted in the USA by the National Association for State Information Systems (1978-79) for its annual report on information systems technology in state government showed the ranking of management commitment as a problem in data processing rising from third in 1974 to second in 1975, dropping to third again in 1976, rising to second in 1977 and dropping to fourth in 1978. This highlights the important role of management commitment in the development of MIS: despite its fluctuating ranking from year to year, it remains at the top of the list of data processing problems. Gaining 'true' commitment is not easy, managers must be convinced that the MIS would be to their benefit and be fully committed to its development.

3.3.3 Gaining Management Commitment

Top management has a key role to play in obtaining support, commitment and cooperation from their employees in the development and use of MIS. Top managers must take the lead and involve themselves actively in all phases of the system's design and implementation, as their attitudes have a strong influence on the success or failure of the MIS effort. Figure 3.1 illustrates the possible level of management commitment during the MIS development process. In particular, it is important to note that a large degree of top management commitment is required during the planning phase.

Figure 3.1 The Degree of Management Commitment.



Managers must be prepared for this role and for the changes in their own decision-making methods that a new MIS is certain to bring. Argyris and Schon (1978) stated that managers must recognise that they must not only respond to particular changes in the corporate environment, but must also build organisational competence for responding continually to such changes, foreseeable and unforeseeable.

Strassmann (1985) stated that if there is a lack of strong leadership, which means the leaders will not personally adopt the new information systems environment, a very small degree of success can be expected. Leaders must have a strong sense of purpose and a vision that the leader articulates about how the results to be obtained from the technology relate to the purposes of the business. Successful computerised systems are carried on the shoulders of a handful of enthusiastic and dedicated operating managers rather than technical experts, managers who can articulate what the important objectives of the system are, regardless of how many administrators come and go. These managers according to Strassmann give the continuity and safeguard the integrity of information systems.

According to Argyris and Schon (1974) taking one's own value seriously requires a strong commitment to self. In fact commitment to self could run counter to commitment to MIS. The possibility of such a conflict occurring underlines the need for securing management commitment to MIS.

A free flow of communications between the management and the system builder is essential because the role of effective communication is to ensure commitment. The theory developed by DeBrabander and Edstrom (1977) for successful information

systems development is based on the central role of 'effective communication'. Effective communication is defined in terms of the final outcome of interaction between users and specialists.

Gaining top management commitment will ensure adequate coordination of resources and avoid wasteful redundancy. Without the commitment and support of top management MIS may face major difficulties, but having that support and commitment will be of quite direct help.

User Attitudes and Expectations is the second key condition to be satisfied.

3.3.4 Definition

This key element is directed to whether users have positive or negative attitudes to MIS and what they expect to get from MIS.

3.3.5 Importance of User Attitudes and Expectations

Modern organisations are becoming increasingly dependent on MIS, and the ability of the user to use them is a significant factor in their successful and effective operation. When management find that MIS is taking up a large amount of time and causing more problems than it is solving its usage will decline (Clegg and Associates 1988, Hill 1990). The willingness of managers and users to spend the necessary time and effort to make effective use of MIS will depend on their attitudes, values and philosophies toward MIS. User attitudes towards MIS and top management association with MIS have long been recognised as contributing to the success of systems (see, for example, Ein-Dor and Segev 1986). In view of the importance to the future well being of an

organisation of effective use of MIS the root cause of poor attitudes must be deal with. An unclear view of user attitudes and expectations may lead to problems during the implementation and operational phases of the system. It is important to ascertain user attitudes and expectations thoroughly for successful MIS development. This key element should have higher priority than user involvement because it is important to assess user attitudes, whether they are negative or positive, and their expectations before involving users in system development.

In Kaye (1990) respondents were asked to identify successful and unsuccessful information systems and to indicate their attitude pre-implementation and post-implementation. The most striking feature was the change in attitude before and after implementation: in successful systems, 80 percent were in favour before, and 100 percent after. For unsuccessful systems, 31 percent were undecided and 69 percent in favour before, and after 39 percent were undecided, 46 percent were sceptical, and 15 percent were against.

The favourable attitude of the potential MIS users to MIS is absolutely essential as the human element is of primary importance. There are three types of user attitudes ranging from the negative to the positive. Firstly, users with negative attitudes fear the introduction of computerisation and fight change and make life difficult for the system builder and the organisation. Secondly, there are users with neutral attitudes, this type of user accepts change gracefully. Finally, there are positive users who welcome the idea of change. In certain cases they even propose radical changes and assist authority in the use of methods to effectively overcome resistance. These users are identified by Strassmann (1985) as high performance users. The more positive users are about the systems the more likely they are to use them.

Robey (1979) stated "MIS can and does fail where user psychological reactions and organizational factors are ignored by system designers". According to Davis and Olson (1985) a well-designed system may fail in one organisation and succeed in another (also see Emery 1990). The reason as Davis and Olson suggested can usually be traced to human factors. Members of an organisation who are affected by the new system and who dislike and distrust a system can make a well-designed system fail; and likewise those who want a system to succeed can usually make it work, even if the design of the system is poor. Resistance to change (see, for example, Watson 1966, Lawrence 1969, Child 1977, Land 1982, Markus 1983, Hirschheim, Land and Smithson 1985, Land 1991) may arise because of dislike of change, or it may be due to design features which make the system an irritation to the user. The resistance of users had often been recognised as a serious barrier to the successful application of information systems.

It is necessary to consider user attitudes and expectations when building MIS, otherwise the system will be likely to fail from lack of use. Experience has shown that neglect of this key element can have disastrous results for the success of the project (see, for example, Freeman 1969, Williams 1969, Dickson and Simmons 1970, Barnett 1972, Adams 1973, Tomeski 1975, Davis and Olson 1985, Herzog 1991).

Ginzberg (1981) stated that "The results of a number of implementation studies suggested that implementation failure is more likely when users hold unrealistic expectations about a system. Research in other areas, especially product evaluation and job satisfaction, also shows a connection between realism of expectations and outcomes (e.g. satisfaction)". Ginzberg's work reports on a longitudinal study of user

expectations as predictors of project success or failure. Ginzberg clearly shows that users who hold realistic expectations prior to implementation are more satisfied with the system and use it more than the ones whose pre-implementation expectations are unrealistic.

Satisfaction with the system could be used as a measure of MIS success (see, for example, Ginzberg 1978), while Keen (1975) has indicated that MIS implementation failure may result from the improper management of user expectations. Studies have shown a relationship between user attitudes and effective system use (see, for example, Lucas 1975, King and Rodriguez 1978, Lucas 1978a, Zmud 1979, Ives and Olson 1984, Raymond 1985, Lees 1987). MIS operates in the human environment, and its effectiveness depends, critically, on the acceptance and support of the people who use it and those who interact with it on a daily basis. User attitudes and expectations are found to be very significant in the success of MIS.

3.3.6 Determining User Attitudes and Expectations

According to Ahituv (1982) a prerequisite to the successful development and implementation of MIS is understanding human behaviour. This section is addressed to determining user attitudes and expectations.

The system builder must consider the reactions of the users to the introduction of MIS to an organisation. These reactions may be surprising and sometimes destructive. The fears and anxieties associated with the introduction of a computer may undermine the success of the entire MIS. Managers must learn the behavioral effects they are likely to encounter and propose solutions to deal with them effectively (Dickson and Simmons 1970, Davis and Olson 1985). Markus (1983) discussed three theories of resistance to

MIS based on work by Kling (1980), people-determined, system-determined, and interaction and three companion implementation strategies. Markus suggested that the reaction of the system installer depends on the theory to which he or she subscribes. Markus, based on her investigation of interaction theory, concluded that this latter is the most useful in avoiding MIS resistance.

Recently a field study was carried out by Moynihan (1990) in Ireland to learn more about the experiences of managers in introducing information technology in organisations. One particular point of interest from this survey is the finding that managers from all three levels (Chief Executive Officer, the Senior Functional Manager and the IT Manger) wanted users to take more responsibility for systems projects and put more effort into specifying requirements. The main obstacle according to the managers is seen to be users' lack of the necessary creative and analytical skills, not disinterest. The problem is then not a question of attitudes but a question of ability to contribute, an issue for user involvement perhaps.

Communication with users and their participation are primary approaches for reducing resistance to new systems (see Land 1991). An approach to determining user attitudes and expectations is to carry out an attitude survey to gauge user attitudes and expectations of MIS. According to Carlson (1974) "The attitude survey is a method which attempts to measure opinions through a questionnaire administered to a set of individuals". In the present study two measures were developed to assess attitudes toward computerisation. One was to measure attitudes toward computers in general and other was to measure attitudes toward the implemented MIS. These two measurements are addressed in chapter five and they were taken account of when the questionnaire, given in Appendix 5, was designed. To assess the user attitudes and expectations the

systems builder should also listen, talk or interview users on a one-on-one basis or in a group. Useful opportunities for getting a greater understanding of user attitudes and expectations are offered by the conversations which take place in the informal settings of the lunch break, the lift, the corridor and social events. Internal communication of information on successful computerised systems will help users to have a better expectation of the new MIS and will generate a positive attitude toward the system. Showing users video films of some successful systems may alter their attitudes and expectations.

Dickson and Wetherbe (1985) stated that the perceived need for the system is likely to be low if users expect that a system will not enable them to do their job more appropriately and will not increase organisational efficiency. Similarly, they will be unlikely to use the system if they expect that performing well on job tasks supported by the system will not assist them in achieving their goals. Poor attitudes and low expectations can be overcome by training, experience, and the attitudes of other users. It is possible, therefore, to use tactics associated with these areas to influence this key element and thus to deal with this cause of implementation problems.

For example, see Kaddah (1990) who demonstrates the development and application of a particular mechanism for influencing user attitudes and expectations prior to systems development.

3.4 Organisational Issue

User Involvement is an Organisational Issue.

3.4.1 Definition

User involvement is concerned with how and when users take part in the development of MIS and the influence that users can/should exert over MIS development.

3.4.2 Importance of User Involvement

After assessing the user's attitudes and expectations, it is necessary to consider the role of users in MIS development. It can be argued that for the success of MIS, it is imperative for the users to be involved. The distinction between user involvement and user participation was recently discussed by Barki and Hartwick (1989) and Kaddah (1990). Kaddah argued that "In information systems research in general, no distinction is clearly made between user involvement and user participation. They are both used to refer to a set of activities or operations performed by potential users during system development and implementation". Involvement and participation are used interchangeably in this thesis.

In the literature user involvement in computer systems development is often seen as consistent with success or failure (see, for example, Evan and Black 1967, McKinsey and Company 1968, Schultz and Slevin 1975, Newman 1984, Kaddah 1990). One of the major factors in the successful use of MIS is user involvement in the development of the MIS. The success of MIS development is completely dependent on people. The MIS literature contains many claims that user involvement is a necessary condition for successful development of MIS. For example, Dickson and Simmons (1970) stated that "Participation by those who will be affected by the system is essential. This is especially true for operating managers". Nicholson (1970) noted that the key to system success is total involvement of the users. Guthrie (1972) pointed out that "The middle managers' role is critical in the design, conversion, and operation of the MIS. Many

writers refer to the need for middle management participation, but token participation is not enough". Powers and Dickson (1973) stated "User participation is critical to the success of the MIS project". DeBrabander and Edstrom (1977) pointed out that "In relation to other factors e.g., top management support, competence of EDP staff, quality of goal setting, user involvement seems to be the only one which is consistently related to the quality of final outcomes", and Lucas (1978b) stated that "There is too little involvement in developing a system and too little ownership of the resulting system. These conditions lead to lack of use and dissatisfaction with the system". Land (1983) state that "Participation by users in the design process is a powerful technique to avoid the isolation of the EDP specialist and the loss of certainty and control by the users, and to help strike a balance between the specialist's need to innovate, and the line manager's requirement for stability". However, MIS users must be actively involved from the beginning of a project and throughout its life cycle (Murdick and Ross 1975, Ein-Dor and Segev 1981, Thierauf 1982, Multinovich and Vlahovich 1984). Baronas and Louis (1988) stated "User involvement has long been considered a critical component of effective system implementation". Recently Kaye (1990) has emphasised the importance of user involvement during the systems analysis and design phases.

As outlined by Ives and Olson 1984, user involvement is predicted:

(i) to improve system quality by:

- * Providing a more accurate and complete assessment of user information requirements (Norton and McFarland 1975, Robey and Farrow 1982);
- * Providing expertise about the organization the system is to support, expertise usually unavailable within the information systems group (Lucas 1974a and

1974b);

- * Avoiding development of unacceptable or unimportant features (Robey and Farrow 1982);
- * Improving user understanding of the system (Lucas 1974a and 1974b, Robey and Farrow 1982);

(ii) and to increased user acceptance by:

- * Developing realistic expectations about system capabilities (Gibson 1977);
- * Providing an arena for bargaining and conflict resolution about design issues (Keen 1981);
- * Leading to system ownership by users (Robey and Farrow 1982);
- * Decreasing user resistance to change (Lucas 1974a and 1974b);
- * Committing users to the system (Lucas 1974a and 1974b, Markus 1983).

McKinsey and Company (1968) found in various studies that the most successful organisations with respect to computerisation were those showing a high degree of participation by management. Willcocks and Mason (1987) indicated that user involvement has not received enough attention during the design and implementation process.

This section underlines the importance of user involvement. The evidence from literature supports the active involvement of users. On the other hand criticisms of this key element may also be found in the literature. Land and Hirschheim (1983) and Friedman (1989) report the following difficulties:

- * Lawrence (1969) raises the problem of users not understanding what is meant by participation even though they may understand the technical side of the project.
- * The user is powerless (Adams 1975).
- * User participation is not always functional for different reasons, one of them being that the user is unable to understand the technical jargon of the system builder and therefore makes no input (Hedberg 1975).
- * System specification is difficult for the user to understand, system delays may be due to multiple user groups, and inefficient systems may result from competition between user group (Eason 1977).
- * In Keen and Gerson (1977) it is argued that user participation may lead to power struggles between user groups and these conflicts are obviously not welcomed by the systems builders inside the organisation.

Nevertheless despite the acknowledged difficulties and risks a strong case can still be made to support user involvement on logical, ethical and rational grounds. Effective user involvement is essential to effective user 'ownership' of the resultant MIS.

Baronas and Louis (1988) stated that there is significant proof that little is understood about the way strategies of user involvement work. They have also reported that there is no theoretically grounded explanation for linking system success with user involvement (see, Ives and Olson 1984, Baroudi, Olson and Ives, 1986). Baronas and

Louis (1988) investigated the experience of the typical user immediately before, during and after implementation of the system. They presented a theoretically grounded perspective to account for the effects of involving users during implementation, and devised a preliminary test of this theory. They suggested that system implementation represents a threat to users' perceptions of control over their work and a period of transition during which users must cope with differences between old and new work systems. They also stated that user involvement in system installation is effective because it restores or enhances users' perceived control over their work. In particular, those users who received appropriate training were more satisfied with the new system, more positive in their perception of interacting with systems implementation and happier with the new systems than with the old one.

In the literature the call for user involvement in information systems was based on number of issues, ranging from a moral obligation to involve users in systems development to a perception of user involvement as an important antecedent variable in relation to system quality and usage (Baroudi, Olson and Ives 1986, Kaddah 1990). Ideally involving users should produce for MIS the results noted by Wood (1985) who described an approach which resulted in the successful implementation of health information systems "involving users throughout the project was absolutely essential". Wood added that "... involving users has a positive by-product: the feeling of ownership that develops among people involved in defining a system". Involving users will provide them with an opportunity to participate and also a feeling of satisfaction with the course of action agreed upon.

3.4.3 Ensuring Effective User Involvement

As noted earlier the reasons for MIS failure tend not to lie only in the technical side,

though the technology is complex, nor in the economic side, though it is expensive to build these systems. The reasons for failure are more likely to be caused by the users. This problem is due to the lack of cooperation when the systems are being developed and resistance to change that occurs when MIS is implemented. Users resist involvement in uncertain situations. For example, Argyris (1971), has argued that workers may feel that the computer will usurp their own valued decision making responsibilities. Ainsworth (1977), identified lack of understanding, fear of job loss, and human nature as underlying causes of resistance. Sanders and Birkin (1980) have argued that threats to security, reduction in social satisfaction, and reduction in self-esteem and reputation are reasons for resistance. While, Sales and Mirvis (1985), have suggested that workers' general willingness to accept change significantly affects their responses to computer system implementation.

User involvement has been shown in the literature to be an important element in MIS success and involving users can assist in reducing resistance to change. However, there is less agreement on the extent and style of user involvement. According to Nicholas (1985), "Though different users should have different kinds of involvement, which can range from project initiation and specification of system objectives to simple on-the-job training, the extent of their involvement will vary depending on the stage of development the system is in". Participation in practice can take place at many levels and take many forms (Mumford 1981, Land 1982). "There is no simple prescription for the way participation should be introduced or practised" (Land and Hirschheim 1983). Ives and Olson (1984) stated that user involvement in the design of MIS is supported in the prescriptive literature. Determining when and how much, or even if, user involvement is appropriate are questions that have received insufficient research attention. Ives and Olson reviewed the link between user involvement and system

success. Bingham and Davies (1978) showed that user involvement has a strong bearing on determining the success or failure of a system. They outlined the benefits that occur from effective involvement and identified three categories of users: top management, line management and non-management personnel.

Some researchers view user involvement as a democratic right of organisation members (see, for example, Mumford 1979, Land 1982, Ives and Olson 1984, Hirschheim 1985). Preece (1991) reported that in some countries, for example, West Germany, there is a legal requirement that employees be involved in the introduction of new technology.

Kaddah (1990) reported that notwithstanding the many theoretical advantages of user involvement in systems development, its implementation has been to a large extent problematic. The following are among the major implementation difficulties reported by different researchers and practitioners in the field of information systems:

- * Inability of users to contribute meaningfully, due to inadequate technical knowledge (Hirschheim 1986, Blacker and Brown 1987, Long 1987).
- * Lack of mechanisms and techniques for the effective implementation of user involvement (Bronsema and Keen 1982).
- * Reluctance of systems designers to include users (Long 1987).
- * Conflicts of interests between participants (Mumford 1983, Long 1987).

- * Design delays caused by participation (Hirschheim 1985) which can be quite costly (Baroudi, Olson and Ives 1986) and time-consuming (Willcocks and Mason 1987).

The inability of users to contribute objectively, because of their insufficient technical background and their fears and misconceptions are amongst the major obstacles reported in literature (see, for example, Ives and Olson 1984). Issues such as user willingness to participate prior to the commencement of systems development have received some attention, see, for example, Kaddah (1990) but further work is required.

Hirschheim (1985) distinguished between two types of participation; the direct way which is when users participate personally in discussions, and the indirect way, which is when a representative is participating on their behalf. An example of the direct approach to user involvement which could be beneficial is to work with the users of individual departments within the organisation to design their own input/output screens and report formats for internal reporting. By using this approach the user knows what to expect from the new system and will have a degree of system ownership.

Land and Hirschheim (1983) stated in their conclusions on ensuring the effectiveness of user participation that "... a variety of users in many countries have attempted to design systems with various degrees of participation, by various levels of users. The reports coming from these experiments suggest that participation does work, that users can develop the skills which enables their knowledge of the organisation of their needs and of the system to be input into the design process. Participation does not provide an easy answer. Few users have the confidence to set out on the road themselves. The

learning process takes time and there are many set-backs from when the process is first attempted". Nevertheless, the evidence suggests that the return on the effort invested in securing effective user involvement is considerable.

3.5 Tools

Performance Measurement is one of the key tools needed to enable management and users to judge the effectiveness of the operational MIS.

3.5.1 Definition

This is measurement of the effects or changes to the organisation's performance that can be attributed to the introduction of MIS.

3.5.2 Importance of Performance Measurement

"You cannot measure what is not defined. You also cannot tell whether you have improved something if you have not measured its performance"
Strassmann (1985).

It is essential to consider performance measurement since it will determine whether MIS has affected the organisation's performance. A successful MIS must provide quality information to support the decision-making and operational functions of the organisation. Quality information has the characteristics of timeliness, accuracy, reliability and accessibility (see, for example, Kobayashi 1978, McFarlan and McKenney 1983, Batiste 1986). Performance measurement methods are needed that focus on efficient usage of MIS. Any change in information systems must aim to improve the ability of the organisation to accomplish its goals. A general rule is that performance measurement should always relate to the final objective and in particular be capable of measuring the potential improvements to the system. This key element

depends on the type of system, its objectives, and conditions under which the measurement is conducted.

In the context of the introduction of new or improved MIS, performance measurement is concerned with: system enhancement, increased system usage, and better integration of activities. Without proper performance measurement techniques it would not be clear if there are any problems with the system or whether users are finding the system reliable. A system which does not meet organisational needs is unlikely to be used.

The standards of performance for the MIS are based on how well the information needs of the managers are supported. Performance measurement is one of the most frequently used criteria, and may be seen as a metric of both system quality and user acceptance (Ives and Olson, 1984). Amongst the reasons for its frequent use is that satisfaction of users with their information systems can be assessed and is an acceptable surrogate for utility in decision-making (Ives, Olson, and Baroudi, 1983). While Lees (1987) stated that among the more frequently used measures of system success are the extent of system satisfaction and usage, he also reported that such studies found that there was a positive association between system utilisation and user satisfaction. The success of MIS is largely dependent on the satisfaction of users at different levels of management within the organisation.

Hamilton and Chevancy (1981a) stated that MIS effectiveness is determined by comparing performance to objectives, and is of concern not only to the management function, but also to the user, developer, and to internal audit personnel involved in MIS implementation.

3.5.3 Aspects of Performance Measurement

A good performance measurement methodology which is carefully executed will assist the organisation achieve its objectives. Measurement is concerned with how the system affects the organisation's performance when it is installed. MIS installation may be justified on the basis of increased speed, decreased errors, better integration of activities, reduced data redundancy, improved communication and increased productivity. If there were no improvements under these headings, then measuring performance may direct the management to the critical aspects of the MIS implementation and exploitation which require closer investigation.

Some of the issues related to MIS evaluation have already been discussed in section 2.6 and will not be repeated here.

Research on MIS utilisation suggests the need for periodic measurement of MIS (see, for example, Davis and Olson 1985, Dickson and Wetherbe 1985). Regular measurement of performance may tell whether MIS operates ineffectively because of the technical capabilities of the hardware and software. For example, the network may work but the response time may be very slow, perhaps because the computer involved has insufficient capability to handle the workload or lack of sufficient storage or the CPU cannot respond to all requests within the specified time period, or perhaps the network itself lacks capacity.

Perceived inaccessibility is also likely to be a reason for user rejection of MIS (see, for example, Kerr and Hiltz 1982). Accessibility is often viewed as a delivery system issue which is related to the success of MIS (Zmud 1979) and hence may be regarded as a measure of performance.

A consequence of including performance measurement is that emphasis is focused on the overall performance of the system rather than on any single part. The study of large scale MIS is in essence a study of the performance of the total system: hardware, software and other procedures. Furthermore, since the objective of developing MIS is to achieve improved performance, it is essential to include relevant performance measurement techniques in the proposed guidelines for the successful development of MIS.

Measurement Techniques is the second tool addressed to judging the value of operational MIS.

It is difficult to formulate a compact definition of measurement techniques for MIS. This can be attributed to the costs and benefits of MIS which are inherently complex, have a high degree of variability and also are interrelated. As a consequence they pose significant measurement problems. A variety of measurement techniques have been developed to assess MIS. For this key element Cost-Benefit Analysis and Cost-Effectiveness Analysis will be examined in detail. Although these techniques have been shown to be useful for measurement (see, for example, Carlson 1974 and Lucas 1978a), it is not claimed for this key element that these are the only suitable measurement techniques. These two techniques were found to be the most appropriate by survey population in both the UK and Bahrain. A review of other techniques can be found in Appendix 2.

3.5.4 Definitions

Cost-Benefit Analysis is defined as a technique for assessing the desirability of a project through systematic examination of the anticipated costs and benefits associated with the project. The goal of Cost Effectiveness Analysis is to identify the most efficient alternative that allows one to reach a pre-defined objective within a stated level of expenditure.

3.5.5 Importance of Measurement Techniques

The design and implementation of MIS is costly and cannot be carried out on a trial-and-error basis and without planning. Measurement techniques must be used in planning and in advance of development.

According to Aris (1974) "... there is no such thing as an intangible computer cost or benefit. No element in a computer-related decision is meaningful unless it has some effects and any such effect must be perceptible and, therefore, in principle, measurable". Aris acknowledges that these effects may be very difficult to measure, but that this is no reason for not including measurement techniques. Aris' conclusion is that any means of crudely measuring an 'intangible' benefit is better than none at all. Decisions on which measurement techniques to use have to be part of the MIS development process if their subsequent application is to be effective. Measurement Techniques are, therefore, a key element in the guidelines.

Costs are normally expressed in terms of quantitative monetary requirements, while benefits are often expressed in qualitative terms of cost-saving, cost-avoidance, and intangibles. The first two qualitative benefits can be assigned a monetary value with relatively little effort. Cost-saving and cost-avoidance represent the type of benefits

traditionally included in cost-benefit analysis for data processing standalone systems. It is the value of intangible benefits that is the most elusive to the system builders. It is difficult for them to define and determine a value and obtain agreement that the value assigned does, in fact, represent the benefit (see Parker 1982). Intangible benefits include items such as improved information, which, when applied, would "help most in planning and decision-making by reducing mistakes and increasing the reliability of estimates" (King and Schrems 1978).

The literature (see, for example, Carlson 1974, Lucas 1978a) confirms the relevance of the two measurement techniques, Cost-Benefit Analysis and Cost-Effectiveness Analysis, for defining performance standards. Determining the measurement techniques to be employed will have to be performed as an integral part of MIS development strategy if it is to be effective.

3.5.6 Some Measurement Issues

It is clear from the preceding discussion that cost-benefit analysis and cost-effectiveness analysis are techniques for helping in decision-making. Although measurement techniques such as cost-benefit analysis are never straightforward to use since the direct benefits of a system are often difficult to identify and measure, it is possible to compare the cost of the system with the cost of obtaining the same information by other methods. Another possibility is to estimate the time gained or the increase in productivity resulting from the use of the system, even if this can only be done by estimating losses owing to the lack of such a system. If such measurement techniques prove impossible, it is always possible to seek the opinions of users by means of a questionnaire or an interview to determine how satisfied they are with the system and to obtain their own assessment of the benefits they have derived.

It is argued by Sartore and Kraemer (1974) that the speed and efficiency of computerisation can replace staff numbers required for many routine information processing tasks. However, staff reductions are the exception on most of the more complex tasks which have been computerised. It is extremely difficult to claim that installing MIS would reduce the running cost of non-profit making organisations such as a hospital. This is due to the fact that the cost savings argument is often linked with significant staff reductions. But if staff numbers are not reduced and if the MIS personnel are paid even moderately high salaries, this aspect of cost reduction is problematic.

A study conducted by Danziger (1977) concluded that perhaps for most, information systems processing tasks, computerisation does not seem to result in reduction of costs or staff. Buchanan and Boddy (1983) used a case study method to investigate the experience of six firms in Scotland regarding the effects of information technology on jobs and organisations. They found that reports of a rapid and wide ranging revolution in organisational and working life were exaggerated. Contrary to popular belief, none of the six firms studied made employees redundant as a direct result of introducing information technology. Another study by Prattipati (1988) concluded that little or no evidence could be found to support the popular belief that computerisation reduces the running costs of a hospital. In at least a third of the departments considered there was significant evidence to support the opposite view, that computerisation may be associated with higher costs.

Emery (1971) stated that the cost-benefit method is the only way to evaluate economic impact, and it should not be ignored or limited only to direct costs and benefits. Emery

also gives hypothetical examples of techniques for cost-benefit analysis of information systems. He also added that any benefit can be given a tangible value if adequate effort is devoted to the task. The difference between a 'tangible' and 'intangible' benefit thus lies in the difficulty of estimating monetary value. The Emery techniques could be used for both feasibility studies and for impact evaluations.

Advance computing and communication systems often provide a variety of intangible benefits. For example, a comprehensive Automatic Teller Machine may be justified on such tangible grounds as a reduction in the teller clerks. The 24 hours banking services and improved customers services may be as valuable as any of these, but it may not be possible to assign a monetary value.

The development of MIS involves costs as well as benefits. The question the manager usually asks in Cost-Benefit Analysis is "is our Benefit higher than our Cost ? ". If this is the case, then the system is a good investment for the corporation (see, for example, Akoka 1981). However, some benefits are intangible for example, social benefits such as increased morale of the personnel, improved service and user satisfaction. Therefore this technique may be particularly difficult for such a case. The costs and benefits of MIS are variable, complex, interrelated, and difficult to estimate. These difficulties often negate a meaningful Return on Investment (see Bowman, Davis and Wetherbe 1981).

It makes sense to apply cost-benefit analysis to MIS, but infrequently are the benefits directly measurable. In the early days of Data Processing computers were used to replace manual systems where the cost of the existing systems could be easily compared to the costs of the new systems. Now as computers are used to produce

information that was not formerly available, the benefits in cost reduction are not so clear. On the financial side, industry is beginning to understand more that the costs are not merely the initial outlay for software and hardware. Systems must be maintained and sophisticated systems require talented and expensive personnel. According to Self (1970) "It is just possible that cost-benefit exercises have some utility as supporting evidence for certain kinds of decision. But when this art is elevated to the level of a comprehensive framework for decision-making, the costs of cost-benefit become severe indeed, amounting almost to actual vitiation of proper professional and political procedures". Self added that the cost-benefit figures are incredible, not only because of the dissimilar basis of the items included, but because of the important items excluded. Important factors are often eliminated from policy judgments, but the appropriate remedy, and one easily available where a major inquiry is occurring, is to point out the missing factors with the aid of as much supporting evidence as possible. Self describes cost-benefit analysis as a "confidence trick" and as an effort to convert real political and social issues into false technical ones.

Stern (1976) stated that cost-benefit practitioners are doing something which is basically irrational and they demand further resources to hide under ever deeper layers of sophistication the emptiness of what they are doing. The majority of the parameters can only be known approximately, and it is not worth doing more than estimate them roughly. Stern criticised the use of cost-benefit analysis in a public project. In particular, he evaluated the work of the Roskill Commission on the Third London Airport (1971). There was an interesting debate between Stern, and Abrahams, Flowerdew and Smith (1978) about the use of cost-benefit. Stern virtually dismissed cost-benefit as both useless and misleading with his opponents making a case for the utility of the cost-benefit approach.

Akoka (1981) sees one disadvantage of Cost-Benefit Analysis "...that it tends to ignore factors such as intangible costs, psychological cost of change, description of organization's equilibrium, and customer annoyance.". These factors are often difficult to equate to monetary value (also see Self 1970, Land 1976).

According to King and Schrems (1978) cost-benefit analysis can be an accurate, useful tool for guiding decisions about information systems in organisations, but there are problems:

- * difficulties of assigning costs and benefits,
- * failure to identify all alternatives,
- * failure to specify the critical characteristics demanded of the system and
- * social and political realities.

An analyst must be well informed about these problems. The user of such an analysis must be aware of the analytical shortcomings.

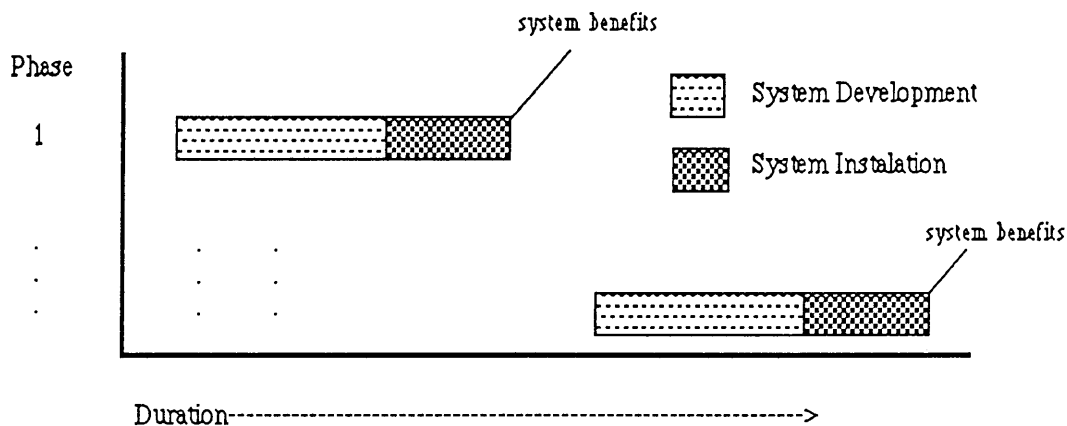
However, the determination of costs may be relatively straightforward, although Strassmann (1985) criticises the frequent failure in practice to include all the true costs. The calculation of benefits, however, is fraught with difficulties (Land 1976). The problem of accounting for qualitative benefits is usually overcome by attributing to them some quantitative value, treating them as a side issue or ignoring them altogether

(Keen 1981). It is not surprising therefore that many writers have been critical of cost-benefit analysis (see Hirschheim and Smithson 1988).

Researchers (see, for example, Rockart and Treacy 1982, Houdeshel and Watson 1987, Moad 1988, Rockart and Delong 1988) in the MIS field observe that cost-benefit analysis is quite difficult to perform because of the difficulty in measuring many of the benefits. These researchers propose that the system will justify its costs. Cost saving and benefits could be identifiable after the system becomes operational and utilised. Recently a study carried out by Watson, Rainer and Koh (1991) supported the above assertion. The results show 95 percent of the respondents in the study indicated that their organisations assessed potential benefits of their Executive Information Systems through intuitive feeling about improved decision making, while only 5 percent assessed hard monetary benefits.

A very important consideration is the justification of the duration it will take for the system benefit to be realised. It is not uncommon for the benefit of MIS improvements to take several years to appear. Costs, however, start to appear during the planning stage and as soon as time is spent on the project. As illustrated in figure 3.2 the benefits of the system will be realised only when the development of each phase is finished and successfully installed. Management may have to wait for a long time before appreciating the benefits from the system. Indeed, according to Herzog (1991), management and staff must appreciate that in most cases it is unrealistic to predict overnight benefits. The process usually takes longer than originally expected.

Figure 3.2 The Benefits Edge of the Systems.



After the MIS has been installed, it should be periodically reviewed for continuing cost-effectiveness (see, for example, Davis and Olson 1985). Cost Effectiveness Analysis assumes the output from the MIS to be maximum in terms of quantity and quality and explores the comparative cost of various methods of producing this maximum output at lower cost. In other words how can the cost of the system be reduced while maintaining its effectiveness.

The principle of using investments to generate improved results should not be based on blind faith in the miracles of information technology and because of the heavy initial organisational costs, the benefits from most investments in information technology can only be realised in the long run. The payoff becomes a matter of managing the realisation of benefits rather than simply benefiting from lower hardware prices (Strassmann 1985).

Significant economic gains in many systems accrue from intangible benefits to the management. The nature of information systems suggests that they be viewed, for the purposes of economic evaluation, in a wider context than that of a producing machine (Boyd and Krasnow 1963). Boyd and Krasnow provided a model for evaluating MIS.

Their model represents the gross characteristics of an information system within a dynamic model of the organisation. The performance of the organisation and, indirectly, that of the information system is measured in accordance with usual financial accounting procedures. Boyd and Krasnow show an approach to measuring intangible aspects of a proposed MIS in terms of its contribution to the dynamic control of the organisation.

A valid way of looking at the economics of information technology according to Strassmann (1985) is in terms of its utility. The declining costs of information technology are only relevant in so far they improve the value of other resources and its investment must meet the same criteria of justification as any other investment made by the organisation.

According to Davis and Olson (1985), the value of MIS may be both economic and non-economic. They described economic benefits as those that cause improvements in revenues or reductions in costs. Non-economic benefits are related to quality of life, for example, the reduction in uncertainty, which has no economic impact, may nevertheless be desirable because humans tend to value uncertainty reduction for its own sake. Closely allied is improved confidence in decision making because of improved quality and quantity of information (even when the decisions themselves do not change). Another example is a reduction in frustration due to improved access to information. Even if the non-economic benefits do not affect revenues or expenses they can be assigned a monetary value because organizations are willing to pay for these advantages (see, also, Gallagher 1971, Parker, Benson and Trainor 1988). Information is unlike consumer goods, it has economical value only when it is used by people to make things or to deliver services (Strassmann 1985).

3.5.7 Application of Cost-Benefit Analysis and Cost-Effectiveness Analysis

According to Carlson (1974) cost-benefit analysis will possibly provide the most meaningful results to the management since it is based on some well developed economic theory. Cost-Benefit Analysis produces assessments in monetary terms and has been used for many years in measuring success and failure in both profit and non-profit making organisations. It is more often used in feasibility studies for information systems. There are various possible analysis procedures. The simplest is a year by year comparison of the costs and benefits or the cost-benefit ratio. This analysis can be improved by comparing cost-benefit ratio or amount before and after the information systems implementation. In practice, the analysis involves the calculation of the Cost-Benefit Ratio (CBR) expressed as:

$$\text{Cost-Benefit Ratio} = \frac{\text{Estimated Total Value of Benefit Arising for the Project}}{\text{Total Cost of the Project}}$$

and usually, if the Cost-Benefit Ratio is greater or equal to 1, it is considered as satisfactory.

Cost-Effectiveness is an attempt to measure the effectiveness of investment relative to its cost and represents a type of value for money calculation (Flowerdew and Whitehead 1974). The ratio is expressed as: $r = \text{Effectiveness} / \text{Cost}$.

Gallagher (1971) conducted a study of managers of a medium-sized American firm. They responded to a question to estimate the value of a report used in non programmed decisions. The key question was, "What is the maximum amount you would

recommend paying for xxx report for your use ?". Below are some of the conclusions of Gallagher's study:

- * Managers who participated in the design of the application gave higher estimates of value than managers who had not participated at all.
- * Managers in upper-middle line operating positions placed a higher value on the application than other managers.
- * The managers were able to estimate a value for the application, for example, the maximum amount the company should pay for the report. Their amounts ranged from \$176,000 to \$404,000.

Gallagher suggested that a reasonable estimate of the monetary value of a specific system can be obtained by asking each user for an estimate. It is hard to reconcile the differences between estimates because it is difficult to place a monetary value on information. One way to handle this problem is to get as many users as possible involved in the design of the application and take an average of their estimates to produce an approximate monetary value.

According to Strassmann (1985) when executives were asked about the main problems faced implementing productivity projects, they emphasised that productivity was very difficult to measure, especially when the objectives were qualitative. Productivity could be simply measured when work has been carefully defined so that it can be fitted into a scheme which may work in factory environments but certainly does not apply to office situations. The economic benefits of information technology are derived from its effect

on the productivity of work.

Most 'non-profit' organisations are engaged in the production of services rather than goods. Services have the characteristics of being intangible. Hospitals, for example, offer intangible services called healthcare.

The means of measuring of MIS in non-profit organisations, say hospitals, can be, for example:

- * Reduction in size of waiting lists;
- * Increased availability of medicines due to better stock management;
- * Cuts in paper work.

These are some tangible results of MIS in healthcare and analogous features may be found in other non-profit making organisations.

Intangible benefits can be:

- * High morale of staff due to improvement in working conditions;
- * Growth in good reputation of the organisation in its social environment;
- * Improvements in services.

One of the most intangible aspects of MIS are the social benefits that can be derived from it when introduced in non-profit making organisations. In healthcare, for instance, a system's effect on hospital performance may well lead to an increase in staff morale, as highlighted above. MIS will also assist in making decisions regarding the distribution of health services and improve the delivery of those services.

The real significance of MIS in a non-profit organisation is that it cannot be measured simply in terms of anticipated financial savings. The primary benefit to be derived from MIS development, for example, in hospitals, is an improvement in the delivery of healthcare. The fundamental importance of any proposed system will be the extent to which it improves the manageability of the hospital and the organisation in general. The potential impact of the system may be in terms of intangible benefits that are administrative and social.

The most remarkable organisational benefits are realised from planned quality improvements in areas such as client services. Undue emphasis on cost reduction is likely to obscure the opportunities to achieve quality gains. Focussing on tangible procedural improvement may cause one to overlook the potential for larger changes which benefit the entire organisation (Strassmann 1985).

In general, hospitals are becoming swamped by the sheer physical volume of medical data. This in turn has led to a situation in which vital records cannot be located or retrieved within a reasonable time when their use is required. This results in unnecessary duplication and inefficient use of professional and medical personnel. MIS, however, would be able to manage large volumes of information in an effective

manner. From a management perspective, patient care will be better taken care of, improved analysis of operations will be possible, control of resources will be increased, and internal communication will be enhanced. From the perspective of a patient it seems probable that service time will be improved. The implementation of MIS in the health sector will demand some fundamental restructuring of traditional operating procedures. The need for accuracy in medical data is essential. Manual methods of information handling are proven to be inaccurate. In the long run, changing from manual to computerised systems should dramatically enhance the ability of a hospital to serve the patient in a better way. The administration will also benefit from the system's capability of supporting management techniques, for example, from the increased time for analysis available to the health organisation employees no longer engaged in repetitive clerical tasks, and from the increased control over the allocation and distribution of organisation resources. Improvement of interdepartmental and internal communication in general will result.

Figure 3.3 is used to illustrate the concepts behind the measurement techniques discussed in this section with examples of important features that may constitute dimensions of measurement. For measuring tangible benefits n_b is a measure of the dimensions before the introduction of MIS and n_a is a measure of the dimensions after the introduction of MIS. Therefore n_a or n_b can be equated to a monetary value. For measuring intangible benefits i_b is a measure of the dimensions before the introduction of MIS and i_a is a measure of the dimensions after the introduction of MIS. Therefore i_b or i_a can take a value such as GOOD, FAIR, or BAD.

Figure 3.3 Dimensions for Measurement Techniques.

	Dimensions	Introduction of MIS	
		Before	After
T a n g i b l e	Waiting List	n_b	n_a
	Stock Management	n_b	n_a
	Cuts in Paper Work	n_b	n_a
	.	.	.
	.	.	.
I n t a n g i b l e	Quality of Services	i_b	i_a
	Reputation	i_b	i_a
	Staff Morale	i_b	i_a
	.	.	.
	.	.	.

Assume that two numbers n_b and n_a are available, which describe the length of the waiting list for hip operations in a hospital. The numbers respectively refer to the length of the list before and after the introduction of MIS in the hospital. Clearly, if one assumes that the social environment is roughly the same over the period of the introduction of MIS, then n_a less than n_b can be due to the introduction of MIS. Of course, other reasons for this development can be found, but, for simplicity, it is assumed that there are none. A similar relationship may be derived between every couple of numbers associated with each feature, tangible or intangible. These relationships objectively measure the performance of the system. A monetary value can then to be assigned to each difference.

3.6 Conclusion

This chapter has been concerned with identifying and defining the key elements of the guidelines necessary for the successful development of MIS. The key elements for successful development have been discussed in the light of their contribution and importance.

In order to reap maximum advantage from the introduction of MIS in an organisation it has been stressed that the determination of corporate needs is the first step to be taken. Having determined corporate needs management commitment has been found to be an important condition for the successful development of MIS. User attitudes and expectations have a direct bearing on users' willingness to be actively involved in the design, development and operation of MIS. To involve people in the introduction of technological change, or new technology, they need to become aware of the dynamics of their behaviour and that of others within their organisational work context. After all, human performance, satisfaction and acceptance of change are directly related to the closeness of fit between the characteristics or personality of individuals and various features associated with their interpersonal and work environments. It is important to involve the users in the development of the system they are going to use so as to generate a sense of system ownership. Performance measurement determines how the system is to be regarded as satisfying the organisational objectives. Finally, measurement techniques aimed at measuring the intangible and tangible benefits of the systems are required.

Many methods for systems development have focused mainly on the technology. The psychological and social implications have often been neglected. It has been

recognised that computerised systems involve technical, human and organisational change which needs to be carefully planned and managed. Human relations have much greater impact here than is generally realised; they are at least as important as technical expertise.

The prime concern of the present study has been to find a means of ensuring successful MIS development in non-profit organisations, where the nature of the organisation itself makes the human aspects of systems particularly important. The proposed guidelines address both human and organisational aspects, directly, in the Determination of Corporate Needs, Management Commitment, User Attitudes and Expectations, and User Involvement as well as including them implicitly in Performance Measurement and Measurement Techniques.

CHAPTER FOUR

SURVEY METHODOLOGY

4.1 Introduction

In chapter three guidelines for the successful development of MIS were proposed. The key elements on which they were based were defined and discussed. In this chapter the author is concerned with some of the fieldwork undertaken as part of the research study.

Having chosen as a testbed for the study of MIS in non-profit organisations the use and justification of MIS in the specific field of hospital management, fieldwork was undertaken in two countries, the UK and Bahrain, initially to establish the current MIS situation in both environments.

Methods used to collect the data involved visits, interviews, and the distribution of questionnaires. The first questionnaire contained implicit references to the key elements of the proposed guidelines for developing successful computerised MIS in non-profit organisations. The second questionnaire was explicitly addressed to the key elements.

Visits and Interviews

To determine the state of the art of 'MIS' in 'hospital management' in the UK, the author visited members of staff in the NHS and had discussions with them. These interviews were deliberately unstructured and wide ranging since the overall aim was to get a broad understanding of the state of the play of MIS in the health sector.

Two visits (of three months each) were paid to Bahrain to look in particular at the Ministry of Health and the Bahrain Defence Force Hospital for a preliminary assessment of the problems of MIS in Bahrain and to get an initial idea of the ways in which top management and the other staff involved would like to see these solved.

Questionnaires

To obtain a more complete picture than could be gained from the sample of interviewees it was felt that the questionnaire method would generate rich data while at the same time minimising the time and effort required of the respondents. This method is generally found to be the best technique to collect data from a large group of respondents in a short time and provides the opportunity for the respondents to give frank and open answers. This was the main technique used in this study to collect the data. The author found that a very small number of respondents had some difficulty in replying to certain questions either because the respondent lacked experience in completing a questionnaire or because of a lack of understanding of some of the terms used. However, the questionnaire was the most appropriate instrument for this study because of the large size of population and the limited free time available to the managers whose opinions were being sought.

Two different questionnaires were used in this study. The purpose of the first one was to determine the management opinions and their likely level of agreement with the research hypotheses. The purpose of the second questionnaire was the follow up for the first one and its aim was to determine management reaction to the proposed guidelines.

In the Bahraini organisations as well as in Yorkshire Regional Health Authority (YRHA) in the UK, 'managers' were the target respondents because they are responsible for directing the affairs of the hospitals and health services in general. This gives them considerable influence over the implementation and use of computerised MIS.

4.2 Choice of Organisations

The organisations involved in this research study were from two countries, the UK and Bahrain. In the UK, the Yorkshire region was selected for the study. A map of the Yorkshire region is in Appendix 3. Table 4.1 shows the organisations involved and percentage of respondents, while table 4.2 shows the breakdown of the Yorkshire Regional Health Authority by district and number of replies.

Table 4.1 The Organisations Involved in the UK (Yorkshire Regional Health Authority).

YORKSHIRE REGIONAL HEALTH AUTHORITY	% OF RESPONDENTS	NO. OF ORGANISATIONS INVOLVED
Regional Supply Organisation	3	1
DHA/Hospitals	97	15
	100	16

Table 4.2 UK Replies by Organisation.

DISTRICT HEALTH AUTHORITY	NUMBER OF REPLIES
Airedale	2
Bradford	2
Calderdale	*
Dewsbury	2
East Yorkshire	1
Grimsby	1
Harrogate	1
Huddersfield	**
Hull	1
Leeds Eastern	1
Leeds Western	2
Northallerton	1
Pontefract	3
Scarborough	1
Scunthorpe	2
Wakefield	1
York	1
Regional Supplies Organisation	1
Total Population for First Questionnaire Distributed	23
Total Population for Second Questionnaire Distributed (Only in St. James's Hospital in Leeds)	13
Total Number of The UK Respondents	36
* The reply was that due to work commitments they could not participate. ** They replied that it would be inappropriate to complete the questionnaire at this time due to the significant changes in information services which were underway with the development of Resource Management.	

In Bahrain, the Ministry of Health, the Bahrain Defence Force (BDF) Hospital, and the Directorate of Computing within the Central Statistical Organisation (CSO) were

selected. Table 4.3 shows the three organisations involved in Bahrain, where both the first and second questionnaires were applied. A map of the state of Bahrain is in Appendix 4.

Table 4.3 Organisations Involved in Bahrain.

BAHRAINI ORGANISATIONS	No of PARTICIPANTS		FREQUENCY	
	First Questionnaire	Second Questionnaire	First Questionnaire	Second Questionnaire
Ministry of Health	79	77	67	53
Bahrain Defence Force (BDF) Hospital	15	16	13	11
Directorate of Computing (CSO)	6	7	5	5
TOTAL	100	100	85	69

4.3 Choice of Participants

This section examines the respondents who participated in the study. There were 121 participants in total from the UK and Bahrain, 36 from the UK and 85 from Bahrain. The second questionnaire was only used in Bahrain as a follow-up to the first questionnaire and 69 respondents participated in this follow-up questionnaire. A copy of the covering letter is in Appendix 5 for the first questionnaire and in Appendix 6 for the second questionnaire.

It was hoped that participants selected in the UK would be occupationally compatible with the Bahraini participants. Unfortunately, this did not prove possible, partly

because of the different operating structure of each organisation and partly because of the smaller number of responses obtained in the UK.

The UK Participants

In the UK the managers were selected by using a number of NHS directories. A total of 36 managers participated in the study and they were divided into four managerial levels as follows: General Manager, Unit General Manager, Information System Personnel, and Other.

Table 4.4 shows the breakdown of respondents by managerial level in the Yorkshire Regional Health Authority.

Table 4.4 Respondents by Managerial Level in the Yorkshire Regional Health Authority.

MANAGEMENT CLASSIFICATION	% OF PARTICIPANTS	FREQUENCY
General Manager	22	8
Unit General Manager	14	5
Information Systems	36	13
Other	28	10
TOTAL	100	36

The Bahraini Participants

In the Ministry of Health, the author met the Minister of Health who was very helpful and gave the author access to all the departments in the Ministry of Health and in the hospitals. From the organisation chart which was provided from the office of the

Minister the author met three undersecretary assistants and obtained the names of managers and administrators. Questionnaires were distributed to all the managerial staff in the Ministry of Health. In Bahrain Defence Force (BDF) hospital, the author met the Brigadier General who is the General Manager of BDF hospital and gave the author permission to meet and distribute questionnaires to all staff at managerial level. In the Directorate of Computing within the Central Statistical Organisation, the author met with the Directorate and distributed the questionnaire to the Director, the Head of System Development, the Head of System Consultancy and to two Advisors.

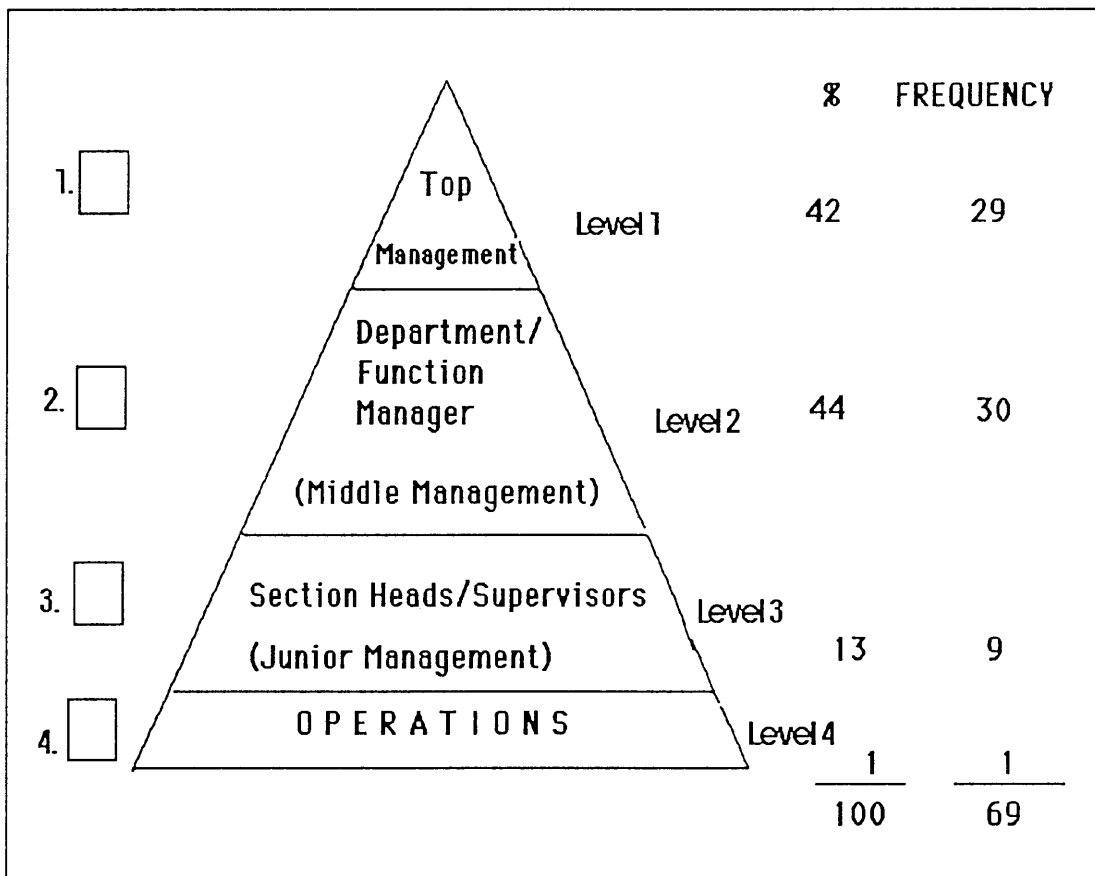
There were a total of 100 individuals in the Bahraini population for the first questionnaire. Usable responses were received from 85 of these individuals. In the second questionnaire in 1989, there were a total of 85 individuals in the target population. Usable responses were received from 69 (81%) of these. The second questionnaire was a follow-up to the first questionnaire and those who participated in the first questionnaire were asked to participate in the second.

The population for both questionnaires was categorised as executive level, administration/ superintendent level, information systems personnel level, medical doctor managerial level, medical support managerial level and other managerial levels. Table 4.5 shows the breakdown of the respondents by managerial level in Bahrain. In the second questionnaire the participants were asked to classify their managerial level in the organisation hierarchy (which is shown in figure 4.1) by ticking the one that most closely matched their level of management.

Table 4.5 Respondents by Managerial Level in Bahrain.

MANAGEMENT CLASSIFICATION	% OF PARTICIPANTS		FREQUENCY	
	First Questionnaire	Second Questionnaire	First Questionnaire	Second Questionnaire
Executive Level	18	25	15	17
Administration/Superintendent Level	19	14	16	10
Information Systems Personnel Level	13	19	11	13
Medical Doctor Managerial Level	18	13	15	9
Medical Support Managerial Level	23	20	20	14
Other	9	9	8	9
TOTAL	100	100	85	69

Figure 4.1 Managerial Level in Bahrain (Second Survey).



4.4 The Questionnaires

4.4.1 Design of the Questionnaires

The first questionnaire was designed after a survey of other questionnaires used for a similar purposes by professionals in the field of the management information systems, for example, Ginzberg (1981), Mcleod (1983), Roberts and Boone (1983), Dickson and Wetherbe (1985), Hoplin (1985), Ein-Dor and Segev (1986), Murdick and Munson (1986), Miller and Doyle (1987), Thierauf (1987), Wells (1987). The second questionnaire was based on the first questionnaire but with the emphasis explicitly on the key elements in the guidelines.

A copy of the English version of each questionnaire is to be found in Appendices 5 and 6 while Appendix 7 is the Arabic version of the second questionnaire. In the introduction to both questionnaires, the respondents were reassured of the confidentiality of their responses and a definition of Management Information Systems was given. The first questionnaire had two parts while the second questionnaire had three parts. Part one of both questionnaires was directed to the identification of the respondent in order to assist in the analysis and to provide access to individuals for any necessary clarification. Position and grade, department/section, organisation and phone number were requested from the respondents. Part two of the first questionnaire and Part three of the second questionnaire focused on the research hypotheses. Part two of the second questionnaire was designed to give the respondent a brief explanation of the proposed guidelines.

4.4.2 Questionnaire Procedures

Most of the questions simply required the respondent either to tick an appropriate square/box or to circle an appropriate number (0-5). This process enabled the respondents to indicate their answers to most questions. Figure 4.2 shows an example from the first questionnaire.

Figure 4.2 An example from the First Questionnaire.

7. Do you have a terminal or a PC connected to the main computer to access the information you require ?							
Yes	☐	No	☐	No Such Facilities Available	☐		
Please circle the appropriate number (0-5) that most closely describes your level of agreement with the following statements or questions, where:-							
0 = Don't Know 1 = Not at all 2 = To a Small Degree 3 = To a Moderate Degree 4 = To a Large Degree 5 = Maximally / Essential							
QUESTIONNAIRE ITEM		LEVEL OF AGREEMENT					
20. The installation of MIS should reduce the running costs of the organisation.		0	1	2	3	4	5

4.4.3 Pilot Study

For the purpose of this research study, two different questionnaires were constructed based on the proposed guidelines and piloted in the UK and Bahrain. For each questionnaire an initial version was drafted and tested on a specimen of the target population.

The initial version of the first questionnaire was given in September 1988 to NHS

managers who were attending a training course at the Nuffield Institute for Health Services at the University of Leeds, to lecturers from the Nuffield Institute and to some Regional Health Authority and District Health Authority managers.

The initial version of the second questionnaire was tested in September and October 1989 and consists of Arabic and English versions. The 'test' population for the English version in the UK were members of the staff from the School of Computer Studies at the University of Leeds. Both Arabic and English versions of the questionnaire were piloted in Bahrain on a population of managers from the Ministry of Health, members of the staff from the University of Bahrain and managers from other Ministries.

About 80 per cent of the first pilot questionnaire and 100 per cent of the second pilot questionnaire (Arabic and English versions) were returned with no significant problems in understanding or completing the questionnaire. No changes were made as a result of the pilot studies.

4.4.4 Distribution of the Questionnaires

UK First Target Population

In the UK, the questionnaires for the first target population in the Yorkshire Regional Health Authority, individually addressed and accompanied by a covering letter, were distributed via their local mail systems. Completed questionnaires were returned again via local mail to the author for analysis. The respondents were requested to return the questionnaires at their earliest convenience. A total of 80 reminder letters were sent out. Those who did not send a reply were contacted either by a personal visit or by telephone, whichever was convenient. A total of 23 questionnaires out of 100 were

collected and entered into the computer for analysis.

UK Second Target Population

Due to the low level of response from the first target population, a second target population was selected. The questionnaires for the second population were taken personally to St. James's Hospital in Leeds; one of the biggest hospitals in Western Europe. The Information Manager agreed to participate by distributing and collecting the questionnaires to/from each manager, each of whom was selected because of his/her managerial level.

The respondents were given three weeks to complete and return the questionnaires to the Information Systems Manager in St. James's Hospital. A total of 13 questionnaires out of 28 were collected and used in the analysis. This gave a total of 36 UK respondents.

The Bahraini Target Distribution

In Bahrain, both the first and second questionnaires were taken personally to the managers of each department to be distributed to the head of each section within their departments. The questionnaires for each section head and manager were individually addressed. The respondents were requested to return the questionnaire at their earliest convenience. The author personally reminded each department and section manager to complete the questionnaire. In the Arabic covering letter for the second questionnaire the respondents were asked to complete and return the questionnaire within four weeks. The department managers or their secretaries were responsible for collecting the sealed questionnaires from each section manager.

In case of difficulty the author was able to provide assistance from his office in the Ministry of Health, Bahrain Health Information Centre, in Salmania Hospital. In a number of cases there was some evidence of a lack of understanding of the English language on the first questionnaire and the author solved this problem by writing the second questionnaire in Arabic and English. However, in addition the author assisted some respondents to complete the questionnaire.

4.5. Structure of the Questionnaires

Two different questionnaires were used in this study. The first questionnaire can be divided into four categories for the purposes of tabular analysis as shown in table 4.6.

Table 4.6 Tabular Analysis of the First Questionnaire.

C A T E G O R Y			
1	2	3	4
General Questions	General MIS Questions	No Computerised MIS Installed	Computerised MIS Installed
Questions 1 to 13	Questions 14 to 22 and Questions 52 to 54	Questions 23 to 29	Questions 30 to 52

Question 22 in column 2 in the table was used to direct the respondents to the questions in column 3 or column 4 according to their response to question 22.

Table 4.7 is a tabular analysis of the questions against the key elements. Each of these key elements in the guidelines will be analysed separately in the next chapter.

Table 4.7 Tabular Analysis of the First Questionnaire by Key Elements.

Background Information and Other Questions	THE PRESCRIPTION'S KEY ELEMENTS					
	Determination of Corporate Needs	Management Commitment	User Attitudes and Expectations	User Involvement	Performance Measurement	Measurement Techniques
Question Number	Question Number	Question Number	Question Number	Question Number	Question Number	Question Number
1 to 9	14	16*	15	27	20*	48
10 to 13**	15*	18*	16	29*	32	52
22	16*	19*	18	33*	44*	
49	17	21	19	35	45	
53	20	27*	20*	40*	46	
54	23	29	23*	42	47	
	24	34*	24*	43	50	
	28	37*	25			
	34	39	26			
	37	40*	27*			
		41	28*			
		42	29*			
			30			
			31			
			32			
			34			
			36			
			37*			
			38			
			40			
			43 to 47*			
			50*			
			51			
Note: * This question could be analysed as a secondary feature under this key element. ** These questions are excluded from the computer analyses.						

The first questionnaire has two parts. Part one is designed to identify the managers and consists of five questions. Its aim was to assist the author with his analysis and with clarification if necessary. Part two consists of question 6 to question 54 and its aim was to find out managers' opinions and their level of agreement with the research hypotheses.

Question 6 was largely directed to establishing managers' committee memberships. Questions 7 and 8 were about access to information. Question 9 covered the type of MIS within the organisation and questions 10 to 13 were centred around the organisational profile.

Question 14 attempted to find out if there is a need for Arabisation of MIS and was directed to managers in Bahrain. Question 15 asked if it is important for every manager to have direct access to computerised information, while question 16 was concerned with the claim that some managers are afraid of computers. Question 17 was concerned with MIS investments while question 18 was about executives' interest in the results and information. Question 19 attempted to measure the importance of computing in the search for greater efficiency. Question 20 was about the installation of MIS and reducing running costs while question 21 was concerned with the promotion of training in MIS. Question 22 considered if there was any type of computerised MIS installed within the organisation. The answer to this question directed the managers to subsets of questions 23 to 52.

Questions 23 to 29 were for respondents where no computerised MIS was installed.

Question 23 attempted to find out about the need for MIS in the organisation while question 24 was about the importance of MIS. Question 25 covered the value expected from MIS and question 26 was concerned with MIS success. Question 27 concerned user involvement in MIS planning and development. Question 28 asked about the MIS delivery of useful, integrated decision support systems and question 29 was concerned with management involvement in the design and development of MIS.

Questions 30 to 51 were directed to respondents with a computerised MIS installed.

Question 30 asked about satisfaction with MIS and question 31 was about the extent of MIS usage. Question 32 attempted to determine if there was any user satisfaction survey employed in the organisation. Question 33 asked if the MIS organisation issued regular reports on its performance. Question 34 asked if MIS were designed to support all levels of management and question 35 considered whether the respondent was familiar with MIS development. Question 36 attempted to find out about the use of MIS and its results in improving user decision making and question 37 examined MIS expenditure and whether it yielded higher management performance. Question 38 considered if the ease of system use was more important than sophistication while question 39 considered managerial support and commitment to the MIS development.

Question 40 was concerned with the involvement of MIS specialists in corporate planning and question 41 was about the priority management placed on the development of MIS in comparison with other projects within the organisation. Question 42 was about participation in the design and development of MIS, while question 43 was about being kept sufficiently informed about MIS. Question 44 was about MIS cost justification and question 45 was concerned with rating the overall

performance of MIS. Question 46 attempted to find out if MIS changed the way in which operations are performed. Question 47 considered whether MIS changed the accuracy of information received by the managers and question 48 tested whether any of a given set of criteria were used to measure MIS. Question 49 attempted to find out about the staff and tools used in MIS development. Question 50 considered timeliness of information and reports received, while question 51 investigated the attitudes of the users to computer systems.

Questions 52 to 54 were directed to all respondents. Question 52 attempted to find out if any of a given set of criteria should be used to measure MIS. Question 53 tried to determine the extent of hospital computerisation. Finally, question 54 was an open question inviting the respondents to indicate any particular views or comments regarding MIS.

The second questionnaire was completed only by the Bahraini managers who participated in the first questionnaire. This was shorter and less time consuming than the first one. It was written in both Arabic and English languages and both versions were given to managers with the manager being given the choice of completing either version. This questionnaire has three parts.

Part one was designed to collect information about the responding managers to assist the author in identifying the respondent for further comments or clarification. This part consisted of seven questions. Part two was designed to give the respondent a brief explanation of the proposed guidelines for the successful development of computerised MIS. Part three consisted of six major questions covering the proposed guidelines and these are described below.

Question 1 attempted to find out if any of the author's key elements should be used for the successful development of computerised MIS while question 2 considered the usefulness/benefits of the author's guidelines with the managers being asked to order their preferences. Question 3 asked whether managers agreed with the proposed key elements. Question 4 gave the managers the opportunity to suggest any additional key elements, while question 5 asked the managers if they would like to replace or delete any of the proposed key elements. Finally, question 6 was an open question inviting the managers to indicate any particular views or comments regarding MIS.

4.6 Summary of Responses

UK First Population Responses

100 questionnaires were distributed and 23 were returned, a response rate of 23%. In some cases incomplete questionnaires were from managers who returned the questionnaire and stated that they had no time to participate. It was also found that the managers diverted the questionnaires to their Information Systems Managers. One Information Systems Manager wrote to the author "... I have ended up having more than 4 questionnaires lying on my desk, this happened because the managers, to whom you had sent the questionnaire, diverted them to my office".

UK Second Population Responses

The Population

In this study a total of 28 questionnaires were distributed and 13 were returned, a response rate of 46%.

The Bahraini Responses

100 copies of the first questionnaire were distributed within the three organisations and 85 were returned, a response rate of 85%. The second questionnaire was issued in 1989 as a follow-up to the previous one and was given to those who responded to the first questionnaire. Responses were received from 69 participants, a response rate of 81%.

4.7 Conclusion

This chapter has outlined the survey methodology used for collecting data. The questionnaire method was the major data collection mechanism. It was found that this technique was the most appropriate way of collecting the data because it allowed the members of the target population (managers) to deal with it in their spare time.

In this survey, the respondents from the two countries, UK and Bahrain, were selected because they were responsible for managing hospitals and health services. The initial choice of individual participants was made from different levels of management and included managers likely to have some responsibility for the development of MIS in their organisations. The Bahraini sample is thought to be reasonably representative of the different groups involved in the development of MIS.

From conversations with some of the respondents it became clear that completing a questionnaire was a new experience for a number of the Bahraini participants. They regarded the questionnaire as an examination paper. Those managers who did not

completely understand a question would either adopt the middle of the scale response or the highest positive response. A particular example was question 48 when some respondents gave an answer which was very unlikely (see section 6.3).

Two different questionnaires were used in this study and the discussion of the results is partitioned into two chapters. Chapter five covers the first survey and provides a detailed analysis of the data in relation to the key elements on which the guidelines are based. Chapter six reports general conclusions on the suitability of the key elements which were tested implicitly in the first study and explicitly in the second survey.

CHAPTER FIVE

DETAILED ANALYSIS OF INITIAL SURVEY DATA

5.1 Introduction

The purpose of this chapter is to analyse the data collected through the fieldwork undertaken for the first survey. A second survey, see chapter six, was later undertaken in Bahrain to test the guidelines explicitly.

Each completed and usable questionnaire was given a serial number and coded for the statistical analysis using general purpose coding forms. The SPSS-X (Statistical Package for Social Science) package was used for the purpose of analysis. The descriptive statistical analysis mechanism was employed in this analysis. Descriptive statistics were defined by Weiss and Hassett (1982) as follows: "... consists of methods for organizing and summarizing information". The descriptive analysis for this research involved calculating frequencies, percentages and means.

In order to assure statistically reliable results it was necessary to classify the managers for both countries into three groups. Group 1 for Bahrain consists of executive, administration and superintendent levels, while for the UK it consists of general manager and unit general manager levels. Group 2 for both countries consists of information systems personnel. Finally, group 3 for Bahrain consists of medical doctor managerial level, medical support managerial level and other managerial levels, while in the UK this group consists of other managerial levels. The results related to each of the six key elements are presented separately and tabular summaries of the results are included.

5.2 Background Information

Scale of Operation

In the event it did not prove possible to draw any useful conclusions from the rather mixed responses to questions 10-13 about the scale of operation in which the respondents were involved. Therefore, the analysis has concentrated on the roles/management levels of the respondents rather than on the size of the organisations by which they are employed. There is no apparent indication from the analysis that organisational size had a material effect on the nature of managers' responses.

Committee Membership

Data indicating whether the respondent is a member of various committees within the organisation is shown in table 5.1 for both Bahraini and UK organisations.

In Bahrain 14% of the respondents were members of steering committees for computer systems development, compared with 50% in the UK. On management planning committees, 37% of Bahraini respondents were members, while in the UK 34% of the respondents were members of such a committee. For the information systems committee, 16% of Bahraini respondents were members while in the UK 39% of the respondents were members. Finally, the respondents were asked if they were a member of any other computing committee and the study shows that in Bahrain 7% were members while in the UK 28% indicated they are members of other computing committees. In general the figures here indicate that the UK respondents are more likely to be involved in appropriate committees.

Table 5.1 Committee Membership of Respondents.

TYPE OF COMMITTEE	YES	NO		NO SUCH COMMITTEE	TOTAL
		If NO, have you been a member before ?			
		Yes	No		
	% (n)	% (n)	% (n)	% (n)	% (n)
BAHRAIN					
Steering Committee	14 (12)	1 (1)	53 (44)	32 (27)	100% (84)
Management Planning	37 (31)	1 (1)	52 (44)	10 (9)	100% (85)
Information Systems	16 (13)	2 (2)	64 (52)	18 (15)	100% (82)
User-Group	33 (27)	1 (1)	46 (38)	20 (16)	100% (82)
Other Committees	7 (6)	93 (77)			100% (83)
UK					
Steering Committee	50 (18)	8 (3)	20 (7)	22 (8)	100% (36)
Management Planning	34 (12)	0 (0)	40 (14)	26 (9)	100% (35)
Information Systems	39 (14)	3 (1)	28 (10)	30 (11)	100% (36)
User-Group	47 (15)	1 (1)	31 (10)	22 (7)	100% (32)
Other Committees	28 (9)	72 (23)			100% (32)

Usage of Personal Computers (PCs) and Terminals

The respondents were asked if they had a terminal or a personal computer (PC) connected to the main computer to access information. The majority of Bahraini responses (60%) indicated that they 'do not have' a terminal or PC connected to the main computer to access information. Another 20% indicated that there are 'no such facilities available', while the remaining 20% indicated that they have these facilities. In the UK almost half (49%) indicated that they have these facilities, 31% indicated they 'do not have' these facilities', while 20% said there are 'no such facilities available'. Table 5.2 shows the analysis of the responses to this question and table 5.3 shows the breakdown by managerial level.

Table 5.2 Terminal or PC Availability.

COUNTRY	Do you have a terminal or a PC connected to the main computer to access to the information you require?			Do you have a standalone PC ?	
	Yes	No	No Such Facilities	Yes	No
	% (n)	% (n)	% (n)	% (n)	% (n)
Bahrain	20 (17)	60 (50)	20 (17)	32 (27)	68 (57)
UK	49 (17)	31 (11)	20 (7)	61 (22)	39 (14)

Table 5.3 Terminal or PC Availability (Breakdown by Managerial Level).

Managerial Level and Country	Do you have a terminal or a PC connected to the main computer to access to the information you require?			Do you have a standalone PC ?	
	Yes	No	No Such Facilities	Yes	No
	% (n)	% (n)	% (n)	% (n)	% (n)
BAHRAIN					
Group One	6 (5)	24 (20)	6 (5)	11 (9)	26 (22)
Group Two	12 (10)	1 (1)	0 (0)	12 (10)	1 (1)
Group Three	2 (2)	35 (29)	14 (12)	9 (8)	40 (34)
TOTAL	20 (17)	60 (50)	20 (17)	32 (27)	68 (57)
UK					
Group One	15 (5)	17 (6)	6 (2)	11 (4)	25 (9)
Group Two	25 (9)	6 (2)	6 (2)	25 (9)	11 (4)
Group Three	9 (3)	8 (3)	8 (3)	25 (9)	3 (1)
TOTAL	49 (17)	31 (11)	20 (7)	61 (22)	39 (14)

This latter table shows that information systems personnel (Group 2) in both countries were most likely to have a terminal or PC to access information.

Respondents were also asked to indicate if they had a standalone PC. Table 5.2 shows that the majority of the Bahraini sample (68%) indicated that they 'do not have' a standalone PC in their offices, while in the UK the majority (61%) said they 'do have' a standalone PC. This indicates that the UK managers were more likely to have a standalone PC than their counterparts in Bahrain. In particular the figures indicate that

Group 2 and Group 3 managers in the UK have a greater opportunity to have a PC.

MIS Function

The respondents were asked how their MIS functions are structured with regard to management and systems development personnel. Table 5.4 summarises the results.

Table 5.4 Structure of MIS Function.

MANAGERIAL LEVEL	O P T I O N S					ROW TOTAL
	1	2	3	4	5	
BAHRAIN						
Group One	17%	5%	5%	0%	11%	38%
Group Two	12%	0%	1%	0%	0%	13%
Group Three	13%	1%	4%	5%	27%	49%
TOTAL	42%	6%	10%	5%	38%	100%
UK						
Group One	14%	8%	6%	3%	5%	36%
Group Two	13%	6%	11%	0%	6%	36%
Group Three	6%	0%	5%	11%	6%	28%
TOTAL	33%	15%	22%	14%	17%	100%

Five options were given and respondents were asked to tick the one that most closely described their organisation. *Option one: One centralised MIS organisation to support the entire enterprise.* The result showed that 42% of Bahraini respondents specified this option as well as 33% of the UK respondents. *Option two: Each division/department has its own independent MIS section.* 6% of Bahraini respondents specified this option and 14% in the UK. *Option three: Each division/department has its own MIS section, but these report to the corporate MIS organisation.* In Bahrain 10% specified this option compared with 22% in the UK. *Option four: None of the above (Please specify briefly).* In this option the respondent has the opportunity to specify any other structure not included in the above options. The result showed that 5% of Bahrain respondents specified options other than those set out above whilst 14% in the UK responded similarly. *Option five: Do not have an MIS function.* 37%

of Bahraini respondents specified this option compared with 17% in the UK. Table 5.4 gives more details and a breakdown for each managerial level.

MIS Installed

The respondents were asked in question 22 to state whether they have a computerised MIS installed in their organisation or not. This question was used to direct the respondents to certain related questions (as already noted in section 4.5). In Bahrain a majority (62%) said there was no computerised MIS installed, while in the UK a majority (72%) of the respondents said there was a computerised MIS installed in their organisations. Table 5.5 is an overall analysis of the responses, while table 5.6 shows the breakdown by managerial level.

Table 5.5 Computerised MIS Installed.

COUNTRY	YES		NO		TOTAL		MEAN	MODE
	%	n	%	n	%	n		
BAHRAIN	38	32	62	53	100	85	1.647	2
UK	72	26	28	10	100	36	1.278	1
Note: For the purpose of this table: 1= Yes 2= No								

Table 5.6 Computerised MIS Installed (Breakdown by Managerial Level).

MANAGERIAL LEVEL	YES		NO		TOTAL	
	%	n	%	n	%	n
BAHRAIN						
Group One	15	13	20	17	35	30
Group Two	10	8	4	3	14	11
Group Three	13	11	38	32	51	43
TOTAL	38	32	62	52	100	84
UK						
Group One	36	13	0	0	36	13
Group Two	22	8	14	5	36	13
Group Three	14	5	14	5	28	10
TOTAL	72	26	28	10	100	36

System Development

Respondents who said they had a computerised MIS were asked to identify how their current MIS was developed. The analysis in table 5.7 presents the responses from the two countries. In Bahrain 29% and in the UK 33% indicated it was developed by departmental MIS staff; 13% of Bahraini and 33% of UK respondents stated outside consultants were employed; 18% of Bahraini and 31% of UK respondents indicated development was undertaken by headquarters MIS staff, while 2% of Bahraini and 31% of the UK responses indicated development by vendors.

Table 5.7 Source of MIS Development Expertise.

COUNTRY	Departmental MIS Staff % (n)	Outside Consultants % (n)	Headquarters MIS Staff % (n)	Vendor % (n)	Others % (n)
BAHRAIN	29 (25)	13 (11)	18 (15)	2 (2)	2 (2)
UK	33 (12)	33 (12)	31 (11)	31 (11)	8 (3)

Computerised Systems

Tables 5.8 and 5.9 show, from the responses to question 53, the extent to which hospital systems in both countries were computerised. The systems were ranked in order to find the level of computerisation in each country. To simplify the statistical analyses and for the purpose of this table, note that N= not at all and to a small degree, M= to a moderate degree and F= fully computerised (to a large and maximally/essential).

Respondents Comments

In the last question of the questionnaire the respondents were given the opportunity to make any further comments they wished regarding MIS and 19 (7 from the UK and 12 from Bahrain) availed themselves of the opportunity. It was difficult to draw any conclusion from the comments.

Table 5.8 Level of Computerisation.

QUESTIONNAIRE ITEMS	BAHRAIN					UK				
	N	M	F	Mean	Rank	N	M	F	Mean	Rank
Payroll	21%	25%	54%	3.68	1	0%	10%	90%	4.79	1
In-Patients	32%	22%	46%	3.29	2	4%	4%	92%	4.76	2
Stores	27%	33%	40%	3.29	2	7%	23%	70%	4.27	4
Patient Administration System (PAS)	29%	37%	34%	3.10	4	0%	39%	61%	4.23	5
Patient Master Index (PMI)	40%	29%	31%	2.84	5	20%	12%	68%	3.96	7
Personnel	60%	10%	30%	2.40	6	14%	38%	48%	3.69	11
Out-Patients	66%	11%	23%	2.14	7	64%	9%	27%	2.27	17
Administration	64%	18%	18%	2.08	8	64%	32%	4%	1.82	19
Works	63%	25%	12%	2.0	9	15%	31%	54%	3.77	10
Psychiatric Care	61%	29%	10%	1.97	10	65%	22%	13%	1.96	18
Catering & Hotel	78%	15%	7%	1.59	11	48%	30%	22%	2.48	14
Maternity Care	81%	9%	10%	1.56	12	24%	28%	48%	3.48	13
Waiting Lists	83%	7%	10%	1.53	13	82%	5%	13%	1.64	20
Accident & Emergency (A & E)	83%	7%	10%	1.53	13	59%	9%	32%	2.46	15
Intensive Care	83%	7%	10%	1.53	13	57%	14%	29%	2.43	16
X-Ray	81%	14%	5%	1.50	16	16%	20%	64%	3.96	7
Pharmacy	87%	10%	6%	1.45	17	14%	24%	62%	3.97	6
Pathology	84%	10%	6%	1.45	17	3%	17%	80%	4.54	3
Radiology	83%	11%	6%	1.44	19	25%	25%	50%	3.50	12
Nursing	84%	10%	6%	1.44	19	94%	6%	0%	1.13	21
Community Care	86%	10%	4%	1.35	21	10%	33%	57%	3.95	9
Day Care	87%	10%	3%	1.33	22	100%	0%	0%	1.00	22

Table 5.9 Level of Computerisation (Breakdown by Managerial Level).

QUESTIONNAIRE ITEMS	BAHRAIN									UK								
	% Group 1			% Group 2			% Group 3			% Group 1			% Group 2			% Group 3		
	N	M	F	N	M	F	N	M	F	N	M	F	N	M	F	N	M	F
Payroll	6	24	70	67	33	0	19	24	57	0	8	92	0	17	83	0	0	100
In-Patients	33	7	60	33	33	34	30	30	40	11	0	89	0	8	92	0	0	100
Stores	35	40	25	33	50	17	17	22	61	0	33	67	15	23	62	0	0	100
Patient Administration System (PAS)	27	40	33	33	50	17	30	30	40	0	55	45	0	42	58	0	13	87
Patient Master Index (PMI)	53	40	7	17	17	67	35	24	41	38	12	50	8	8	84	20	20	60
Personnel	63	13	25	83	17	0	50	6	44	25	25	50	8	50	42	0	40	60
Out-Patients	60	7	33	100	0	0	60	20	20	57	0	43	89	0	11	33	33	34
Administration	81	6	13	80	20	0	44	28	28	56	44	0	73	18	9	50	50	0
Works	62	31	8	100	0	0	53	27	20	27	27	46	0	36	64	25	25	50
Psychiatric Care	67	20	13	67	17	17	50	50	0	63	25	13	64	18	18	75	25	0
Catering & Hotel	75	25	0	100	0	0	70	10	20	60	20	20	40	40	20	33	33	34
Maternity Care	86	7	7	80	20	0	77	8	15	33	22	44	18	18	64	20	60	20
Waiting Lists	87	0	13	100	0	0	73	18	9	86	14	0	82	0	18	75	0	25
Accident & Emergency (A & E)	86	0	14	80	20	0	82	9	9	60	0	40	70	0	30	43	29	28
Intensive Care	85	8	8	100	0	0	75	8	17	33	0	67	80	10	10	40	40	20
X-Ray	79	14	7	67	33	0	88	6	6	11	22	67	18	18	64	20	20	60
Pharmacy	86	14	0	83	17	0	82	0	18	0	18	82	0	17	83	17	17	66
Pathology	86	7	7	100	0	0	73	18	9	9	27	64	8	17	75	33	33	34
Radiology	86	7	7	83	17	0	81	13	6	22	33	45	25	17	58	29	29	42
Nursing	86	14	0	100	0	0	77	8	15	100	0	0	88	12	0	100	0	0
Community Care	87	13	0	100	0	0	78	11	11	13	38	50	9	36	55	0	0	00
Day Care	86	14	0	100	0	0	82	9	9	100	0	0	100	0	0	100	0	0

5.3 Analysis of the Key Elements

Many of the questions are relevant to more than one key element as explained earlier in section 4.5.

In the following analysis each key element will be discussed separately. Therefore to find the level of importance of each question it was necessary to calculate the total mean values of responses to each question. Thus the mean values were ranked in order to determine the most important question for each key element. To simplify the statistical analysis procedures it was decided to classify the responses on a scale which measured respondents level of agreement (see Appendix 5 for further details). These were formed into a scale as follows: Disagree contains responses 'Not at all' and 'To a small degree', Moderate represents agreement defined as 'To a Moderate degree', whilst Strongly Agree represents agreement as measured by 'To a Large degree' and 'Maximally / Essential'.

In the following tables if a question is marked with an asterisk (*) it indicates that this question could be analysed as a secondary feature for this key element (see section 4.5 for further details) but that it would not be analysed for this key element. If the rank column is marked with ampersand (@) it indicates that this question is not included for ranking purposes. It is important to note that the ordering of the data presented in the tables is based upon the rankings generated by the data gathered in the survey conducted in Bahrain. For certain analyses the following key is used: B= Better; W= Worse and N= No change.

The data gathered from the questionnaires were analysed in two phases. The first phase was concerned with analysing and identifying respondents' opinions and their

likely level of agreement with the research hypotheses. For this phase the number of respondents in each level agreeing with a question was calculated and used to determine mean values. These mean values were used to indicate the level of agreement, for instance, mean values of less than 3 indicated a disagreement, mean values of equal to 3 and less than 4 indicated moderate agreement and those equal to or greater than 4 indicated strong agreement. The second phase of data analysis involved comparing the different managerial levels and their likely level of agreement with the research hypotheses.

5.3.1 Determination Of Corporate Needs

This key element was concerned to find the importance of determining of corporate needs. Corporate needs are concerned with defining the strategic aims and long term objectives of the organisation. Determination deals with establishing corporate needs and gauging the extent to which MIS can fulfil these needs. Tables 5.10 and 5.11 summarise the results for this key element.

Table 5.10 Determination of Corporate Needs.

QUESTION NUMBER	BAHRAIN					UK				
	D	M	S	Mean	Rank	D	M	S	Mean	Rank
28	6%	8%	86%	4.60	1	0%	0%	100%	5.0	1
23	8%	12%	80%	4.43	2	0%	10%	90%	4.8	2
24	8%	12%	80%	4.43	2	0%	10%	90%	4.8	2
15 *	8%	18%	74%	4.30	4	17%	28%	55%	3.79	6
16 *	14%	25%	61%	3.93	5	18%	23%	59%	3.82	5
17	21%	12%	67%	3.91	6	15%	12%	73%	4.18	4
20	18%	20%	62%	3.89	7	60%	26%	14%	2.90	7
34	20%	37%	43%	3.47	8	46%	27%	27%	2.62	8
14	30%	28%	42%	3.25	9	Respondents in the UK were asked to ignore this question				
37	31%	31%	38%	3.13	10	59%	32%	9%	2.0	9

Table 5.11 Determination of Corporate Needs (Breakdown by Managerial Level).

QUESTION NUMBER	BAHRAIN									UK								
	% Group 1			% Group 2			% Group 3			% Group 1			% Group 2			% Group 3		
	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S
28	12	6	82	0	0	100	3	10	87	0	0	100	0	0	100	0	0	100
23	6	18	76	0	0	100	10	10	80	0	0	100	0	0	100	0	20	80
24	6	18	76	0	0	100	10	10	80	0	0	100	0	0	100	0	20	80
15 *	19	26	55	0	9	91	2	15	83	8	31	61	23	39	38	20	10	70
16 *	0	46	54	25	0	75	29	14	57	27	27	46	13	13	75	0	33	67
17	15	15	70	9	9	82	29	10	61	23	8	69	0	8	92	25	25	50
20	27	17	57	9	27	64	13	21	66	62	23	15	67	17	16	50	40	10
34	38	31	3	25	13	62	25	50	25	82	18	0	43	43	14	25	50	25
14	28	35	37	18	36	46	35	20	45	Respondents in the UK were asked to ignore this question								
37	38	31	31	25	13	62	25	50	25	82	18	0	43	43	14	25	50	25

It can be seen from table 5.10 (question 28) that the respondents in both countries, 86% in Bahrain and 100% in the UK, strongly supported the view that MIS should have an effective strategy to deliver useful, integrated decision support systems for its users. Table 5.11 shows the proportion of respondents within each level who strongly agreed with this statement and produced the following statistics: for Group 1 managers 82% of Bahraini and 100% of the UK respondents strongly agreed, whilst for Group 2 managers 100% of respondents in both countries agreed with this statement, and, finally, for Group 3 managers the level of agreement was 87% in Bahrain and 100% in the UK.

It can also be seen from table 5.10 (question 23) that of the respondents in both countries

who stated there was no MIS installed in their organisations, 80% in Bahrain and 90% in the UK, strongly agreed with the fact that there was a need for MIS in their organisations. In table 5.11, the proportion of managers within each level who strongly agreed with a need for MIS within their organisations can be broken down as follows: for Group 1 managers 76% of Bahraini and 100% of the UK respondents strongly agreed, whilst for Group 2 managers 100% of respondents in both countries agreed with this statement and, finally, for Group 3 managers the level of agreement was 80% for both countries.

From table 5.10 (question 24) one can see that the majority of respondents in both countries, 80% in Bahrain and 90% in the UK, strongly believe it is important for their organisations to have MIS. Table 5.11 shows the proportion of managers within each level who strongly support this statement: for Group 1 managers 76% of Bahraini and 100% of the UK respondents strongly agreed, whilst for Group 2 managers 100% of respondents in both countries agreed with this statement and, finally, for Group 3 managers the level of agreement was 80% in Bahrain and 100% in the UK.

Table 5.10 (question 17) shows that of the respondents in both countries, 67% in Bahrain and 73% in the UK, strongly supported the view that MIS investments that are not in support of corporate strategy will not help achieve corporate strategic goals. Table 5.11 shows the proportion of managers within each level who strongly agreed with this statement: for Group 1 managers 70% of Bahraini and 69% of the UK respondents strongly agreed, whilst for Group 2 managers 82% of Bahraini and 92% of the UK respondents strongly agreed, and, finally, 61% of Bahraini and 50% of UK Group 3 managers were in strong agreement.

When respondents of both countries were asked whether the installation of MIS should

reduce the running costs of their organisation, it can be seen from the tables that there is a significant difference in the degree of agreement between managerial levels of both countries. The analysis for question 20 in table 5.10 shows that 62% of Bahraini but only 14% of the UK strongly agreed with this statement. Table 5.11 shows the managerial breakdown was similar. For Group 1 managers 57% of respondents agreed with this in Bahrain and 15% in the UK, whilst for Group 2 managers the level of agreement was 64% in Bahrain and 16% in the UK, and, finally, for Group 3 managers the level of agreement was 66% in Bahrain and 10% in the UK.

The analysis of question 34 in table 5.10 shows that 43% of the Bahraini respondents and 27% of the UK respondents support the claim that MIS is designed to support all levels of management in the organisation. Table 5.11 summarises the breakdown by managerial level.

When the Bahraini respondents were asked if there was a need for Arabisation of MIS, table 5.10 (question 14) shows that 42% felt strongly that there was a need for Arabisation of MIS. In table 5.11 the proportion of management within each level which strongly agreed with this statement was: 37% of Group 1 managers strongly agreed, 46% of Group 2 and 45% of Group 3.

Table 5.10 (question 37) also shows that 38% of Bahraini but only 9% of UK respondents felt that increasing MIS expenditure yielded higher management performance. It is clear from table 5.10 that the UK respondents strongly disagree with this statement, especially those in Group 1 (see table 5.11).

The survey results indicate that managers consider there is an important need for MIS which has an effective strategy to deliver useful, integrated decision support systems

which are designed to support all levels of management, and for MIS investment to achieve strategic corporate goals. The data from this part of the survey show that managers in both countries are significantly in favour of determining corporate needs first. It is important to determine corporate needs as a starting point for MIS development.

5.3.2 Management Commitment

Key element two is concerned with the level of management commitment to developing MIS and the importance attached by management at different levels to computerised MIS.

Tables 5.12 and 5.13 provide a summary of the analysis of the responses for this key element.

Table 5.12 Management Commitment.

QUESTION NUMBER	BAHRAIN					UK				
	D	M	S	Mean	Rank	D	M	S	Mean	Rank
21	0%	5%	95%	4.90	1	0%	8%	92%	4.83	1
19 *	0%	12%	88%	4.76	2	6%	26%	68%	4.26	3
40 *	9%	14%	77%	4.37	3	12%	19%	69%	4.15	5
29	2%	29%	69%	4.35	4	10%	20%	70%	4.20	4
27*	10%	14%	76%	4.31	5	20%	10%	70%	4.00	7
18*	12%	16%	72%	4.19	6	6%	14%	80%	4.50	2
39	6%	46%	48%	3.85	7	32%	24%	44%	3.24	8
41	15%	32%	53%	3.77	8	32%	28%	40%	3.16	9
34*	12%	34%	49%	3.47	9	46%	27%	27%	2.62	11
42*	32%	27%	41%	3.18	10	38%	29%	33%	2.92	10
37*	31%	31%	38%	3.13	11	59%	32%	9%	2.00	12
16*	47%	29%	24%	2.53	12	8%	31%	61%	4.06	6

Table 5.13 Management Commitment (Breakdown by Managerial Level).

QUESTION NUMBER	BAHRAIN									UK								
	% Group 1			% Group 2			% Group 3			% Group 1			% Group 2			% Group 3		
	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S
21	0	10	90	0	0	100	0	3	97	0	8	92	0	8	92	0	10	90
19 *	0	19	81	0	9	91	0	8	92	8	46	46	8	23	69	0	0	100
40 *	13	13	75	0	11	89	10	20	70	15	15	70	0	25	75	20	20	60
29	0	50	50	0	0	100	3	20	77	0	0	100	0	20	80	20	20	60
27*	18	6	76	0	50	50	7	17	76	0	0	100	0	20	80	40	0	60
18*	10	16	74	0	0	100	18	21	61	8	23	69	0	0	100	10	20	70
39	0	53	47	13	37	50	10	40	50	33	25	42	25	25	50	40	20	40
41	12	44	44	11	22	67	22	22	56	42	25	33	13	32	50	40	20	40
34*	19	38	43	13	25	62	33	50	17	62	23	15	38	12	50	20	60	20
42*	44	38	18	11	11	78	33	22	45	50	42	8	13	13	75	50	25	25
37*	38	31	31	25	13	62	25	50	25	82	18	0	43	43	14	25	50	25
16*	60	20	20	18	36	46	46	33	21	8	31	61	23	39	38	20	10	70

It can be seen from table 5.12 (question 21) that the majority of respondents in both countries agreed with the statement that management should actively promote training in computerised MIS for potential users of MIS and ranked it as number one for this key element. It can also be seen from table 5.13 that the proportion of managers within each level which strongly support this statement was as follows: for Group 1 managers 90% of Bahraini and 92% of the UK respondents strongly agreed, whilst for Group 2 managers 100% of Bahraini and 92% of the UK respondents strongly agreed, and, finally, for Group 3 managers the level of agreement was 97% in Bahrain and 90% in the UK.

As can be seen in table 5.12 (question 29) the majority of respondents in both countries moderately/strongly agreed on the level of importance they attached to management

commitment and involvement in the design and development of MIS. The overall percentages were 98% for Bahrain and 90% for the UK. In table 5.13 the proportion of managers within each level who had moderately/strongly held views with regard to this question were: for Group 1 and Group 2 managers 100% of respondents in both countries were agreed on this question, whilst for Group 3 managers the level of agreement was 97% in Bahrain and 80% in the UK.

Respondents were also asked for their opinion of management support and commitment to MIS development. Table 5.12 (question 39) shows that 48% in Bahrain and 44% in the UK strongly believed their support was adequate. The breakdown of the positive responses by managerial level as shown in table 5.13 was 47% of Group 1 in Bahrain and 42% in the UK, 50% of Group 2 in Bahrain and 50% in the UK, and, finally, 50% of Group 3 in Bahrain and 40% in the UK.

Table 5.12 (question 41) shows that of all respondents, 53% in Bahrain and 40% in the UK, felt that in comparison to other projects within the organisation, management placed a high priority on the development of MIS. From table 5.13 it can be seen that for Group 1 managers 44% of respondents agreed with this in Bahrain and 33% in the UK, whilst for Group 2 managers the level of agreement was 67% in Bahrain and 50% in the UK, and, finally, for Group 3 managers 56% of the Bahraini respondents and 40% of the UK agreed.

From the results of the survey it is clear that managers endorse the claim that management commitment and support is essential for developing MIS.

5.3.3 User Attitudes and Expectations

This key element is concerned with discovering if users possess attitudes which are for or against MIS as well as their expectations from MIS.

Table 5.14 and table 5.15 provide a summary of the analysis of the responses for this key element.

Table 5.14 User Attitudes and Expectations.

QUESTION NUMBER	BAHRAIN					UK				
	D	M	S	Mean	Rank	D	M	S	Mean	Rank
19	0%	12%	88%	4.76	1	6%	26%	68%	4.26	7
28*	6%	8%	86%	4.60	2	0%	0%	100%	5.00	1
23*	8%	12%	80%	4.43	3	0%	10%	90%	4.80	2
24*	8%	12%	80%	4.43	3	0%	10%	90%	4.80	2
25	8%	12%	80%	4.43	3	9%	9%	82%	4.46	6
38	11%	9%	80%	4.37	6	4%	12%	84%	4.60	4
40	6%	46%	48%	4.37	6	12%	19%	69%	4.15	9
29*	2%	29%	69%	4.35	8	10%	20%	70%	4.20	8
27*	10%	14%	76%	4.31	9	20%	10%	70%	4.00	11
15	8%	18%	74%	4.30	10	17%	28%	55%	3.78	13
18	12%	16%	72%	4.19	11	6%	14%	80%	4.50	5
26	9%	26%	65%	4.13	12	33%	11%	56%	3.44	15
44*	14%	25%	61%	3.93	13	18%	23%	59%	3.82	12
20*	18%	20%	62%	3.89	14	60%	26%	14%	2.09	23
34	20%	37%	43%	3.47	15	46%	27%	27%	2.62	20
31	36%	9%	55%	3.36	16	30%	35%	35%	3.08	16
36	31%	23%	46%	3.29	17	42%	25%	33%	2.83	17
43*	37%	14%	49%	3.23	18	28%	12%	60%	3.64	14
37*	31%	31%	38%	3.13	19	59%	32%	9%	2.00	24
51	31%	31%	38%	3.11	20	30%	48%	22%	2.83	17
30	31%	36%	33%	3.06	21	54%	35%	11%	2.15	22
45*	22%	53%	25%	3.06	21	40%	36%	24%	2.68	19
46*	32%	35%	33%	3.00	23	54%	15%	31%	2.54	21
16	48%	29%	23%	2.53	24	8%	31%	61%	4.06	10
32	No 79%		Yes 21%		@	No 92%		Yes 8%		@
50*	B 75%	W 3%	N 22%		@	B 60%	W 12%	N 28%		@
47*	79%	3%	18%		@	63%	4%	33%		@

Table 5.15 User Attitudes and Expectations (Breakdown by Managerial Level).

QUESTION NUMBER	BAHRAIN									UK								
	% Group 1			% Group 2			% Group 3			% Group 1			% Group 2			% Group 3		
	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S
19	0	19	81	0	9	91	0	8	92	8	46	46	8	23	69	0	0	100
28*	12	6	82	0	0	100	3	10	87	0	0	100	0	0	100	0	0	100
23*	6	12	82	0	0	100	10	13	77	0	0	100	0	0	100	0	20	80
24*	6	18	76	0	0	100	10	10	80	0	0	100	0	0	100	0	20	80
25	6	12	82	0	0	100	10	13	77	100	0	0	0	0	100	0	20	100
38	13	6	81	0	11	89	20	10	70	0	17	83	0	0	100	20	20	60
40	13	13	75	0	11	89	10	20	70	15	15	70	0	25	75	20	20	60
29*	0	50	50	0	0	100	3	20	77	0	0	100	0	20	80	20	20	60
27*	18	6	76	0	50	50	7	17	76	0	0	100	0	20	80	40	0	60
15	19	26	55	0	9	91	2	15	83	8	31	61	23	39	38	20	10	70
18	10	16	74	0	0	100	18	21	61	8	23	69	0	0	100	10	20	70
26	14	50	36	0	0	100	7	17	76	0	0	100	20	20	60	50	0	50
44*	0	46	54	25	0	75	29	14	57	27	27	46	13	13	75	0	33	67
20*	27	17	57	9	27	64	13	21	66	62	23	15	67	17	16	50	40	10
34	19	38	43	13	25	62	33	50	17	62	23	15	38	12	50	20	60	20
31	31	13	56	33	11	56	50	0	50	46	46	8	13	37	50	20	0	80
36	31	31	38	22	22	56	40	10	50	58	25	17	25	38	37	25	0	75
43*	38	19	43	11	11	78	60	10	30	42	8	50	0	25	75	40	0	60
37*	0	46	54	25	0	75	29	14	57	82	18	0	43	43	14	25	50	25
51	43	36	21	11	22	67	33	33	34	33	50	17	29	43	28	25	50	25
30	29	41	30	33	22	45	30	40	30	85	15	0	25	50	25	20	60	20
45*	20	60	20	33	44	23	13	50	37	50	42	8	25	38	38	40	20	40
46*	37	44	19	33	33	34	22	22	56	62	15	23	38	25	37	60	0	40
16	60	20	20	18	36	46	46	33	21	8	31	61	23	39	38	20	10	70
32	No 100		Yes 0	No 78		Yes 22	No 80		Yes 20	No 92		Yes 8	No 87		Yes 13	No 100		Yes 0
50*	B 69	W 6	N 25	B 78	W 0	N 22	B 82	W 0	N 18	B 62	W 8	N 30	B 57	W 29	N 14	B 60	W 0	N 40
47*	69	6	25	89	0	11	88	0	12	50	8	42	86	0	14	60	0	40

The respondents were asked about the importance of computing in the search for greater efficiency. Table 5.14 (question 19) shows that 88% in Bahrain and 68% in the UK were agreed on its importance. Question 19 in table 5.15 summarises the breakdown of agreement by managerial level.

In order to find the level of importance attached to MIS by the respondents they were asked how highly they valued MIS. Table 5.14 (question 25) shows that 80% in Bahrain and 82% in the UK were agreed on the value of MIS. Table 5.15 shows that

the proportion of managers within each level who strongly agreed with this was as 82% of managers from Group 1 in Bahrain but none in the UK, whilst for Group 2 managers 100% of respondents in both countries agreed. Finally for Group 3 managers the level of agreement was 77% in Bahrain and 100% in the UK. The significant differences between the managerial levels in the UK and Bahrain may be attributed due to differing levels of experience and, hence, perception of MIS capabilities.

Table 5.14 (question 38) shows that 80% of all respondents in Bahrain and 84% in the UK were in strong agreement that ease of system use is more important than sophistication, with the breakdown by managerial level given in table 5.15.

Question 40 aimed to determine respondents opinions on whether MIS specialists should be actively involved in corporate planning and table 5.14 shows 70% of Bahraini and 60% of UK respondents were in strong agreement that the MIS specialists should be involved in corporate planning. The analysis of question 40 in table 5.15 summarises the breakdown by managerial level.

When they were asked whether it is important for every manager to have a terminal or a PC connected to the main computer to access information, table 5.14 (question 15) shows 74% in Bahrain and 55% in the UK were in strong agreement, with table 5.15 summarising the breakdown by managerial level.

From table 5.14 (question 18) one can see that the majority of respondents in both countries, 88% in Bahrain and 94% in the UK, moderately/strongly believe that executives are more interested in results and information that clarifies goals than in how the information is obtained. Question 18 in table 5.15 shows the proportion of

managers within each level who strongly support this statement: for Group 1 managers 74% of Bahraini and 69% of the UK respondents strongly agreed, whilst for Group 2 managers 100% of respondents in both countries agreed with this statement. Finally, for Group 3 managers the level of agreement was 61% in Bahrain and 70% in the UK.

The respondents were asked how highly they would rate the probability of MIS being a success in their organisation in the future and table 5.14 (question 26) shows 65% of Bahraini and 56% of UK respondents maintaining that MIS would be a success in their organisations. However, of the Bahraini managers who stated that they have an MIS about half indicated that the MIS is not a success in their organisations. This difference between actual experience and future expectations is discussed later in section 6.2.3. Question 26 in table 5.15 gives the breakdown by managerial level.

When they were asked if MIS was designed to support all levels of management, table 5.14 shows 43% of Bahraini and 27% of UK respondents strongly agreed but the UK figures show that there are more respondents who disagree. The breakdown by managerial level is given in table 5.15.

Question 31 in table 5.14 shows 55% of Bahraini and 35% of UK respondents use MIS to a high extent. Table 5.15 shows the proportion of managers within each level who strongly agree: for Group 1 managers 56% of Bahraini but only 8% of the UK respondents strongly agreed, whilst for Group 2 managers 56% of respondents in Bahrain and 50% in the UK agreed. Finally, for Group 3 managers the level of agreement was 50% in Bahrain and 80% in the UK.

Table 5.14 (question 36) shows that 46% of Bahraini and 33% of UK respondents strongly agreed with the statement that the use of MIS has resulted in improved user

decision making. Table 5.15 (question 36) shows the proportion of managers within each level who agreed: for Group 1 managers 38% of Bahraini and 17% of UK respondents agreed, whilst for Group 2 managers 56% of Bahraini and 37% of UK agreed and, finally, for Group 3 managers the proportion was 50% in Bahrain and 75% in the UK.

When they were asked whether MIS has changed the attitudes of users to computer systems, table 5.14 (question 51) shows 38% of Bahraini and 22% of the UK respondents were in strong agreement with this claim. Table 5.15 shows the proportion of managers within each level who agreed: for Group 1 managers 21% of Bahraini and 17% of the UK respondents agreed, whilst for Group 2 managers 67% of the Bahraini and 28% in the UK agreed and, finally, for Group 3 managers the proportion was 34% in Bahrain and 25% in the UK.

When the respondents were asked to determine whether they were satisfied with their current MIS, table 5.14 (question 30) shows 33% of Bahraini and 11% of the UK respondents were well satisfied. These figures suggest that respondents in both countries were not satisfied with their existing MIS systems and that there were more dissatisfied managers in the UK. Question 30 in table 5.15 summarises the breakdown by managerial level. These results are similar to those for question 26.

Respondents in both countries were asked whether they agreed with the claim that some managers are afraid of computerisation. It can be seen from table 5.14 (question 16) that the mean for Bahraini respondents was 2.53, indicating that the Bahraini respondents disagree with this statement, while in the UK the calculated mean was 4.06, indicating that the UK responses were strongly in favour of this statement. Table 5.15 provides an analysis of the responses by managerial level. It can be seen from

this table that in Bahrain 60% of Group 1, 18% of Group 2 and 46% of Group 3 **strongly disagree** with the statement that certain managers are afraid of computerisation, while in the UK 61% of Group 1, 38% of Group 2 and 70% of Group 3 **strongly agree** with the claim. It can be seen from the analysis that the Bahraini managers were more negative about this claim, which indicates they do not fear computers, while the UK respondents support the opposite view.

The respondents were also asked whether a satisfaction survey had been carried out. Table 5.14 (question 32) shows 79% of the Bahraini and 92% of the UK managers indicated **no such survey** had been conducted in their organisations. Question 32 in table 5.15 shows that: for Group 1 managers 100% of Bahraini and 92% of the UK respondents said no such survey had been conducted, whilst for Group 2 managers 78% of Bahraini and 87% of the UK said no, and, finally, for Group 3 managers 80% of Bahraini and 100% of the UK respondents indicated that no such survey was conducted in their organisations.

The survey found that the majority of Bahraini managers questioned had a more negative attitude to the claim that some managers are afraid of computers, while their UK counterparts expressed the opposite view. The majority of respondents in both countries were in agreement with the statement of the importance of computing in the search for greater efficiency. The survey also indicated that managers had a preference for accessing computerised information from the main computer. Managers from both countries regarded MIS as highly valuable. The survey data suggested that computerised systems do not change the attitudes of their users. The majority of respondents felt that it was likely that MIS would be a success in their organisations. The current survey found that the MIS may not improve user decision making. However, respondents were not satisfied with their current MIS. It was discovered

that user satisfaction surveys had not been undertaken. The survey data indicated that ease of system use was of greater importance than sophistication.

It is clear from the above responses that User Attitudes and Expectations are important and will influence MIS development. These attitudes and expectations are affected by previous experience and must be explored before users can be effectively involved in the development process.

5.3.4 User Involvement

User Involvement, deals with how and when users ought to actively participate in MIS development and also relates to the influence that users can/should bring to bear on such development. Tables 5.16 and 5.17 provide a summary analysis of the responses for this key element.

Table 5.16 User Involvement.

QUESTION NUMBER	BAHRAIN					UK				
	D	M	S	Mean	Rank	D	M	S	Mean	Rank
40*	9%	14%	77%	4.38	1	12%	19%	69%	4.15	2
29*	2%	29%	69%	4.35	2	10%	20%	70%	4.20	1
27	10%	14%	76%	4.31	3	20%	10%	70%	4.00	4
35	33%	15%	52%	3.36	4	15%	15%	70%	4.08	3
43	37%	14%	49%	3.23	5	28%	12%	60%	3.64	5
42	32%	27%	41%	3.18	6	38%	29%	33%	2.92	6
	No		Yes			No		Yes		
33*	79%		21%		@	69%		31%		@

Table 5.17 User Involvement (Breakdown by Managerial Level).

QUESTION NUMBER	BAHRAIN									UK								
	§ Group 1			§ Group 2			§ Group 3			§ Group 1			§ Group 2			§ Group 3		
	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S
40*	13	13	75	0	11	89	10	20	70	15	15	70	0	25	75	20	20	60
29*	0	50	50	0	0	100	3	20	77	0	0	100	0	20	80	20	20	60
27	18	6	76	0	50	50	7	17	76	0	0	100	0	20	80	40	0	60
35	31	25	44	22	0	78	50	13	37	23	15	62	0	13	87	20	20	60
43	38	19	43	11	11	78	60	10	30	42	8	50	0	25	75	40	0	60
42	44	38	18	11	11	78	33	22	45	50	42	8	13	13	75	50	25	25
	No		Yes	No		Yes	No		Yes	No		Yes	No		Yes	No		Yes
33*	80		20	78		22	78		22	77		23	50		50	80		20

Table 5.16 (question 27) shows that 76% of Bahraini and 70% of UK respondents had a strong feeling that the users should be actively involved in MIS planning and application development. Table 5.17 shows the proportion of managers within each level who strongly agreed and gives the following results: for Group 1 76% of Bahraini and 100% of the UK respondents strongly agreed, whilst for Group 2 managers 50% in Bahrain and 80% in the UK agreed, and, finally, for Group 3 managers the level of agreement was 76% in Bahrain and 60% in the UK.

The respondents were also asked if they were familiar with MIS development in their own organisations and question 35 in table 5.16 shows 52% of Bahraini and 70% of the UK respondents indicated familiarity. In table 5.17 the proportion of managers within each level who strongly agreed is shown as: for Group 1 managers 44% of Bahraini and 62% of the UK respondents, for Group 2 managers 78% in Bahrain and 87% in the UK, and, for Group 3 managers 37% in Bahrain and 60% in the UK.

The respondents were asked whether they had been sufficiently informed about MIS. Question 43 in table 5.16 shows 49% of Bahraini and 60% of the UK respondents had been kept informed. From table 5.17 the proportion of managers within each level

who strongly agreed was: for Group 1 43% in Bahrain and 50% in the UK, for Group 2 78% in Bahrain and 75% in the UK and for Group 3 30% in Bahrain and 60% in the UK.

When the respondents were asked about the extent of their participation in the design and development of MIS, question 42 in table 5.16 shows 41% in Bahrain and 33% in the UK said they participated in the design and development of MIS. The breakdown by managerial level is shown in table 5.17 as 18% of Group 1 in Bahrain and 8% in the UK, 78% of Group 2 in Bahrain and 75% in the UK, and 45% of Group 3 in Bahrain and 25% in the UK. It is clear that in both countries at the group 1 managerial level participation was very low.

The statistical analysis shows that users should be actively encouraged to participate in MIS planning and application development. The survey data suggest that familiarity with MIS development had been found to be crucial to success. In particular UK respondents were more adequately informed about MIS development than their Bahraini counterparts. When the respondents were asked about their participation in the design and development of their current MIS it was discovered that their participation was poor in both countries and this appears to correlate with the managers' dissatisfaction with their current MIS. It is clear from both the survey data and the literature that user involvement is a very important key element for the successful development of MIS. However, the effectiveness of User Involvement is strongly influenced by the user's attitudes and expectations in relation to MIS and for this reason both are included in the proposed guidelines.

5.3.5 Performance Measurement

Performance measurement, is concerned with assessing the effects or changes to the functioning of an organisation caused by the introduction of MIS. Tables 5.18 and 5.19 provide the summary analysis for this key element.

Table 5.18 Performance Measurement.

QUESTION NUMBER	BAHRAIN					UK				
	D	M	S	Mean	Rank	D	M	S	Mean	Rank
44*	14%	25%	61%	3.93	1	18%	23%	59%	3.82	1
20*	18%	20%	62%	3.89	2	60%	26%	14%	2.09	4
45	22%	53%	25%	3.06	3	40%	36%	24%	2.68	2
46	32%	35%	33%	3.00	4	54%	15%	31%	2.54	3
	No		Yes			No		Yes		
32	79%		21%		@	92%		8%		@
33	79%		21%		@	69%		31%		@
	B	W	N			B	W	N		
50	75%	3%	22%		@	60%	12%	28%		@
47	79%	3%	18%		@	63%	4%	33%		@

Table 5.19 Performance Measurement (Breakdown by Managerial Level).

QUESTION NUMBER	BAHRAIN									UK								
	% Group 1			% Group 2			% Group 3			% Group 1			% Group 2			% Group 3		
	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S
44*	0	46	54	25	0	75	29	14	57	27	27	46	13	13	75	0	33	67
20*	27	17	57	9	27	64	13	21	66	62	23	15	67	17	16	50	40	10
45	20	60	20	33	44	23	13	50	37	50	42	8	25	38	38	40	20	40
46	37	44	19	33	33	34	22	22	56	62	15	23	38	25	37	60	0	40
	No		Yes	No		Yes	No		Yes	No		Yes	No		Yes	No		Yes
32	100		0	78		22	80		20	92		8	87		13	100		0
33	80		20	78		22	78		22	77		23	50		50	80		20
	B	W	N	B	W	N	B	W	N	B	W	N	B	W	N	B	W	N
50	69	6	25	78	0	22	82	0	18	62	8	30	57	29	14	60	0	40
47	69	6	25	89	0	11	88	0	12	50	8	42	86	0	14	60	0	40

When the respondents were asked to rate the overall performance of their MIS, table 5.18 (question 45) shows 25% of Bahraini and 24% of UK respondents rated the overall performance highly, while the majority of responses were in the moderate to low range. Question 45 in table 5.19 shows that the proportion of managers within each level who strongly agreed was as follows: for Group 1 managers 20% of Bahraini and 8% of the UK respondents strongly agreed, whilst for Group 2 managers 23% in Bahrain and 38% in the UK strongly agreed, and, finally, for Group 3 managers the level of agreement was 37% in Bahrain and 40% in the UK.

Respondents were asked whether MIS has changed the way in which operations are performed and table 5.18 (question 46) shows 33% of Bahraini and 31% of UK respondents indicated a strong agreement with the view that operations have changed, while the majority of respondents in both countries were unsure whether it had changed at all. Question 46 in table 5.19 shows the proportion of managers within each level who strongly agreed was: for Group 1 managers, 19% of Bahraini and 23% of UK respondents strongly agreed, whilst for Group 2 managers, the figure was 34% in Bahrain and 23% in the UK, and, finally, for Group 3 managers the level of agreement was 56% in Bahrain and 40% in the UK.

The respondents were also asked if they have an MIS organisation, and if it issues regular reports on its performance. Table 5.18 (question 33) shows that 79% of Bahraini and 69% of UK respondents said no such reporting takes place. Question 33 in table 5.19 shows that the proportion of managers within each level who indicated no such reporting takes place was: for Group 1 80% of Bahraini and 77% of the UK respondents, for Group 2 managers 78% in Bahrain and 50% in the UK, and, for Group 3 managers 78% in Bahrain and 80% in the UK.

The respondents were asked whether MIS had changed the timeliness of information and reports received. Table 5.18 (question 50) shows 75% of Bahraini and 60% of the UK respondents indicated an improvement in timeliness of information and reports received. Question 50 in table 5.19 shows the proportion of managers within each level who strongly support the claim of an improvement, to be: for Group 1 managers, 69% of Bahraini and 62% of the UK respondents, for Group 2 managers, 78% of Bahraini and 57% of the UK managers, and, for Group 3 managers, 82% in Bahrain and 60% in the UK.

The respondents were also asked whether MIS had changed the accuracy of the information received and table 5.18 (question 47) shows that 79% of Bahraini and 63% of the UK respondents stated that the accuracy of information they received with MIS had improved. Question 47 in table 5.19 shows that the proportion of managers within each level who agreed with improved accuracy of information was: for Group 1 69% of Bahraini and 50% of the UK respondents strongly agreed, for Group 2 managers 89% in Bahrain and 86% in the UK strongly agreed, and, for Group 3 managers, the level of agreement was 88% in Bahrain and 60% in the UK.

The overall performance of the current MIS in the organisations surveyed has been found to be poor. The majority of respondents in both countries claimed that the current MIS has not changed the way in which their organisations' operations were performed. Furthermore, the survey evidence indicates that regular reporting on MIS performance was not carried out in organisations. However, a majority of the respondents in both countries indicated that MIS has changed the timeliness of the information and reports received and the accuracy of the information.

The survey data which note poor overall performance but some important

improvements in some operational areas underline the need for performance measurement to be included in the guidelines for the successful development of MIS. MIS development needs to be directed to achieving improved performance.

5.3.6 Measurement Techniques

In section 3.5 two particular measurement techniques, Cost-Benefit Analysis and Cost-Effectiveness Analysis, were discussed. Cost-Benefit Analysis is a technique used to measure the suitability of a project by a detailed examination of the expected costs and benefits related to that project. The objective of Cost-Effectiveness Analysis is to select the most effective alternative in order to satisfy pre-defined goals within a preferred level of expenditure. However, the questionnaire also offered respondents a choice of other measurement techniques to assess both the level of actual use and the level of potential interest across the range.

Tables 5.20 and 5.21 summarise the analysis of the responses on actual measurement techniques.

Table 5.20 Measurement Techniques - Actual.

TECHNIQUES	BAHRAIN					UK				
	D	M	S	Mean	Rank	D	M	S	Mean	Rank
Cost-Benefit Analysis	32%	27%	41%	3.18	1	58%	8%	34%	2.50	2
Cost-Effectiveness Analysis	50%	14%	36%	2.73	2	46%	27%	27%	2.64	1
Break-Even Analysis	67%	13%	20%	2.07	3	89%	0%	11%	1.44	4
Payback Period Analysis	61%	28%	11%	2.00	4	100%	0%	0%	1.00	5
Net Present Value	73%	13%	14%	1.80	5	78%	11%	11%	1.67	3
Internal Rate of Return	80%	7%	13%	1.67	6	100%	0%	0%	1.00	5

Table 5.21 Measurement Techniques - Actual (Breakdown by Managerial Level).

TECHNIQUES	BAHRAIN									UK								
	% Group 1			% Group 2			% Group 3			% Group 1			% Group 2			% Group 3		
	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S
Cost-Benefit Analysis	27	46	27	29	14	57	50	0	50	80	0	20	25	0	75	67	33	0
Cost-Effectiveness Analysis	58	8	34	33	33	34	50	0	50	60	0	40	50	25	25	0	100	0
Break-Even Analysis	50	25	25	75	0	25	100	0	0	100	0	0	50	0	50	100	0	0
Payback Period Analysis	75	25	0	60	20	20	40	40	20	100	0	0	100	0	0	100	0	0
Net Present Value	75	12	13	75	0	25	67	33	0	100	0	0	50	50	0	50	0	50
Internal Rate of Return	75	12	13	75	0	25	100	0	0	100	0	0	100	0	0	100	0	0

The respondents who indicated that they have an MIS in their organisation were offered a choice of a variety of criteria which can be used to measure an investment's attractiveness and asked to indicate the extent to which each of the given techniques was actually used to evaluate MIS. Table 5.20 shows that 41% of the Bahraini and 34% of the UK respondents stated that Cost-Benefit Analysis techniques were used, 36% of Bahrain and 27% of the UK respondents stated that Cost-Effectiveness Analysis techniques had been used, 20% of the Bahraini and 11% of the UK respondents reported the use of Break-Even Analysis, 11% of the Bahraini but none of the UK respondents reported the use of Payback Period Analysis, 14% of the Bahraini and 11% of the UK respondents listed Net Present Value and, finally, 13% of the Bahraini but none of the UK respondents identified the use of Internal Rate of Return. Table 5.21 summarises the breakdown by managerial level.

Tables 5.22 and 5.23 summarise the analysis of the responses on potential measurement techniques.

Table 5.22 Measurement Techniques - Potential.

TECHNIQUES	BAHRAIN					UK				
	D	M	S	Mean	Rank	D	M	S	Mean	Rank
Cost-Effectiveness Analysis	9%	17%	74%	4.32	1	0%	30%	70%	4.40	2
Cost-Benefit Analysis	10%	18%	72%	4.26	2	0%	16%	84%	4.68	1
Payback Period Analysis	26%	24%	50%	3.48	3	28%	44%	28%	3.00	4
Net Present Value	26%	28%	46%	3.42	4	33%	33%	34%	3.00	4
Break-Even Analysis	26%	29%	45%	3.38	5	9%	55%	36%	3.55	3
Internal Rate of Return	23%	35%	42%	3.37	6	30%	50%	20%	2.80	6

Table 5.23 Measurement Techniques - Potential (Breakdown by Managerial Level).

TECHNIQUES	BAHRAIN									UK								
	% Group 1			% Group 2			% Group 3			% Group 1			% Group 2			% Group 3		
	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S	D	M	S
Cost-Effectiveness Analysis	15	22	63	0	13	87	4	13	83	11	0	89	43	0	57	50	0	50
Cost-Benefit Analysis	12	28	60	9	18	73	8	8	84	18	0	82	13	0	87	17	0	83
Payback Period Analysis	33	33	34	14	29	57	23	12	65	13	50	37	33	67	0	50	0	50
Net Present Value	32	16	52	14	29	57	24	41	35	33	33	34	0	67	33	67	0	33
Break-Even Analysis	28	33	39	50	0	50	17	33	50	0	67	33	0	50	50	33	33	34
Internal Rate of Return	20	50	30	29	14	57	25	25	50	25	50	25	0	100	0	50	25	25

When the respondents were given the opportunity to indicate which of the measures should be used, in their opinion, to evaluate MIS, table 5.22 shows that 74% of the Bahraini and 70% of the UK respondents specified Cost-Effectiveness Analysis, 72% of the Bahraini and 84% of the UK respondents, Cost-Benefit Analysis, 50% of the Bahraini and 28% of the UK respondents, Payback Period, 46% of Bahraini and 34% of the UK respondents, Net Present Value, 45% of the Bahraini and 36% of the UK respondents, Break-Even Analysis, and, finally, 42% of the Bahraini and 20% of the UK respondents stated Internal Rate of Return. Table 5.23 gives the breakdown of the responses by managerial level.

The survey data show clear support for the use of two particular techniques, Cost-Benefit Analysis and Cost-Effectiveness Analysis, and there is a clear need, demonstrated earlier, for setting performance standards. Determining the measurement metrics has to be done as part of MIS development if it is to be effective.

5.4 Conclusion

This chapter analysed the data collected through the fieldwork undertaken in the UK and Bahrain to assess the current situation in relation to MIS in two different hospital management environments. In the next chapter the focus will be on providing a general conclusion for each key element analysed in this chapter.

Chapter six will also present the analyses and summaries of the main conclusions derived from the second survey which was undertaken in Bahrain.

CHAPTER SIX

TESTING THE GUIDELINES

6.1 Introduction

In this chapter the data from the first survey analysed in chapter five will be used to allow some general conclusions to be drawn and presented in the context of the wider findings from the literature allowing particular points of importance to be highlighted.

In chapter three the key elements of the proposed guidelines were described. This chapter will also summarise the main conclusions derived from the second survey which was undertaken by the author during a second visit to Bahrain to test management reaction to the proposed key elements. In particular, this further analysis will determine if the key elements of the proposed guidelines can be utilised for successful development of MIS in non-profit making organisations.

6.2 General Conclusions from the First Survey

6.2.1 Key Element One: Determination Of Corporate Needs

The determination of corporate needs is an essential prerequisite that must be satisfied before attempting the installation of MIS.

The majority of managers in both countries are in agreement with the statement: MIS investments that are not in support of corporate strategy will not help achieve corporate strategic goals. This indicates the importance of corporate needs. The main goal of

MIS in hospitals as in other corporations is to improve the functioning of the total organisation.

The results of the initial survey suggested that managers in both countries (Bahrain and UK) who stated that there is no MIS installed within their organisations have a strong belief in the need and importance to have MIS in their organisations. They also have high expectations of MIS success. However, these expectations of MIS success are not backed up with any definitive plans for totally computerised MIS. This state of affairs reflects to some extent ill-defined corporate needs, which constitutes the first key element suggested in the guidelines.

Managers strongly agreed that MIS should have an effective strategy to deliver a useful, integrated decision support system for its users. This survey has clearly demonstrated that managers have indicated a need for MIS and in order to introduce MIS to the organisation it is necessary to determine corporate needs. Since there is a demand and need for MIS it is absolutely essential to deliberate upon this key element as a first step toward development of MIS.

Earlier in this study it had been found that there is a significant difference in the number of managers who are members of MIS development steering committees in the UK compared to Bahrain. This indicated that UK managers are more likely to be involved in the policy making for systems development and have more influence on building MIS systems, while in Bahrain the fact that there were fewer members involved on the steering committees for computer development could be one of the reasons which has delayed the development of MIS in Bahrain. The implementation of MIS needs to be planned and arranged within the corporate framework as a whole, rather than on the wishes of particular managers. When key management are involved in the steering

committee for computer systems development, it would seem to speed up the development of MIS. These data support the first key element.

One of the MIS objectives is to deliver a support system for all level of managers in the organisation and this survey shows that only 43% of all managers in Bahrain and 27% in the UK supported the fact that MIS is designed to support all levels of management. The survey shows that the current MIS system in the organisations surveyed is not designed to support all levels of management. Defining the support to be provided to all levels of management forms part of the determination of corporate needs.

In this research the author also found that managers believed that increasing MIS expenditure would not yield higher management performance. In both countries managers agreed upon this statement. The managers also held similar beliefs with regard to MIS usage, success, delivery of useful integrated decision support systems, search of greater efficiency and reduction of running costs of the organisation. Unless corporate needs are determined at the outset it would be difficult to achieve these goals. Strong evidence for the importance of determining corporate needs has been highlighted by the survey.

The Bahraini managers are not in favour of the Arabisation of Management Information Systems. This is quite interesting since the native language in Bahrain is Arabic and yet the managers are not in favour of their mother tongue. However, this may be due to the fact that the communication between hospitals worldwide and the common language of expatriates in Bahrain is English. Nevertheless, it is government policy to favour communication in Arabic between governmental organisations. Whether MIS is to be developed in Arabic or English is clearly a local Bahraini issue to be addressed as part of the determination of corporate needs.

Some conclusions from the survey without explicitly supporting this key element are interesting in their own right. For instance, when managers were asked if the installation of MIS would reduce the running costs of their organisations, 62% of the Bahraini but only 14% of the UK respondents believed this to be so. The striking difference may be due to the Bahraini managers, in most cases, having less experience of MIS or other computing facilities. The UK response confirms what is already known from the literature (see, for example, Danziger 1977, Prattipati 1988).

Although at the present time, the survey found that there is lack of PC usage in hospitals in Bahrain, the majority of Bahraini managers (74%) were strongly in favour of allowing a manager to have a terminal/PC connected to a main computer to access information, while in the UK the majority was smaller, 55% of managers. On the other hand when managers were asked if they have a terminal or a PC connected to the main computer, 80% of Bahraini managers indicated they have no such facilities or no such facilities are available, while in the UK the majority indicated they have such facilities. About 68% of Bahraini managers do not have a standalone PC while in the UK a majority (61%) do have a standalone PC. The majority of PC 'owners' in both countries were MIS personnel. The results of the survey can be summarised as indicating an unfulfilled demand for suitable access facilities. This is another issue to be addressed in determining corporate needs and the outcome will have an impact on other key elements such as Management Commitment and User Attitudes and Expectations.

6.2.2 Key Element Two: Management Commitment

The development of MIS in hospitals is a complex task involving vast quantities of money and significant management commitment if the system is to function

appropriately. In the organisations surveyed management commitment and support was claimed to be sufficient. In this study managers were asked how adequate was their own support and commitment to the MIS development, 96% of Bahraini respondents indicated moderate/strong support and committed themselves to the MIS development and in the UK the percentage was 68%. In these circumstances there is a high probability of MIS success. The responses to question 30, however, indicate that current MIS is not considered to be a success. Table 5.14 (question 30) shows only 33% of Bahraini and 11% of the UK respondents were well satisfied, ie the majority of respondents in both countries were not satisfied with their existing MIS systems with more dissatisfied managers in the UK.

These statistics are important because they demonstrate that managers recognise the significance and role of management commitment for achieving successful development of MIS. MIS success will not be achieved if management commitment is not present. The survey results perhaps indicate that to date management commitment has been theoretical rather than actual.

When the managers were asked how high a priority in comparison to other projects within the organisation, they believed management placed on the development of MIS, the response, in term of moderate/strong preferences, was 85% in Bahrain and for the UK the figure was 68%. It is clear that management support, commitment, and the priority given to MIS development was found to be high, and this key element is also identified in the literature as significant in the successful development of MIS. Therefore, this key element must be considered when introducing MIS. The strong statistical evidence generated by the survey indicates the importance of management commitment for the successful development of MIS.

6.2.3 Key Element Three: User Attitudes And Expectations

The biggest barrier to the implementation of information systems is user resistance to change. This often arises from a fear of unknown technology.

In surveying the attitude of managers towards the statement that some managers are afraid of computers, it was shown that Bahraini managers did not agree with this statement. However, there is some empirical evidence to suggest that Bahraini managers are afraid to admit to their fear of technology. There are managers in Bahrain who would prefer to have a PC or terminal in their offices even though they do not know how to use such a system or have the potential to learn about new technology. The presence of the terminal is only for appearances to suggest that they are up to date with technology. Some managers may be nervous of admitting that they agreed with the statement in case they may risk losing their position or be replaced by younger managers, when the new system is introduced to their department. A comparable study in Egypt (Kaddah 1990) revealed similar unwillingness on the part of similar participants to admit to fear or worries about new technology.

This study showed that it was very important to consider computing to be a tool in the search for greater efficiency. However, at the same time the majority of managers think that their current MIS is not designed to support all levels of management and that MIS has not resulted in improvements in decision making. The majority of managers strongly agreed that management should actively promote training in MIS for potential users of MIS. This indicated the importance of training to change the attitude of users towards MIS.

It is important to include this key element in the guidelines because people in organisations differ in a variety of ways, such as social background, knowledge,

psychological state, attitude to change, attitude to technology, level of education and mentality. This makes their behaviour and their reaction to change quite difficult to predict. Fear of change is a common problem faced by many system development efforts which result in user anxiety and tension. Users will have concerns about the possible effects of the new system on their own jobs and possible changes that could result in the redistribution of power, greater centralisation of authority, or increased accountability, as a by-product of the new system. It is clear from both the literature and the survey data that user attitudes and expectations are crucial and will influence MIS development. This key element must be included and explored before users can be effectively involved in the development process.

6.2.4 Key Element Four: User Involvement

It is well recognised that the key to success in any task lies in the knowledge, quality, and skills of the personnel involved, as well as their continuity in the task. In both Bahrain and the UK the majority of managers strongly believe that users should be actively involved in MIS planning and application development. Further they attached a high level of importance to management involvement in the design and development of MIS. Of those participants who indicated they have MIS installed, 49% of Bahraini managers and 60% of the UK managers stated that they have been kept sufficiently informed about MIS. Fewer Bahraini respondents were informed about MIS but this could be due to the fact that they are not familiar with MIS development in their organisations. It can be said that a user who did not play an active role in development of MIS would be less in favour of MIS. According to Higgins (1976) it is now generally accepted that success will not be achieved in MIS implementation if managers are not involved. McKinsey and Company (1968) found in various studies that the most successful organisations with respect to computerisation were those showing a high degree of participation by management.

One of the comments which some Bahraini managers made to the author was that they did not cooperate with their previous MIS director to the degree that they refused to work with him due to the fact that he did not consult with them. He ignored user requirements and employed compulsion to ensure they used the system which was inadequate for the user and had no documentation. Alter (1976) points to the common wisdom that the needs of users must be considered in developing systems and that they should be active participants in the implementation stage.

When asked about the level of the importance attached to management/user involvement in the design and development of MIS, 98% of Bahraini respondents and 90% of the UK expressed moderate/strong agreement with user involvement. This indicates success will not be achieved in MIS implementation if the user is not involved. Hence the importance attached to user involvement by the proposed guidelines.

6.2.5 Key Element Five: Performance Measurement

Timeliness of information, utilisation of the system and accuracy of information are important issues to be addressed in measuring MIS performance. This key element is crucial and should be considered before system installation and operation. A similar view towards performance measurement has been advocated by Ackoff (1967) " ... performance measurement must be taken into account before opening the floodgates and permitting the free flow of information between parts of the organization".

When the respondents in this study were asked to rate the overall performance of their current MIS, the majority of those in Bahrain (53%) who indicated they have a MIS system installed rated its performance as moderate, 25% of respondents identified performance as quite high and the remaining 22% were either dissatisfied or had no

knowledge of the system. In the UK 24% rated the overall performance of their MIS systems to be highly satisfying, 36% were moderately satisfied and the remaining respondents (40%) were either dissatisfied or did not know about system performance.

These data indicate there is no significant difference between the proportion of respondents highly satisfied with MIS in both countries. A larger percentage of Bahraini managers expressed moderate satisfaction than their UK counterparts. However, a contradictory view appears when the number of highly dissatisfied participants is measured. This evidence points to the requirement for a standard performance measurement technique to be adopted and reinforces the necessity for including this key element in the proposed guidelines.

Managers in hospitals as in any other organisations are concerned with decision-making and require timely and accurate information on which specific action may be based. This study supported the belief that MIS has changed the timeliness of the information and reports management receive for decision-making. Managers were more interested in obtaining results and information that clarified goals than in how the information was obtained. To determine if MIS is a success it is necessary to gauge if the introduction of MIS has changed the timeliness and accuracy of information as well as reports by the management. Since these factors form an integral part of performance measurement and it is important to consider the effect of introducing MIS to the organisation Performance Measurement is regarded as a key element in the proposed guidelines.

Performance measurement could be also considered after the installation of MIS to determine the degree of utilisation system and user satisfaction. Performance measurement is a useful assessment of system effectiveness and is one of the most frequently used techniques. It may be seen as a metric of both system quality and user

acceptance. A metric to measure performance is crucial. A performance measurement survey will typically assess aspects such as the quality of reports, quality of services, MIS user communication and the timeliness of information. However, this study shows that no user satisfaction survey was conducted by the organisations surveyed in order to measure this performance. This type of survey seems to be quite important for management issues. The degree of user satisfaction is probably the most useful indicator for measuring the success and effectiveness of MIS systems and indicates the importance of this key element in the proposed guidelines.

6.2.6 Key Element Six: Measurement Techniques

Although Cost-Benefit Analysis and Cost-Effectiveness Analysis have been used for many years in assessing the benefits of introducing MIS to profit and non-profit organisations and have been found to be useful measurement techniques in information systems feasibility studies, the real significance of MIS in non-profit organisations is difficult to measure in terms of financial savings.

To determine the value of any investment, a variety of criteria can be used to measure an investment's attractiveness. The respondents were asked to indicate the extent to which given measures *were* (question 48) used to evaluate MIS in their organisations. A variety of measurement techniques were offered to the respondents. The majority (68%) of Bahraini respondents indicated moderately/strongly that Cost-Benefit Analysis was used to measure MIS. (The author has a reservation here as from his observations he found that no such measurement nor any other measure or criterion had been used to measure MIS investment in Bahrain.). The majority (75%) of the UK respondents said that none of the techniques offered or any other measures were used to evaluate their MIS.

A similar question (question 52) asked respondents to rate the applicability of the techniques offered. In answering this question, the majority of Bahraini managers (74%) were strongly in favour and ranked as number one, the use of Cost-Effectiveness Analysis techniques with Cost-Benefit Analysis selected as number two (72%). In the UK, the majority of managers (84%) were strongly in favour and ranked Cost-Benefit Analysis as number one with Cost-Effectiveness selected as number two (70%).

There is a need for measurement techniques while developing MIS because it is important to gauge the benefits which are associated with the introduction of new systems. In particular, for non-profit organisations many of these benefits are intangible, since it is often difficult to assign a monetary value to outcomes that are beneficial to the organisation or its clients. By employing cost-benefit and cost-effectiveness techniques the organisation can assess if the MIS has satisfied the pre-defined goals. The survey supports the use of these two measurement methods. How these (or any other techniques) are to be used to assess the benefits of MIS has to be decided as part of the development process and hence Measurement Techniques is included in the guidelines.

6.3 Testing Management Reaction to the Proposed Guidelines:

Second Survey

The main purpose of this section is to discuss the results of the second (1989) survey of management reactions to the proposed guidelines. A second questionnaire (see Appendix 6) was given in Bahrain to those who participated in the first questionnaire of 1988.

An organisation hierarchy was provided in this study in order to allow the participants to classify their management level. Of the respondents 42% classified themselves as top management, 44% as middle management, 13% as junior management and 1% as at the operational level. In order to assure statistically reliable results and to match those of the previous survey, it was again necessary to classify the managers into three groups. Group 1 consists of executive, administration and superintendent levels, while Group 2 consists of information systems personnel and Group 3 consists of medical doctors managerial level, medical support managerial level and other managerial levels. To simplify the statistical analysis procedures and for the purpose of table 6.1 it was decided again to classify the responses on a scale which measures respondents level of agreement (see Appendix 6 for further details). The scale used is D= disagree (not at all or to a small degree), M= to a moderate degree and finally, S= strongly (to a large degree and maximally/essential). Table 6.1 shows the level of agreement with the proposed guidelines.

Table 6.1 Level of Agreement with the Proposed Guidelines.

KEY ELEMENT	MANAGEMENT POSITION									TOTAL %			MEAN	RANK
	% GROUP 1			% GROUP 2			% GROUP 3			DIS- AGREE	MODE- RATE	Strongly AGREE		
	D	M	S	D	M	S	D	M	S					
Determination of Corporate Needs	0	22	78	15	0	85	3	21	76	4%	17%	78%	4.48	1
Management Commitment	7	22	71	0	23	77	7	17	76	6%	20%	74%	4.36	2
Measurement Techniques	7	30	63	15	8	77	4	18	78	7%	21%	72%	4.29	3
Performance Measurement	16	20	64	0	8	92	3	31	64	8%	22%	70%	4.25	4
User involvement	19	22	59	0	15	85	7	24	69	10%	22%	68%	4.12	5
User Attitudes and Expectations	19	31	50	8	23	69	10	31	59	13%	29%	58%	3.88	6

Respondents were asked to indicate the extent to which each of the proposed key elements should be used to develop MIS. Table 6.1 shows that the majority of the respondents strongly agreed with the proposed guidelines. Means were calculated to find the ranking order of the proposed key elements. The Determination of Corporate Needs with a 78% response rate was ranked first, Management Commitment was ranked second with a 74% response rate, Measurement Techniques were ranked third with a 72% response rate, Performance Measurement was ranked fourth with a 70% response rate, User Involvement was ranked fifth with a 68% response rate and finally User Attitudes and Expectations were ranked sixth with a 58% response rate. Table 6.1 also shows the breakdown by managerial level.

The respondents were asked which key elements they would consider to be the most useful/beneficial. Table 6.2 shows the preference ranking of the key elements.

Table 6.2 Preference Ranking of the Key Elements.

ELEMENTS	TOTAL % OF MANAGEMENT PREFERENCE						RESULT
	1st	2nd	3rd	4th	5th	6th	RANKING
Determination of Corporate Needs	70%	14%	3%	7%	2%	5%	1st
Management Commitment	10%	51%	12%	17%	7%	3%	2nd
User Attitudes and Expectations	0%	12%	29%	24%	22%	14%	3rd
User Involvement	3%	10%	29%	19%	22%	17%	3rd
Measurement Techniques	10%	10%	19%	19%	24%	19%	5th
Performance Measurement	7%	3%	9%	15%	25%	41%	6th

The respondents were also asked to indicate an order by ranking the proposed key

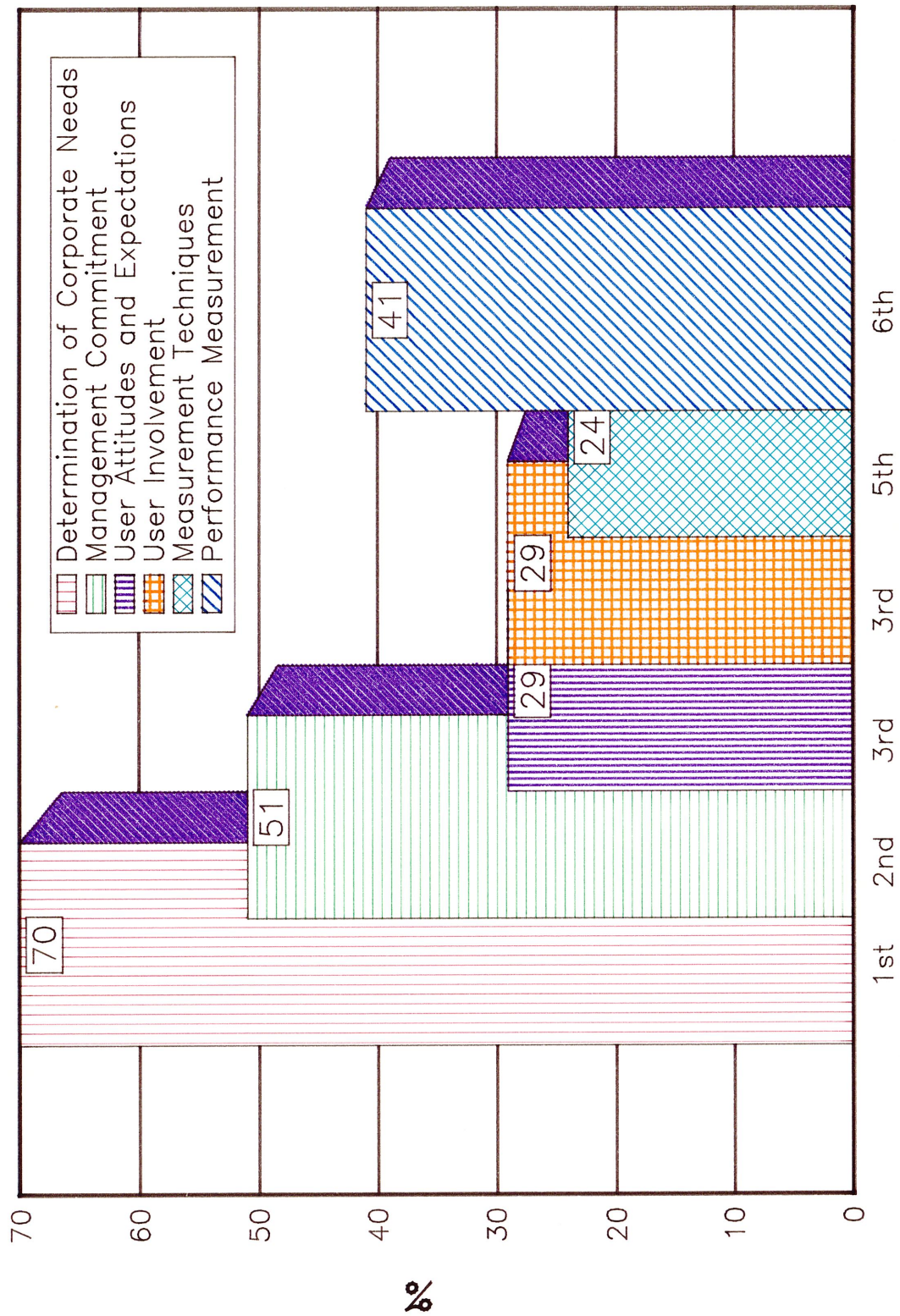
elements from 1 to 6, by entering '1' as their first preference, '2' as the second and so on. It was found in the study that the majority of the respondents (70%) identified Determination of Corporate Needs as the first key element. Management Commitment was identified as the second key element with a 51% response rate. User Attitudes and Expectations, and User Involvement were both placed third with a response rate of 29% each, while Measurement Techniques was rated as the fifth key element with a 24% response rate. Finally, Performance Measurement was identified as the sixth key element with a 41% response rate. Figure 6.1 shows the manager's preference ranking of the key elements in the form of a histogram.

Table 6.3 Respondents' Views on the Proposed Key Elements.

QUESTIONS	YES	NO	DO NOT KNOW
Would you agree with the proposed key elements for developing MIS ?	93%	0%	7%
Would you suggest any additions to the proposed key elements ?	3%	63%	34%
Would you replace (or delete) any of the proposed key elements ?	3%	77%	20%

When the respondents were asked for their views of the proposed guidelines for MIS development, table 6.3 shows 93% indicated positive attitudes towards the proposed key elements and, further, when the respondents were given the opportunity to suggest any additional key elements to those proposed, 97% of respondents made no additions but agreed with the author's proposals. When the respondents were asked if they would like to replace (or delete) any of the proposed key elements, 77% replied with "no" and 20% "do not know". The additions suggested by 3% of respondents were of no relevance to the proposed key elements.

Figure 6.1 Histogram of the Preference Ranking of the Key Elements.



In the last question of this survey the respondents were given the opportunity to make further comments regarding MIS. Only three participants availed themselves of this opportunity and suggested merging User Attitudes and Expectations and User Involvement. It has already been argued in section 5.3.3 that it is necessary to explore User Attitudes and Expectations before embarking on User Involvement.

6.4 Conclusion

In chapter three it was proposed that using the key elements will result in the successful development of MIS in non-profit organisations. These key elements were tested in Bahrain during a second visit to determine management reaction to the proposed guidelines.

The majority of managers were satisfied with the proposed guidelines and when they were asked to rank the key elements in the order in which they considered them to be most useful/beneficial, the majority ranked the key elements in the following order:

- Determination of Corporate Needs;
- Management Commitment;
- User Attitudes and Expectations;
- User Involvement;
- Measurement Techniques;
- Performance Measurement.

The majority of the managers strongly agreed with the proposed guidelines and suggested no additions, replacements or deletions. The major significance of the survey findings was that it supports and reinforces the validity of the proposed

guidelines. Furthermore, this view is supported across all levels of management surveyed. A minority of managers suggested merging User Attitudes and Expectations with User Involvement into one key element but the majority from all levels of management supported the key elements as proposed by the author.

In chapter seven the application of the proposed guidelines in the Bahraini environment is discussed.

CHAPTER SEVEN

APPLICATION OF THE GUIDELINES IN BAHRAIN

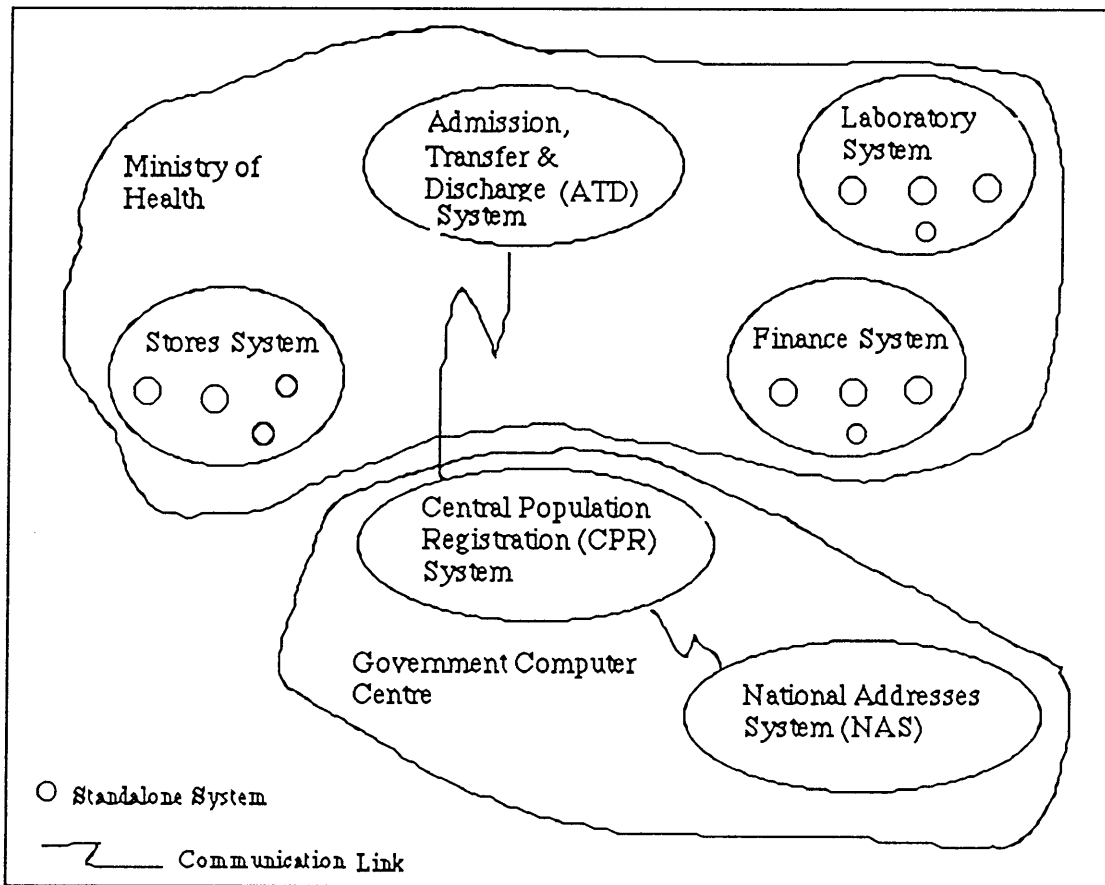
7.1 Introduction

This chapter is concerned with the implementation of the guidelines in the Bahraini environment to show how the guidelines may be used for the successful development of MIS in a non-profit making organisation, the Ministry of Health in Bahrain. This chapter outlines the current MIS situation in Bahrain and then shows how the guidelines could be applied in that context.

7.2 The Current Management Information Systems (MIS) Situation in Bahrain

The main goal of MIS in healthcare as in any other corporation is to improve the total organisation. The organisation should be considered in a dynamic sense taking account of the work flow between the different departments of the organisation. Account must also be taken of the work flow between the organisation and its environment. MIS in the Ministry of Health has been developed in a piecemeal fashion rather than as a result of a carefully controlled planning process. The current situation of computerised systems in the Ministry of Health is illustrated in figure 7.1.

Figure 7.1 Current Situation of Computerised Systems in the Ministry of Health.



According to the Bahrain Health Information Centre Report (1989) "The Information System presently implemented in the Ministry of Health is mainly based on manual methods... However, some areas like finance, materials management, patient administration and laboratory are using computerized data processing to some extent". The need for better information systems in the Ministry of Health is widely accepted but the way ahead seems elusive and the willingness of the government to fund MIS development in the Ministry of Health is probably greater than its ability to put it to effective use. Whilst investment in information technology will help, it can of course only do so if approached in the right way.

There are a number of conceptual frameworks that stand out in the MIS area, the best known and most widely cited model of evolution related to organisational information systems being the one developed by Nolan. The model started as a tentative hypothesis (see Nolan 1973) and has since become regarded as an empirically grounded theory (see Nolan 1979) and an accepted description of how organisational information systems develop over time (see, for example, Alter 1980, Ahituv and Neumann 1982, King and Kraemer 1984). In Nolan (1973) the core concept behind the model was presented as a 'hypothesis grounded' in observation and discussions with managers in three organisations. The four stage model of MIS growth was then developed by Gibson and Nolan (1974) and the model has been further modified by adding two more stages (Nolan 1979). This six stage model provides valuable insights into the evolution of MIS planning and has a number of uses as a conceptual framework.

One way of using the framework is to classify organisations in the aggregate into stages. By doing this, one can see how Bahraini governmental organisations have passed through the Nolan stages. Another use of the Nolan framework is to investigate an organisation, for example, the Ministry of Health in Bahrain, to gather data about its current state of computer use, and to identify how computer use in the organisation fits into the framework. This type of exercise is very helpful as a precursor to an information system planning activity. It is crucial to understand the current status of MIS in an organisation before embarking on ambitious new plans. The discussion below is based on Nolan (1979). Briefly, the Bahraini situation may be described in terms of Nolan's six stages as follows:

1. Stage one: *Initiation*

In the initiation stage, the computer is introduced within the organisation to meet its basic needs. Users are encouraged to use the system but there is slow growth in use due to unfamiliarity and the few applications which have been developed. Users are not yet ready to request further applications due to a lack of computer appreciation. The developed applications are simple and typical of an accounting oriented system. The MIS organisation in this stage is often centralised because both the organisation and the users must learn the new technology. Control in this stage is loose and planning is almost none existent. The *initiation* of computing took place in Bahraini governmental organisations in the late 1970s and the early 1980s. The Government of Bahrain used the Bahrain Petroleum Company (BAPCO) computer services facilities until the first government computer was installed during 1979 when the Government Computer Centre was established. Most Bahraini Ministries are still at this stage.

The initiation stage in the Ministry of Health in Bahrain was: the first computer equipment (IBM 4381) installed for the Ministry of Health in the Government Computer Centre during 1985 together with a communication network based on telephone lines with 9600 BPS speed utilising IBM 3714 and IBM 3274 remote controllers. The first applications were finance and payroll, this latter system being established by the Government Computing Directorate for all the Ministries in Bahrain.

2. Stage Two: *Contagion*

In this stage excessive usage of computerised systems is due to top management

commitment to exploiting computing potential plus high expectations among users, and requests for the development of many different applications. Since computing expenses are often carried as an overhead during this stage, computer services are often free to users and therefore new application developments are encouraged. To keep up with the demand for services there is a rapid growth in cost due to expanding computer hardware and increases in the number of the computer personnel required. During this stage the MIS budget grows rapidly and top management begins to search for controls to contain cost growth. The *contagion* stage in the Bahraini governmental organisations occurred from the mid-1980s. In the Ministry of Health the chronology of this stage was as follows:

Transition to Stage Two:

- | | |
|--|--------|
| 1. Consultation with Government Computing Directorate | 1979. |
| 2. Invitations to tender | 1981. |
| 3. Outside consultants identify user requirements | 1981. |
| 4. Decision taken not to accept any of the tenders | 1982. |
| 5. Decision taken to develop customised systems | 1982. |
| 6. BHIC Directorate established in the Ministry of Health during | 1980s. |

Proliferation of systems in line functional areas 1987/88.

1. Admission, Transfer and Discharge (ATD) system (*without any documentation*).
2. Usage of CPR system as a Patient Master Index.
3. Stores System.

Equipment upgrades:

1. No upgrading of the mainframe.
2. Purchase of PCs.

Costs

Increased.

3. Stage Three: *Control*

In this stage the organisation has entered the control stage when top management becomes concerned about the level of benefits being received from computerisation versus the cost of the MIS operation. Cost control measures are determined or set by top management and the MIS manager is charged with designing and implementing adequate planning control systems, thus raising the MIS manager's position in the organisational hierarchy. Emphasis is placed upon documenting existing applications and moving them more toward middle management and away from focusing on strictly operational functionality. An attempt is made during this stage to make the users accountable for their computer use by introducing chargeout systems. The *control* stage was entered by Bahraini Governmental organisations from the mid-1980s. The control stage at the Ministry of Health occurred during 1987-1989 along the following lines:

Recommendations to improve MIS management

1. Corporate steering committee for computing established.
2. A team of computer/management consultants travelled abroad to see live systems in some recommended hospitals with the aim of purchasing off-the-shelf systems.

NOTE: No system planning function was established, no consideration was given to management commitment nor to user participation in system planning. There was no master plan for MIS development and no blueprint to support the Ministry's MIS.

Extension and consolidation of existing applications

1. Use of Admission, Transfer and Discharge (ADT) system in other hospitals (for example, Psychiatric Hospital).
2. Stores System extended to cover a wider range of items.
3. Laboratory System.

Equipment

1. No significant upgrading of the mainframe (according to management sources only 5% of the mainframe is actually used).
2. More purchases of PCs.

Costs

Increases in cost continue.

4. Stage Four: *Integration*

During this stage top management begins to rethink the management of computing in terms of data resources rather than computing resources. This stage is characterised by an attempt to take advantage of new technology, typically database, by integrating it into existing systems. The computing costs continue to increase rapidly in this stage as well as computer usage. To help to move toward data resource management, database systems are introduced and brought into the organisation. The MIS function is set up mainly as a utility service for the users. Once this stage is achieved there is a significant transition point in an organisation's use of computers. Few Ministries in Bahrain, however, have integrated applications and have become oriented towards database technology, which marks entry into this next stage. However, there are some existing integrated systems, for example, the Central Population Registration (CPR) system. At the Ministry of Health in Bahrain in terms of *integration* some use is being made by the Government Computer Centre of database management systems for certain basic applications and database orientation of applications systems has begun.

5. Stage Five: *Data Administration*

In this stage data base technology is in place and a data administration function is created to locate and control the use of the organisation's data. The focus of computing management, according to Nolan, turns completely to Data Administration. Control of computing resources is maintained in the development of systems. Users are effectively accountable for computer resource usage and the emphasis is upon common, integrated systems in which data are shared among

many functions in the organisation. Some Ministries in Bahrain have begun to enter the *data administration* stage from the mid to late 1980s. The data administration stage is not yet achieved in the Ministry of Health.

6. Stage Six: *Maturity*

This stage of the Nolan model, *maturity*, is achieved when a organisation reaches the final stage of the model (though according to Nolan very few organisations have actually achieved the MIS maturity stage). In this stage organisations have fully integrated the power of computers into their managerial processes and data resources are meshed with the strategic planning process of the corporation. There are no aspects of any governmental organisation in Bahrain that currently represent *maturity*.

According to Davis and Olson (1985), the Nolan Model is a useful conceptual model for understanding the general direction of change. At a conceptual level it aids the planning process by providing a framework for understanding change. The diagnostic measurements and prescriptive elements of the model should be viewed as general guidelines for information system planning.

One can learn from the Nolan Model that as an organisation moves from stage one to higher stages, it becomes more mature. Organisations showing features of stage four are likely to be more mature than organisations displaying features of stage one. From figure 6.2 and the foregoing discussion it seems that the majority of information systems in the Ministry of Health are still in the initiation stage.

7.3 Application of the Proposed Guidelines in the Ministry of Health in Bahrain

From the above discussion of the state of the art of the MIS in Bahrain and also from the survey evidence, it is clear that there is no computerised MIS installed in the Ministry of Health that meets the author's working definition of MIS developed in chapter two.

The proposed guidelines for the successful development of MIS developed and described in chapter three will enable the Ministry of Health in Bahrain to achieve a successful development of MIS. The remainder of this chapter suggests how the guidelines could be applied in this context.

7.3.1 Determination of Corporate Needs

The survey has clearly shown a need and a demand for a computerised MIS for the Ministry of Health in Bahrain. Determination of Corporate Needs is the first step to be taken by the Ministry in order to have a successful development of MIS.

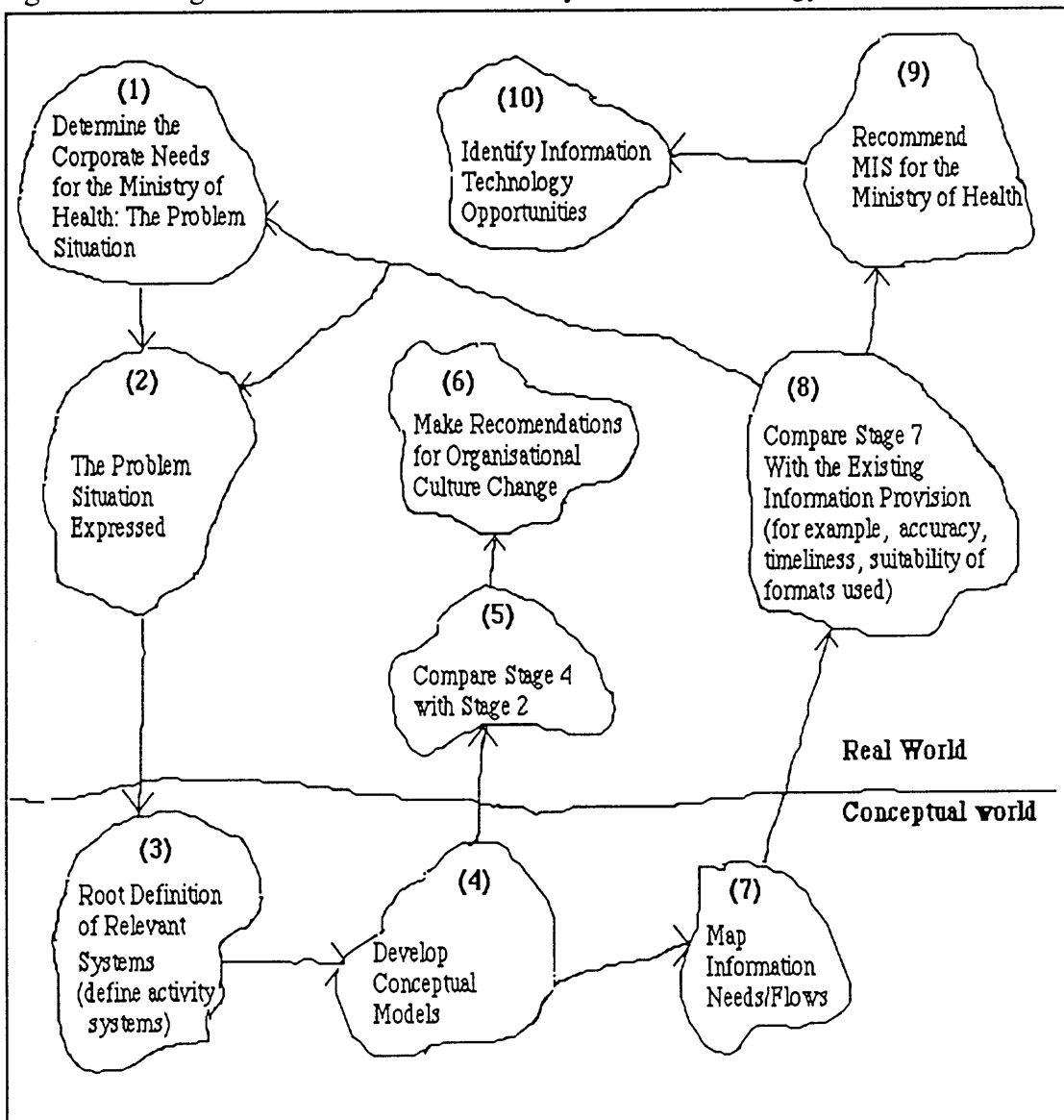
It is proposed that Checkland's Soft Systems Methodology (SSM) be used in Bahrain for the process of determining corporate needs and planning for their achievement. In order to use SSM effectively in the Bahraini context it will be necessary for the Ministry of Health, '*problem owner*', to recognise that as healthcare grows more complex and as information technology becomes increasingly sophisticated, the need for careful planning of MIS in this field is of paramount importance. A team approach both to determining corporate needs and to the planning of MIS is essential. Such a 'team' for

Bahrain would consist of members drawn from the Bahraini Health Information Centre (BHIC), the Government Computer Directorate at the Central Statistical Organisation (CSO) and/or external consultants, '*problem solvers*'. A steering committee with its members selected by the Minister will be responsible for the overall monitoring of the MIS. This committee will report directly to the Minister of Health. Some of the members of the steering committee would form a 'Task Force', the team responsible for the detailed work. The MIS task force, part of the steering committee, would be headed by a knowledgeable member of the BHIC. This task force will include management representatives, '*actors*', from different departments and sections of the Ministry which will be affected by future computerisation including medical doctors, medical support staff, the various directorates, the office of planning evaluation, and hospital administration. The Minister will need to ensure that the committee members at all levels are provided with sufficient time from their normal duties to enable them to participate fully in the planning effort.

The establishment of such a team will also assist with meeting one of the key conditions for MIS success, securing Management Commitment.

It is clear from the previous analysis that SSM is relevant to determining corporate needs in the context of the Ministry of Health. The dynamics of the SSM process may be described by means of the diagram in figure 7.2. A similar diagrammatic presentation may be found in, for example, Checkland 1981, Galliers 1985, Le Fevre and Pattison 1986, Watson and Smith 1988, Checkland and Scholes 1990, and Wilson 1990. The material presented below is mainly borrowed from Galliers (1985) and Le Fevre and Pattison (1986).

Figure 7.2 Stage Model of Checkland Soft Systems Methodology



Problem Situation: Stages 1 and 2

The first two stages are addressed to understanding the overall 'problem situation'. This will allow the 'problem solvers' to gain an insight into the problem area(s) and to identify the different views of the 'actors'. This of course will help to build as rich a picture as possible for the determination of corporate needs. The resulting 'rich pictures' will greatly help in the analysis and determination of corporate needs.

Root Definition of the Relevant Systems and Conceptual Models: Stages 3 and 4

These stages aim at building '*conceptual models*' of activity systems relevant to the '*problem situation*'. These should consider different 'futures' for the Ministry, especially in studies concerned with strategic planning. From the end of the previous stage '*problem situation expression*', the '*system solvers*' must develop an understanding of the Ministry as a system which can be defined in terms of its purpose, processes and environment. These stages are essential as it is from this analysis that the base definitions are created and from the definitions the conceptual models are developed.

Comparison of Stage 4 with the first two Stages: Stage 5

In this stage a comparison is made between models and the '*problem situation*' with a view to initiating discussion with the '*actors*' involved to identify the means by which improvements can be made. This stage iterates and backtracks through stages 1,2,3,4 and 5, until the '*system solvers*' and '*actors*' agree on the definitions, models and views defined.

Recommendations for Change: Stage 6

The '*system solvers*' make recommendations of activity or organisational changes which are felt to be feasible and desirable based on a comparisons made in stage 5. These recommendations will be debated with the user management. It is, however, during this stage and the previous one that, for example, inconsistencies in management practices, lack of communication channels within the Ministry will become clear. These issues must be addressed within the Ministry.

Map Information Needs/Flows: Stage 7

The purpose of this stage is to define conceptual information inputs and outputs for each activity identified in stage 4. The analyses of external information flows to the systems as well as information flows which are not linked with any computerised system should be included. This stage involves documentation of the flow of the information between activities, sources of information and characteristics of information, for example, degree of detail, accuracy, and format.

Comparisons of Stage 7 with the first two Stages: Stage 8

In this stage the identification of information gaps is carried out and the problems related to accuracy of information, its timeliness and the format in which it is handled are addressed. Also in this stage the gaps in the information provided are underlined by comparing this level of information provision with the information required by the '*conceptual models*'.

Recommended MIS and Identification of Information Technology Opportunities: Stages 9 and 10

Following the previous stages (stages 1 to 8), the development of an MIS is recommended. The '*system solvers*' should seek procedural and information technology solutions to the problem situation in hand, recommend which module(s) must be computerised and evaluate the extent of change and its impact on the Ministry of Health.

In summary SSM consists of finding out about the problem situation, naming the relevant human activity systems in '*root definitions*', building '*conceptual models*' from the '*root definitions*' and taking action in the situation to bring about

improvements.

7.3.2 Management Commitment

The survey recognised the significant importance of management commitment in Bahrain as well as in the general case discussed in chapter three. To ensure the Bahraini managers' commitment, the following specific issues must be addressed:

- * Enrol the key managers in the MIS task force committee. As already noted in the discussion of the determination of corporate needs it is recommended that an MIS team/steering committee/task force be established by the Minister of Health with management representatives from the various directorates and departments. The establishment of this organisational structure represents a first step to gaining management commitment to MIS in the Ministry of Health in Bahrain.
- * Establish a free flow of effective communication between the managers and the system builders. In part the structure already described will provide a framework for effective communication.
- * A programme of MIS education and training must be provided for the managers. In Bahrain, despite the Ministry of Health's investment in information systems resources in recent years, there remains a serious need for a better understanding of information systems technology at all levels of management. In the survey and in personal interviews, it was widely recognised that in Bahrain today most managers at all levels of management have not received the sufficient or necessary education and training to overcome their fear of computing. (This issue of education is the subject of a separate fuller discussion in

section 7.4).

- * Assure managers that the new MIS will be established to improve the total organisation and management decision making but without threatening any manager's authority. Managers will make the decisions, the MIS will provide them with information to assist them in their decision making.
- * The SSM approach will encourage commitment and since the SSM stages require iteration and backtracking until a problem is fully defined, management commitment will be tested throughout all stages. Without management commitment, the '*system solvers*' may recommend an inappropriate system and, in one sense, using SSM to determine corporate needs will underline to managers the importance of their commitment to MIS.

As in the general case set out in chapter three ensuring management commitment will provide the following benefits to Bahrain:

- * Management acceptance of responsibility for the management of information resources.
- * The development of an MIS directed to meeting the real needs of managers.

7.3.3 User Attitudes and Expectations

Resistance to change by those affected by the introduction of a new system is often a serious problem for organisations. Although the survey showed Bahraini managers not to be afraid of computers, there is some empirical evidence, noted earlier, to suggest

that they are afraid to admit to their fear of technology. To overcome the problems associated with user attitudes and expectations in Bahrain, appropriate education and training of users is essential (see section 7.4). This education and training will give the users a better appreciation of the role of MIS in the Ministry of Health. Using SSM to investigate the '*problem situation*' is a useful approach for learning more about this key element. An extensive process of informal and formal user discussions and open meetings should lead to an improvement in user attitudes and expectations about MIS in the Ministry of Health.

7.3.4 User Involvement

User involvement in the development of MIS is advocated for Bahrain in order both to increase participation and to ensure accurate specification of user requirements. It is clear from the general case presented in chapter three that the more active the users are in determining their requirements, the more likely they are to accept the system and utilise it appropriately. It has also been shown that user involvement in the development of MIS can subsequently increase their satisfaction with the system. The Bahraini case is no exception, as the survey results supported user involvement in the development of MIS. In a particular instance in Bahrain, managers did not cooperate with the MIS providers to the point that they even refused to use the system. The main reason was that they were not consulted before the installation of the system. The MIS director also ignored user requirements and employed compulsion to ensure the users used a system which was inadequate for the users and had no documentation. The team approach and SSM, as mentioned earlier, will help to build a MIS that will be used.

7.3.5 Performance Measurement

In the survey, there was no evidence that the performance of any existing MIS was being measured. In Bahrain it is suggested that it will be most appropriate for performance measurement to focus on system performance criteria. Users will be asked to rate their satisfaction with such features of the system as response time, timeliness, turnaround time, accuracy and system support. Performance measurement will gauge the reliability of the system and check whether it achieves the corporate goals.

7.3.6 Measurement Techniques

Although a choice of measurement techniques were offered in the survey, most of the managers preferred Cost-Benefit Analysis and Cost-Effectiveness Analysis. The author strongly feels that sophisticated measurement techniques would not be appropriate in the Bahraini case due to the lack of management understanding of such techniques. The two techniques selected by the managers in the survey are those that will need to be explored for application in Bahrain.

7.4 Education and Training

Reference has been made earlier in this chapter to the need for education and training. There are particular problems local to Bahrain, such as, a shortage of trained personnel in the MIS field, lack of managers trained in MIS, and a general lack of MIS literacy which are not, perhaps directly addressed by the guidelines. Therefore, for the guidelines to be successfully implemented in Bahrain some of these problems will need to be tackled first. For Bahrain the application of the proposed guidelines should be

preceded by a period of training and education to provide a sound foundation for the application of the guidelines in Bahrain.

As already noted fear of a unknown complex system is one of the major obstacles to MIS use and it can be overcome by involving users in the system development process. The MIS user must be informed as to how the new job is going to be performed and the user must be educated about the tangible and intangible benefits for the organisation as well as for the individual user.

Training should be given to all people likely to be associated with the new MIS (Scheve 1976, Alter 1979, Maish 1979, Robey 1979, Zmud 1979, Ein-Dor and Segev 1981, Multinovich and Vlahovich 1984).

According to Multinovich and Vlahovich (1984) proper training not only informs the managers/users of the importance of their contribution but also indicates that they are an important integral part of the entire process. The success of MIS depends on how well they perform their jobs. Training also means educating the managers/users of the overall purposes of MIS:

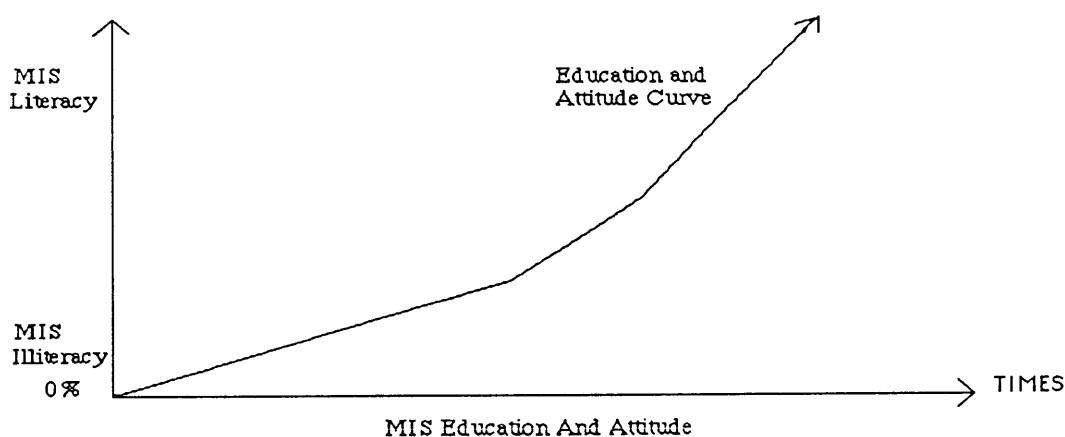
- what is it supposed to do ?
- how is it done ?
- is it required ?
- who must carry it out ?

To obtain user support, it would be necessary to provide training and education on computerised management information systems by introducing related computer MIS courses with hands-on exercises. Training as well as education are very important

factors to increasing the level of computer literacy and to provide users with MIS appreciation. Hence, it is important to construct a training programme for those who are or will be dealing with computerisation. In general, studies (see, for example, Reznikoff, Holland, and Stroebel 1968, Startzman and Robinson 1972, Thies 1975, Melhorn, Legler, and Clark 1979, Counte, Kjerulff, Salloway, and Campbell 1983) report that educational level and period of employment at the organisation being computerised are positively correlated with attitudes towards computers.

A typical relationship between level of MIS literacy and education/attitude is shown in figure 7.3. This figure illustrates the expected relationship but is not backed up with any factual data derived from this investigation; it is an intuitive representation of the rate of growth in MIS literacy in relation to the length of time invested in giving potential MIS users in a given organisation, such as a hospital, training in computing. Note that in the present context education and training may be used interchangeably.

Figure 7.3 Relationships between Level of MIS Literacy/Illiteracy and MIS Education/Attitudes.



7.5 Conclusion

The Nolan conceptual model was used to investigate and classify the state of MIS in Bahrain and in the Ministry of Health in particular to set the scene for the proposed application of the guidelines in the Ministry of Health.

The first step in developing a successful computerised MIS is to determine the corporate needs, and Soft Systems Methodology (SSM) is selected as an appropriate methodology for addressing this key element in Bahrain. The use of SSM also helps with other key elements, for example, Management Commitment. Applying SSM will underline for the managers the importance of their commitment to MIS. To gain management commitment, it is proposed to enrol them in the key MIS committees, educate them and assure them of the role of MIS in improving the total organisation and their decision making. Steps are suggested for gauging attitudes and expectations and for overcoming fear of new technology, particular emphasis is placed in the Bahraini context on education and training. User involvement is advocated for the Bahraini managers both by employing a particular 'user participation' team approach to development and in the selection of SSM. Particular proposals appropriate to Bahrain are made in relation to performance and its measurement.

It is suggested that the proposals set out in this chapter for the application of the guidelines to the Ministry of Health in Bahrain will result in the development of an MIS in that Ministry which will satisfy the definition set out in chapter two and demonstrate the effectiveness of the guidelines in practice.

CHAPTER EIGHT

CONCLUSIONS

8.1 Introduction

The intention of this chapter is to draw conclusions from the discussion in the previous chapters, to indicate to what extent the thesis has contributed to research in MIS and to identify a potential direction for future work.

8.2 Review

The flow of data and information is the lifeblood of any organisation. Decision making is essentially based on this flow. MIS must be tailored towards assisting managers with decision making and supporting management activities throughout the organisation.

The introduction of MIS into non-profit organisations has faced many difficulties. These difficulties are of three types: human, organisational and technical. Overcoming these difficulties is a *sine qua non* for successful MIS.

The present research was conducted in three phases: the *first phase* was concerned with identifying the problems met when introducing MIS into non-profit organisations. In the *second phase* fieldwork was carried out, through the use of questionnaires and

visits to non-profit organisations, to hospitals in the UK and Bahrain. The principal aim of this phase was to enable the author to check on the MIS state of the art in hospitals in the UK and Bahrain. *Phase three* was concerned with the formulation of guidelines to ensure successful MIS and with further fieldwork to test the acceptability of the proposed guidelines to managers in the target environment, a non-profit organisation, hospitals in Bahrain.

Details Of Guidelines

The problems met at the human, organisational and technical levels of the organisation are encapsulated in six key elements:

1. Determination of Corporate Needs: (Organisational)

The determination of corporate needs is the first step that must be taken when attempting to develop MIS. It represents, as supported by fieldwork, the first key element in the suggested guidelines for the successful development of MIS. If this key element is not considered at the outset of the MIS development, the resulting system will face difficulties. Although it has been found in this study that there is no computerised MIS in Bahrain, in terms of the working definition developed in chapter two, it is clearly management's ambition to implement such a system. It is important to deliberate upon the determination of corporate needs as a first step toward the development of MIS. The survey data shows that managers were significantly in favour of determining this key element first.

2. Management Commitment: (Human)

Management commitment is critical and essential to the success of any MIS

development. In the UK and Bahraini organisations surveyed, management commitment was found to be adequate. MIS success will not be achieved if there is no significant management commitment. The overall impression formed in Bahrain is of significant attention being paid to hardware and software acquisition and associated costs, with little attention focused on management commitment. However, the results of the survey supported the importance of management commitment to MIS success by ranking this key element as number two.

3. User Attitudes and Expectations: (Human)

It is essential to know whether potential users of MIS have positive or negative attitudes with regard to MIS and what they expect to get from MIS. No evidence that attitudes had been surveyed was found during the fieldwork. It is disadvantageous to ignore user attitudes and expectations because it is necessary to raise the awareness of people when technological change takes place since they need to become familiar with the dynamics of their behaviour and that of others within their organisations. This key element is ranked third because it is necessary to consider user attitudes and expectations before involving users in MIS and after gaining management commitment.

4. User Involvement: (Human)

User involvement is designed to provide the user with an opportunity to actively participate in MIS development. This will lead to a sense of satisfaction and a degree of system ownership. The surveys found that user involvement in the development and design of existing MIS had been insufficient. Furthermore, the survey data suggested that users should be encouraged to take part in MIS planning and application development. This key element is fourth in the guidelines because after determining

user attitudes and expectations it is then appropriate for users to become involved.

5. Performance Measurement: (Technical)

The performance of MIS can be gauged by the timeliness of information received, system utilisation and the accuracy of information. Furthermore, performance measurement determines whether the system meets organisational goals. The survey indicates that the performance of current MIS in the organisations surveyed was found to be poor and regular reporting on MIS performance was not implemented. These drawbacks identified by the survey can be overcome by including performance measurement as a key element in the proposed guidelines for MIS development.

6. Measurement Techniques: (Technical)

Measurement techniques are employed before and after installation of MIS to determine the benefits associated with the introduction of information systems. This is particularly relevant for non-profit organisations because these benefits are difficult to quantify fiscally but offer advantages to the organisation and its clients. A majority of respondents in both countries supported the use of cost-benefit and cost-effectiveness analyses as examples of techniques that might be used in this part of the guidelines.

These six key elements form the proposed guidelines. If each key element is properly addressed, successful development of MIS is possible. This proposed guidelines are supported by the results of the fieldwork.

The significance of the survey evidence is that it supports and reinforces the validity of the proposed guidelines. All six key elements are regarded as important to the successful development and implementation of MIS in all non-profit making organisations and will enable them to make effective use of MIS. These key elements are encapsulated in the guidelines. Determination of Corporate Needs is the first essential step since this will provide the impetus for MIS development and provide its objectives. The second and third key elements, Management Commitment, and User Attitudes and Expectations, are both 'Conditions' for developing an MIS successfully. Gaining Management Commitment is necessary to support system development. The views of users will have to be taken into account if the new MIS is to achieve user acceptance and this necessitates the inclusion of User Attitudes and Expectations as a key element. The fourth key element is User Involvement which is an organisational issue. Appropriate organisational arrangements are needed for User Involvement to ensure the users' role in MIS development. The remaining key elements, Performance Measurement and Measurement Techniques, are 'Tools'. These tools are primarily concerned with assessing the changes to organisational performance attributed to MIS installation and the associated costs. It is not suggested that the key elements are in themselves entirely comprehensive or sufficient to guarantee success but from the investigation it appears that the six key elements are all critical to the successful development of MIS.

8.3 Research Contributions

The research presented in this thesis is concerned with the effective development of

MIS. The major contribution of this research is the provision of 'guidelines' consisting of a set of key elements designed to facilitate the successful development of computerised MIS in non-profit making organisations.

Although the individual key elements are discussed in a variety of contexts in the literature, the proposed guidelines are unique in combining all the key elements together.

Although the study has focused on non-profit making organisations and the surveys were undertaken in a hospital environment there is no reason why the guidelines should not be applicable to the development of computerised MIS in profit motivated organisations. The proposed guidelines are independent of the Bahraini environment and are expected to be equally effective in other countries.

In addition to the above contribution a working definition of MIS was put forward in chapter two as follows:

MIS is a system which provides historical, present and predictive information derived from both the internal operation of the organisation and the external environment. MIS supplies accurate, selective and timely information and supports the information needs of management at all levels of management activity to assist in decision-making.

This definition is more complete than those currently available in the literature. This definition is based on a detailed analysis of the range of definitions cited in the literature and underlines the key features of MIS which are universal and independent of the particular situations in which MIS can be used. Such a generally applicable

definition will not only help to resolve some of the confusion surrounding MIS it may also provide a clear sense of direction for the developers of MIS.

8.4 Recommendations for Further Work

The working definition put forward in chapter two was used in the development of the proposed guidelines. The proposed guidelines are designed to lead to the construction of an MIS which meets the working definition. Based on his local knowledge the author's view was that there was no computerised MIS system installed in Bahrain which met the working definition. This view was subsequently supported by the majority of the managers surveyed in Bahrain. The definition was employed in the second survey and met with no adverse reaction. The proposed guidelines have so far been tested in theory only and found to be acceptable to all levels of hospital management in Bahrain. It is recommended that the guidelines now be tested in practice in the Ministry of Health in Bahrain, for example, Salmania Medical Centre and the quality and performance of the resulting MIS be fully evaluated to assess the effectiveness of the guidelines.

It was suggested in section 8.3 that the proposed guidelines may be equally applicable to the development of successful MIS in profit-making organisations. Therefore, a second practical test could involve the application of the guidelines in a profit-making organisation, for example, in banking or insurance and the results compared with that for those achieved at Salmania Medical Centre.

Another possible application for the proposed guidelines could be as a diagnostic tool. The suggestion is that the proposed guidelines would be employed in a situation where MIS has been developed and installed but does not appear to meet the needs of its users effectively to determine the cause of the unsatisfactory performance. It is anticipated that an examination of the development process would highlight the omission of one or more of the key elements of the guidelines or their inadequate application. The identification of the causes of poor MIS performance would lead to the taking of more effective remedial action and to improvement in subsequent MIS development.

Evidence from the first survey on whether MIS has changed the attitudes of users to computer systems reveals a majority expressing a negative view. It would be very worthwhile to undertake a further study to determine the effects of raising the level of computer and MIS literacy on the successful development and application of MIS. Such a study could also usefully explore ways in which management literacy would be raised through training schemes as discussed in section 7.4.

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APPENDIX ONE

**Introduction to Bahrain, its Health Services and
the Current State of MIS in Bahrain**

APPENDIX ONE
INTRODUCTION TO BAHRAIN, ITS HEALTH
SERVICES AND THE CURRENT STATE
OF MIS IN BAHRAIN

1.1 The State Of Bahrain

Bahrain comprises a group of 36 islands with a total area of approximately 692 square kilometres located centrally on the southern shores of the Arabian Gulf. The islands lie 24 kilometres off the eastern coast of the kingdom of Saudi Arabia and are linked to each other through a causeway. The medium term projection for the population of Bahrain in 1990 is approximately half million. Bahrain declared independence in 1971, before which it was a British protectorate. A map of the State of Bahrain is in Appendix 4.

1.2 Health Services In Bahrain

The health services in Bahrain started in the early 1900's. Since then, the Government through the Ministry of Health is working very hard to provide advanced free total medical care (Primary and Secondary) to all citizens and non-citizens in the country. Hence the health sector is only one of the many fields that have benefited from the oil boom allowing modern hospitals and health centres to be built.

Primary health care is provided by the health centres. There are a total of 20 health centres distributed across the residential areas. Secondary health care is provided by

the Salmania Medical Centre, four Maternity Hospitals, the Geriatric Hospital and the Psychiatric Hospital. The total number of beds available in these hospitals is about 1300. The Government has approved the building of a new modern hospital with approximately 500 beds in Muharraq City.

In addition to the Salmania Medical Centre, there is a Bahrain Defence Force (BDF) Hospital which provides services to the Western Region residential area and to BDF staff and their relatives. The total number of beds available in the BDF hospital is about 196, though the number will be increased eventually to 681 beds.

There are three private hospitals in Bahrain: the American Mission Hospital with 40 beds, the Awali Hospital with 38 beds and the Bahrain International Hospital with 62 beds.

The location of private, governmental hospitals and health centres are shown on the map in Appendix 4.

1.3 The State of MIS in Bahrain

In Bahrain MIS application is still at very early stage and the use of MIS remains largely unexplored. Some Ministries have not yet achieved even minimal productive use of the computers. Computerisation in Bahrain was started in the oil boom years of the seventies. The Government of Bahrain used the Bahrain Petroleum Company (BAPCO) computer services facilities until the first government computer was installed during 1979.

1.4 The State of MIS in Bahrain Health Services

In June 1981 a number of vendors were invited to study user requirements for developing a Computerised Management Information System for Health in Bahrain. Some vendors replied and issued a number of different reports, for example, Bahrain Health Information Systems Users' Requirement Report by Computer Sciences Corporation, USA and Proposal for Bahrain Health Information Systems by ISMC, Sweden. (Both of these reports are confidential and are therefore not included in the references). However none of the respondents were selected and the Government decided to develop systems independently, irrespective of the time required to develop local expertise.

1.4.1 Bahrain Health Information Centre

In the Ministry of Health, the Bahrain Health Information Centre (BHIC) was developed to serve as the Ministry's primary centre for information technology. It would be responsible for computerisation of the Ministry of Health as well as for the evaluation and recommendation of systems equipment to be used within the Ministry.

BHIC is now in the early stages of planning for computerised Management Information Systems for the Ministry. BHIC is trying to pursue the difficult path towards providing management and medical personnel with a computerised information service which can be used as a management tool. The information presented to management requires data from every hospital function. Therefore, it would be sensible to link the data banks for the different functions in an integrated manner with the computer facilities which are available to the Ministry of Health in the Central Statistical Organisation (CSO) Computer Centre.

The only system to have been implemented in the Ministry of Health hospital (Salmania Medical Centre), is the Patient Administration System (PAS) and it is called Admission, Transfer and Discharge System (ATD). This undocumented system was developed using a 4GL prototype level system. For the Patient Master Index (PMI), the Salmania Medical Centre is using the nationwide computerised Central Population Registration (CPR) system which contains information on every citizen in Bahrain. This CPR has a unique number which is assigned to each resident and is used for every transaction (The CPR number is, for example, the driving licence number, the patient number, and a personal identification number). The patient has to present a CPR card for admission to the Medical Centre as it is required to provide positive identification of the patient. The CPR information is in a database and each Ministry or Department in the government has limited authority to access this database. The Government Computer Centre within the Computing Directorate is responsible for most of the Ministries' databases.

1.4.2 Computer Equipment And Application

An IBM 4381 system has been installed in the CSO since 1985 for the Ministry of Health. However, according to management sources less than 5 per cent of the system capacity is currently utilised because only a few systems have been developed. In addition a few basic applications have been developed by BHIC mainly for Personal Computers (PCs). These applications are standalone programs and are not integrated.

One of the problems which may limit the development of MIS in the Ministry of Health, is that of uncontrolled production of applications for PCs. Many programs have been written without documentation and by users with an inadequate background

in information systems and without the cooperation of the BHIC.

Although computerised Management Information Systems do not exist, there are ambitious management plans to implement such systems. Presently only basic parts of the Ministry of Health are computerised. None of the private hospitals in Bahrain is fully computerised.

APPENDIX TWO

Review of Other Measurement Techniques

APPENDIX TWO

REVIEW OF OTHER MEASUREMENT TECHNIQUES

2.1 Introduction

In this Appendix an attempt is made to review some other measurement techniques not addressed in main text of the thesis. They are not included in the main text because their sophistication makes them unsuitable in the Bahraini context.

2.2 Review of Other Measurement Techniques

Measuring systems benefits is a very difficult problem and organisations have found it increasingly hard to justify the costs surrounding the purchase, development and use of information systems. Recently, Farbey, Land and Targett (1991) studied sixteen Information Systems in different organisations ranging from financial services to the public sector. The projects were evaluated either by using the traditional Return On Investment (ROI) method or not evaluated at all. In this survey no "one best method" proved fruitful because the range of circumstances to which the techniques would be addressed is so wide that no one technique could cope. The authors outlined some of the methods referred to in the literature for estimating the cost and benefits of a project and for evaluating the value of projects. The following techniques were considered in the paper:

1. Return On Investment (ROI)
2. Cost-Revenue Analysis (CRA)
3. IBM SESAME
4. Cost-Benefits Analysis (CBA)
5. Information Economics (IE)
6. Multi-Objective, Multi-Criteria Methods
7. Boundary Value (BV)
8. Return On Management (ROM)
9. Value Analysis (VA)
10. Experimental Methods (Prototyping, Simulation, Gameplaying)
11. Composite Methods
12. Ad hoc Methods

A detailed discussion of all the items on this list can be found in Farbey, Land and Targett (1991). Cost-Benefit Analysis (item 4) has already been reviewed in chapter three. Information Economics (item 5) is considered below.

Measurement of MIS is poorly developed, not because it lacks importance or relevance but because it is sensitive as well as difficult (Symons 1990). Information Economics (see, Parker and Benson 1987, Parker, Benson and Trainor 1988) begins with establishing that traditional cost-benefit analysis is no longer adequate for most information systems applications that are innovative or that produce or enhance revenue. Nor is cost-benefit analysis necessary for developing information architectures and infrastructures. Information Economics is defined as an attempt to identify and measure or rank the economic impact on the organisation's performance of the change produced by the introduction of new systems. This technique was

developed specifically for measuring information systems projects (see Parker and Benson 1987, Parker, Benson and Trainor 1988, Parker and Benson 1989, Farbey, Land and Targett 1991).

Cost-Benefit Analysis has been used by managers to quantify the benefit of information systems. Parker, Benson and Trainor (1988) investigated ways of dealing with it in Information Economics in order to justify investments in information systems and suggested mixing the traditional cost-benefits analysis with four other techniques highly relevant for assessing potential information technology which they term, Value Linking, Value Acceleration, Value Restructuring, and Innovation Evaluation (see, also, Parker and Benson 1987, Ward 1990, Edwards, Ward and Bytheway 1991). According to this assessment:

1. Cost-Benefits Analysis: is useful when dealing with cost-displacement or cost-avoidance issues and for supporting tactical plans. Managers can apply their enterprise methods of justifying long-term capital investment to architecture-based and infrastructure-based projects.
2. Value Linking: this technique estimates the improvement in corporate performance.
3. Value Acceleration: this technique examines the time dependency issues, such as causing earlier achievement of benefits

Techniques 2 and 3 measure the information systems costs which create additional

benefits to the corporation's departments through ripple, knock-on effects (value-linking), or by making possible reduced time-scales for operations (value acceleration).

4. Value Restructuring: is a technique for examining the increase in productivity resulting from corporate change and change of job roles created by the introduction of the new system in the corporation.

Approaches 2,3 and 4 are to be used in conjunction with an expanded cost-benefit analysis to produce better insights into both costs and benefits of information system applications.

5. Innovation Evaluation: this technique is used to measure the impact of using information systems for new ventures. The value could be in the application itself, for example, the use of expert systems to diagnose machine faults, or in the image it creates for the organisation, for example, having computerised access to make an appointment with your GP while you are at home or at work.

Ward (1990) stated that by appraising costs and benefits using techniques advocated by Parker et al. the overall economics of an application can be assessed. The ideas are actually more creative in interpreting the long term value of information than traditional views of systems' investments. Although it is important to quantify and express in monetary terms costs and benefits wherever possible, it is not essential to convert all intangible benefits to a monetary value. It is impossible to express all the benefits in quantitative terms and it serves no useful purposes to develop artificial calculations to

measure unmeasurable benefits, if, for example, installing a Health Information System in a hospital improves staff morale because it seems that hospital management has seen fit to invest in improving hospital functions.

Despite the fact that Information Economics does not have all the answers, one particular useful aspect of it is its flexibility. For example, because all the criteria are ranked by each separate organisation, the process will be equally effective in non-profit organisations as in profit making ones.

Schafer et al. (1988) developed a Functional Analysis of Office Requirements (FAOR) for addressing social and organisational as well as economic and technical aspects in the development of systems requirements. According to Schafer et al. the FAOR approach aims to provide an analysis method for the office domain. FAOR focuses on the early stages of the life cycle of an office system where the successful application of office technology has to be identified. The requirements reflect what the office system is supposed to do and specify its features in sufficient detail for subsequent design. The objective of FAOR is summarised as: "developing an approach to be applied in an organizational setting for the purpose of identifying and evaluating the requirements which determine the design of office systems, in such a way that they support the achievement of selected organizational objectives". FAOR has five instruments, the Function Analysis Instrument (FAI), the Communication Analysis Instrument (CAI), the Information Analysis Instrument (IAI), the User Needs Analysis Instrument (NAI) and Benefit Analysis Instrument (BAI). Each one is a prepackaged set of tools, techniques and application principles which is tailored to accomplish a certain investigation, analysis modelling or evaluation task from one or several perspectives.

In most practical situations, the BAI forecasts the effects of a planned office system on the performance of office work by comparing the projected situation with present one or by comparing different planned alternatives. BAI starts with the difficulties of evaluating the impact of technology where only some benefits can be captured on a quantitative monetary basis. It is suggested that the primary task of BAI "is to get information about the requirements from a different angle by assuming that changes accruing, potentially or actually, from a conceived or implemented office system have already been made and by trying to see the effects generated by these changes on both the achievement of objectives of the organization and the office workers using the system". To devise an implementation strategy or to identify possible needs for future change, the information obtained from BAI may be used to improve the design of an office system.

The FAOR Benefit Analysis Instrument takes a functional view of office work and provides criteria for identifying and evaluating efficiency and effectiveness benefits which are specific to the organisation analysed. Based on a three level concept of benefits, a stepwise approach is suggested which should help the analyst to investigate the extent to which technological capabilities materialise into actual benefits. The FAOR Benefit Analysis is based on a comparison between the situation before and after the introduction of an investigated office system. Consequently, the analyst has to obtain precise knowledge of the actual change achieved by introducing the office systems.

Recently, Clemons (1991) developed techniques for evaluating the business case for strategic information systems and he presented several empirical cases where the

techniques were applied. Clemons stated "Strategic systems can have enormous impact on a firm and its entire industry, and can involve commensurate risks". The following are some of the essential questions that Clemons raised in relation to the development of a strategic programme:

- * What are the tangible and intangible benefits of the proposed strategic programme ?
- * How might changes in the organisation's future operating environment, either externally imposed or actually caused by the strategic programme, alter estimates of these benefits?
- * What are the costs of attempting the programme ?
- * What are the costs of potentially being frozen out of future opportunities by failing to attempt the programme ?
- * What are the risks of proceeding with the programme and how can they be managed ?

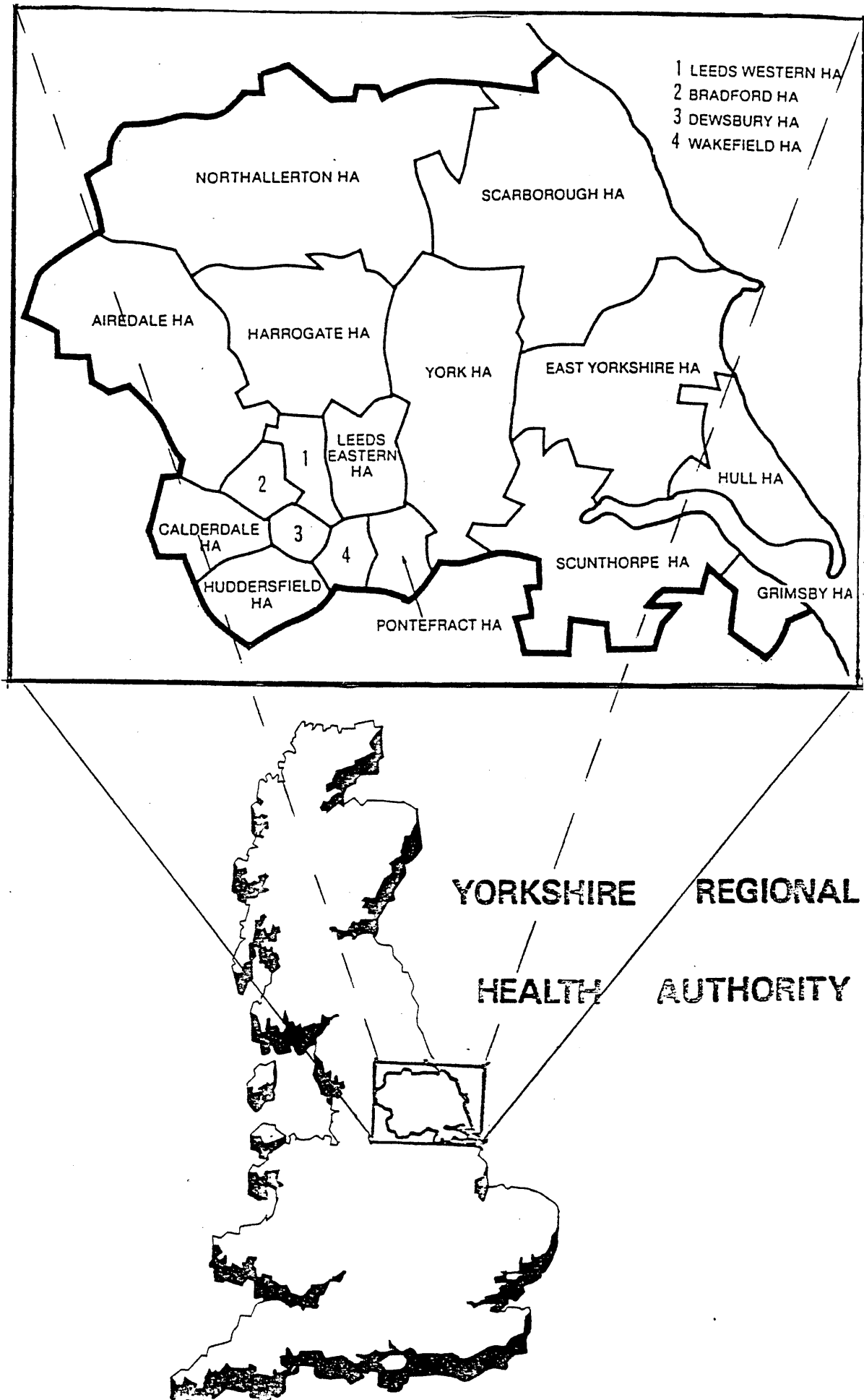
Although all of the case studies carried by Clemons represent profit making organisations, the above selected questions could be usefully addressed for non-profit organisations.

2.3 Conclusion

In addition to their sophistication, most of these techniques are not yet fully investigated or widely used. They therefore do not seem to be the right tools for 'newcomers' to the field of MIS, such as those in Bahrain. What must be recommended are well established techniques with proven efficacy such as Cost-Benefit Analysis and Cost-Effectiveness Analysis, as presented in chapter three. A case could be made, however, that if organisations such as those in Bahrain without any experience with computerised systems decide to adopt MIS they may as well start with the most up-to-date techniques they can find, such as Information Economics or FAOR, but the probability is that the cost of acquiring the necessary expertise to use them effectively would be greater than their value to the naive user. It would better to invest such effect elsewhere in the MIS development cycle.

APPENDIX THREE

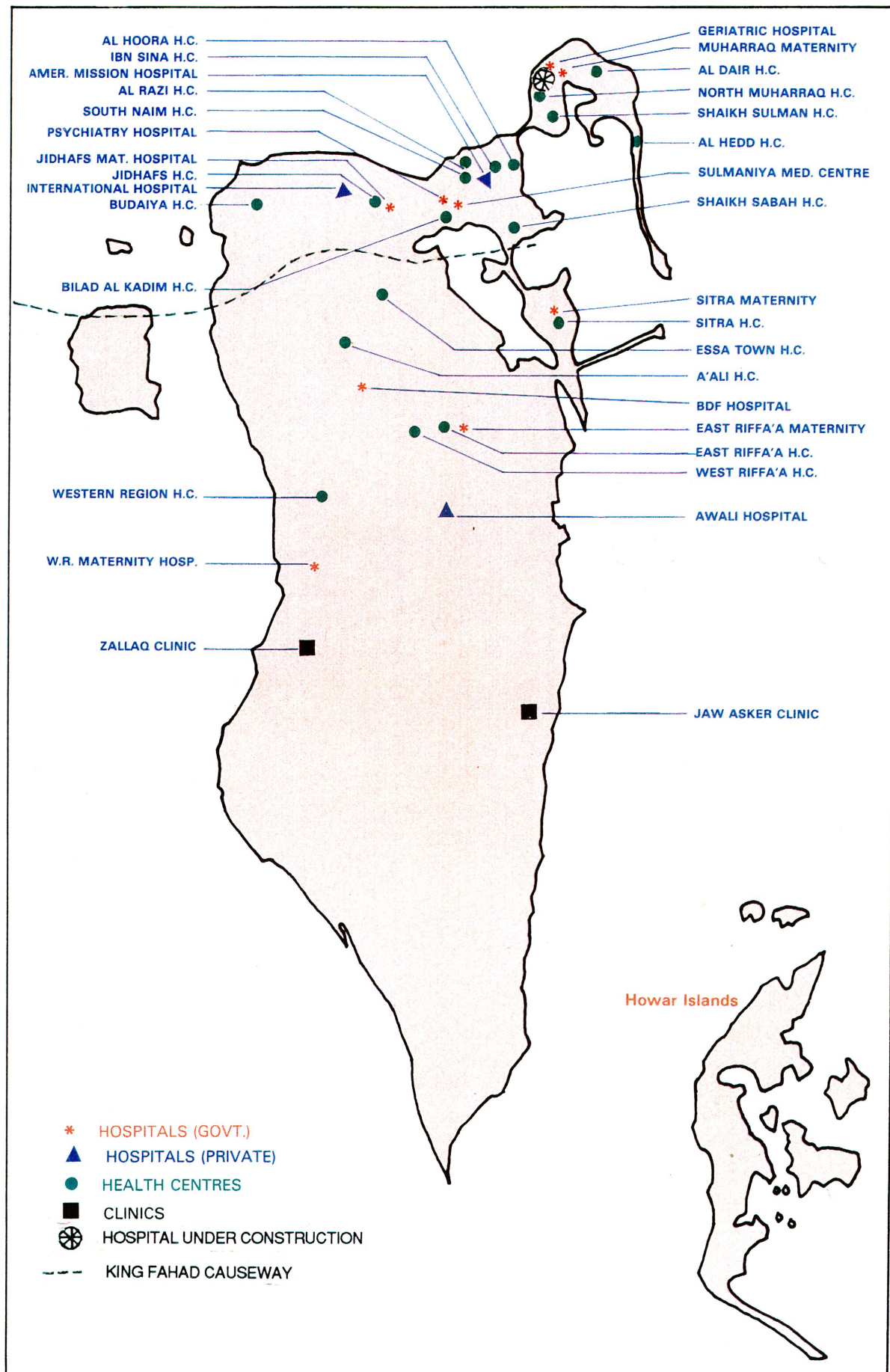
Map of the UK and the Yorkshire Region



APPENDIX FOUR

Map of the State of Bahrain

STATE OF BAHRAIN



Adapted From Ministry of Health Annual Report (1987).

APPENDIX FIVE

Covering Letters and the First Questionnaire (English version)

The University of Leeds

Leeds LS2 9JT

 Telephone Switchboard (0532) 431751 Direct Line (0532) 335430
 Telex 556473 UNLIDS G Fax (0532) 335468

School of Computer Studies

Head: DENIS HUTCHINSON, MA, FBCS, AFIMA

Deputy Head: LES PROLL, BSc, PhD, MBCS

Professor of Computer Science

PETER M. DEW, BTech, PhD, MACM,
MBCS, MIEE

10th October 1988

Dear Sir or Madam:

The University of Bahrain, College of Business and Management, where I am a lecturer has granted me a scholarship to study Computerised Management Information Systems (MIS) at the doctoral level (Ph.D.) at the University of Leeds, England, where I am investigating the Evaluation of Computerised Management Information Systems within non-profit organisation, for example, hospitals. I am intending to try and assess experience in both developed and developing countries and to relate it to the particular situation in Bahrain.

I would appreciate it if you could please answer the questions in the attached questionnaire at your earliest convenience and I will telephone before coming to collect it from you. If you have any questions regarding the instructions, filling the questionnaire or our use of the data, please contact me in Bahrain, telephone 681644 or my supervisor Mr Tom Gough in the University of Leeds, School of Computer Studies, telephone (0532) 335435 or Fax (0532) 335468.

We would like to assure you that any information you may provide will be used only for the purposes of this study and will be kept **CONFIDENTIAL**.

Thank you for your cooperation and I look forward to receiving your response.

Yours sincerely,



Adel Ismail Al-Alawi

Address in Bahrain

The University of Bahrain
 College of Business and Management
 P.O.Box 32038
 State of Bahrain.

Address in England

See Above

Telephone Switchboard (0532) 431751 Direct Line (0532) 335430
Telex 556473 UNLIDS G Fax (0532) 335478

School of Computer Studies

Head: DENIS HUTCHINSON, MA, FBCS, AFIMA
Deputy Head: LES PROLL, BSc, PhD, MBCS

Professor of Computer Science
PETER M. DEW, BTech, PhD, MACM,
MBCS, MIEE

15th February 1989

Dear Sir or Madam,

The University of Bahrain, College of Business and Management, where I am a lecturer has granted me a scholarship to study Computerised Management Information Systems (MIS) at the doctoral level (Ph.D.) at the University of Leeds, where I am investigating the Evaluation of Computerised Management Information Systems in Hospital Administration. I am intending to try and assess experience in both developed and developing countries and to relate it to the particular situation in Bahrain.

I would appreciate it if you could please answer the questions in the attached questionnaire at your earliest convenience. If you have any queries regarding the instructions, completing the questionnaire or our use of the data, please contact me on (0532) 335466 or my supervisor Mr Tom Gough on (0532) 335763.

We would like to assure you that any information you may provide will be used only for the purposes of this study and will be kept CONFIDENTIAL.

Thank you for your cooperation and I look forward to receiving your response.

Yours sincerely,



Adel Ismail Al-Alawi

The University of Leeds

Leeds LS2 9JT

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Deputy Head: LES PROLL, BSc, PhD, MBCS

Professor of Computer Science

PETER M. DEW, BTech, PhD, MACM,
MBCS, MIEE

3rd April 1989

Dear Sir or Madam,

***QUESTIONNAIRE ON EVALUATION OF
COMPUTERISED MANAGEMENT INFORMATION
SYSTEMS IN HOSPITAL ADMINISTRATION***

This is a follow-up to my letter and questionnaire of 15 February 1989.

We would welcome your completion of the questionnaire as having already used a similar questionnaire in Bahrain we are anxious to obtain enough data for comparative purposes. Your responses will remain confidential and will be used only in our study.

We look forward to a favourable response.

Yours sincerely,



Adel Ismail Al-Alawi

QUESTIONNAIRE ON EVALUATION
OF COMPUTERISED
MANAGEMENT INFORMATION SYSTEMS
IN HOSPITALS

OCTOBER 1988

Adel Ismail Al-Alawi

INTRODUCTION

All your responses to these questions will be kept **CONFIDENTIAL** and your responses will not be sent to any other organisation.

For the purpose of this questionnaire, a Management Information System (MIS) is defined as a system that does more than just process routine operational data but has an additional capability of providing summary information, perhaps by integrating material from more than one routine operational system.

Thank you for participating in this questionnaire.

PART 1 : DETAILS OF RESPONDENT

To assist us with our analysis and / or if we need to ask for clarification, please identify yourself below:-

1. Name: _____
2. Position: _____
3. Department / Section: _____
4. Organisation: _____
5. Phone Number: _____

PART 2 : QUESTIONNAIRE

6. Are you a member of any of the following committees ?

6.1 Steering Committee for Computer Systems Development

Yes ☐ No ☐ No Such Committee ☐

If NO, have you been a member before ?

Yes ☐ No ☐

6.2 Management Planning Committee

Yes ☐ No ☐ No Such Committee ☐

If NO, have you been a member before ?

Yes ☐ No ☐

6.3 Information Systems Committee

Yes ☐ No ☐ No Such Committee ☐

If NO, have you been a member before ?

Yes ☐ No ☐

6.4 User-Group Committee

Yes ☐ No ☐ No Such Committee ☐

If NO, have you been a member before ?

Yes ☐ No ☐

6.5 Are you a member of any other computing Committee/s ?

Yes ☐ No ☐

If YES, please identify it/them : _____

7. Do you have a terminal or a PC connected to the main computer to access the information you require ?

Yes ☐ No ☐ No Such Facilities Available ☐

8. Do you have a standalone PC ?

Yes ☐ No ☐

9. How is your MIS function structured with regard to management and systems development personnel ? (Please tick the one that most closely describes your organisation).

9.1 One centralised MIS organisation supports the entire enterprise. ☐

9.2 Each division / department has its own independent MIS section. ☐

9.3 Each division / department has its own MIS section, but these report to the corporate MIS organisation. ☐

9.4 None of the above. (Please specify briefly) ☐

9.5 Do not have an MIS function. ☐

10. Approximately how many full-time employees are in your organisation? _____

Don't Know ☐

11. Approximately what is your organisation's annual budget ? _____

Don't Know ☐

12. Approximately how many full-time employees are in your MIS/DP department ? _____

Don't Know ☐

13. Approximately what is your MIS/DP annual budget ? _____

Don't Know ☐

Please circle the appropriate number (0-5) that most closely describes your level of agreement with the following statements or questions, where:-

- 0 = Don't Know
 1 = Not at all
 2 = To a Small Degree
 3 = To a Moderate Degree
 4 = To a Large Degree
 5 = Maximally / Essential

<u>QUESTIONNAIRE ITEM</u>	<u>LEVEL OF AGREEMENT</u>					
14. Is there a need for Arabisation of MIS ? (IN U.K PLEASE IGNORE QUESTION NO. 14)	0	1	2	3	4	5
15. It is important for every manager to have a terminal or a PC connected to the main computer to access the information s/he requires.	0	1	2	3	4	5
16. Do you agree with the claim that some managers are afraid of computers ?	0	1	2	3	4	5
17. MIS investments that are not in support of corporate strategy will not help achieve corporate strategic goals.	0	1	2	3	4	5
18. Executives are more interested in results and in information that clarifies goals than in how the information is obtained.	0	1	2	3	4	5
19. How important do you consider computing to be in the search for greater efficiency ?	0	1	2	3	4	5
20. The installation of MIS should reduce the running costs of the organisation.	0	1	2	3	4	5

21. Management should actively promote training in MIS for potential users of MIS. 0 1 2 3 4 5

22. Is there any type of computerised MIS installed within your organisation ?

Yes ☐ No ☐

IF YES, GO TO QUESTION (30)

23. Is there a need for MIS in your organisation? 0 1 2 3 4 5

24. How important do you believe it is for your organisation to have MIS ? 0 1 2 3 4 5

25. How valuable do you expect MIS to be to you ? 0 1 2 3 4 5

26. How would you characterise the likelihood of MIS being a success in your organisation ? 0 1 2 3 4 5

27. Should users be actively involved in MIS planning and application development ? 0 1 2 3 4 5

28. MIS should have an effective strategy to deliver useful, integrated decision support systems for its users. 0 1 2 3 4 5

29. What level of importance do you attach to management involvement in the design and development of MIS ? 0 1 2 3 4 5

{ PLEASE TURN TO QUESTION 52 }

30. How satisfied are you now with MIS ? 0 1 2 3 4 5

31. To what extent do you use the MIS ? 0 1 2 3 4 5

32. Has there been any sort of User Satisfaction Survey ?

Yes ☐ No ☐

If YES,

What was the overall result of the User Satisfaction Survey ?

0 1 2 3 4 5

33. If you have an MIS organisation, does it issue regular reports on its performance ?

Yes ☐ No ☐

If YES, please tick the categories of personnel that regularly receive MIS performance reports :

<u>Internal Reports</u> <u>(MIS Personnel)</u>	<u>External Reports</u> <u>(Non-MIS Personnel)</u>
Managerial Level Only ☐	Executive Management ☐
All MIS Personnel ☐	Steering Committee Members ☐
Operational Level ☐	Others Committee Members ☐
Other, please specify ☐	Middle Management ☐

_____	End Users, regardless of position ☐

- | | | | | | | |
|---|---|---|---|---|---|---|
| 34. Is MIS designed to support all levels of management ? | 0 | 1 | 2 | 3 | 4 | 5 |
| 35. Are you familiar with MIS development in your organisation ? | 0 | 1 | 2 | 3 | 4 | 5 |
| 36. The use of MIS has resulted in improved user decision making. | 0 | 1 | 2 | 3 | 4 | 5 |
| 37. Increasing MIS expenditure has yielded higher management performance. | 0 | 1 | 2 | 3 | 4 | 5 |
| 38. Ease of system use is more important than sophistication. | 0 | 1 | 2 | 3 | 4 | 5 |
| 39. In your opinion, how adequate was your management's support and commitment to the MIS development ? | 0 | 1 | 2 | 3 | 4 | 5 |
| 40. MIS specialists should be actively involved in corporate planning. | 0 | 1 | 2 | 3 | 4 | 5 |
| 41. In comparison to other projects within the organisation, how high a priority do you believe the management placed on the development of MIS ? | 0 | 1 | 2 | 3 | 4 | 5 |
| 42. To what extent did you participate in the design and development of MIS ? | 0 | 1 | 2 | 3 | 4 | 5 |
| 43. Have you been kept sufficiently informed about MIS ? | 0 | 1 | 2 | 3 | 4 | 5 |
| 44. Do you agree with the cost justification of your MIS installation ? | 0 | 1 | 2 | 3 | 4 | 5 |

45. How would you rate the overall performance of your MIS ? 0 1 2 3 4 5

46. Has MIS changed the way in which operations are performed ? 0 1 2 3 4 5

47. Has MIS changed the accuracy of information that you receive ?

Better ☐ Worse ☐ No Change ☐

48. A variety of criteria can be used to measure an investment's attractiveness - please indicate the extent to which each of following measures **WERE** used to evaluate the MIS :

1. Break-Even Analysis	0	1	2	3	4	5
2. Cost-Benefit Analysis	0	1	2	3	4	5
3. Internal Rate of Return	0	1	2	3	4	5
4. Net Present Value	0	1	2	3	4	5
5. Payback Period Analysis	0	1	2	3	4	5
6. Cost Effectiveness Analysis	0	1	2	3	4	5
7. Other : Please specify	0	1	2	3	4	5

49. Was your current MIS system developed by ?

[Tick as many as apply]

a. Departmental MIS Staff

☐

b. Outside Consultants

☐

c. Headquarters MIS Staff

☐

d. Vendors

☐

e. Other,

☐

Please specify.

If (a)

Were there any computerised development tools (e.g CASE, IPSE, 4GLs) installed and utilised ?

Yes

☐

No

☐

If YES, please specify the tools used.

50. Has MIS changed the timeliness of information and reports you receive?

Better Worse No Change

51. Has MIS changed the attitudes of users
to computer systems ?

0 1 2 3 4 5

52. A variety of criteria can be used to measure an investment's attractiveness - please indicate the extent to which each of following measures **SHOULD BE** used in your **opinion** to evaluate the MIS :-

1. Break-Even Analysis	0	1	2	3	4	5
2. Cost-Benefit Analysis	0	1	2	3	4	5
3. Internal Rate of Return	0	1	2	3	4	5
4. Net Present Value	0	1	2	3	4	5
5. Payback Period Analysis	0	1	2	3	4	5
6. Cost Effectiveness Analysis	0	1	2	3	4	5
7. Other : Please specify	0	1	2	3	4	5

53. To what extent are the following systems computerised ?

01. PAS (Patient Administration System)	0	1	2	3	4	5
02. PMI (Patient Master Index)	0	1	2	3	4	5
03. Out-Patients	0	1	2	3	4	5
04. In-Patients	0	1	2	3	4	5
05. Waiting Lists	0	1	2	3	4	5
06. Accident And Emergency (A & E)	0	1	2	3	4	5
07. Pathology	0	1	2	3	4	5
08. Intensive Care	0	1	2	3	4	5
09. Radiology	0	1	2	3	4	5
10. Maternity Care	0	1	2	3	4	5
11. Psychiatric Care	0	1	2	3	4	5
12. Community Care	0	1	2	3	4	5
13. Day Care	0	1	2	3	4	5
14. Nursing	0	1	2	3	4	5
15. Catering & Hotel	0	1	2	3	4	5
16. Pharmacy	0	1	2	3	4	5
17. X-Ray	0	1	2	3	4	5
18. Administration	0	1	2	3	4	5
19. Personnel	0	1	2	3	4	5
20. Payroll	0	1	2	3	4	5
21. Works	0	1	2	3	4	5
22. Stores	0	1	2	3	4	5
23. Other : Please specify	0	1	2	3	4	5

54. Have you any further comments which you like to make regarding MIS?

THANK YOU FOR PARTICIPATING IN THIS SURVEY.

Adel Al-Alawi

APPENDIX SIX

Covering Letter and the Second Questionnaire (English version)

The University of Leeds Leeds LS2 9JT

Telephone Switchboard (0532) 431751 Direct Line (0532) 335430
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School of Computer Studies

Head: DENIS HUTCHINSON, MA, FBCS, AFIMA
Deputy Head: LES PROLL, BSc, PhD, MBCS

Professor of Computer Science
PETER M. DEW, BTech, PhD, MACM, MBCS, MIEE

3rd April 1989

Dear Sir or Madam,

**QUESTIONNAIRE ON EVALUATION OF
COMPUTERISED MANAGEMENT INFORMATION
SYSTEMS IN HOSPITAL ADMINISTRATION**

This is a follow-up to my letter and questionnaire of 15 February 1989.

We would welcome your completion of the questionnaire as having already used a similar questionnaire in Bahrain we are anxious to obtain enough data for comparative purposes. Your responses will remain confidential and will be used only in our study.

We look forward to a favourable response.

Yours sincerely,



Adel Ismail Al-Alawi

QUESTIONNAIRE ON
DEVELOPMENT OF COMPUTERISED
MANAGEMENT INFORMATION SYSTEMS
IN HOSPITAL ADMINISTRATION

Management Reaction to the Proposed Key Elements

OCTOBER 1989

ADEL ISMAIL AL-ALAWI
COLLEGE OF BUSINESS AND MANAGEMENT
THE UNIVERSITY OF BAHRAIN
P.O. BOX 32038
STATE OF BAHRAIN

INTRODUCTION

This is a follow-up to my questionnaire of September 1988. The purpose of this questionnaire is to find out your reaction to our proposed key elements for developing Management Information Systems (MIS).

We would welcome your completion of this questionnaire. Your responses will remain **CONFIDENTIAL** and will be used only in our study.

DEFINITION OF MANAGEMENT INFORMATION SYSTEMS (MIS)

For the purpose of this questionnaire, a Management Information System (MIS) is defined as a system which provides historical, present and predictive information derived from both the internal operation of the organisation and the external environment. MIS supplies accurate, selective and timely information and supports the information needs of management activity to assist in decision-making.

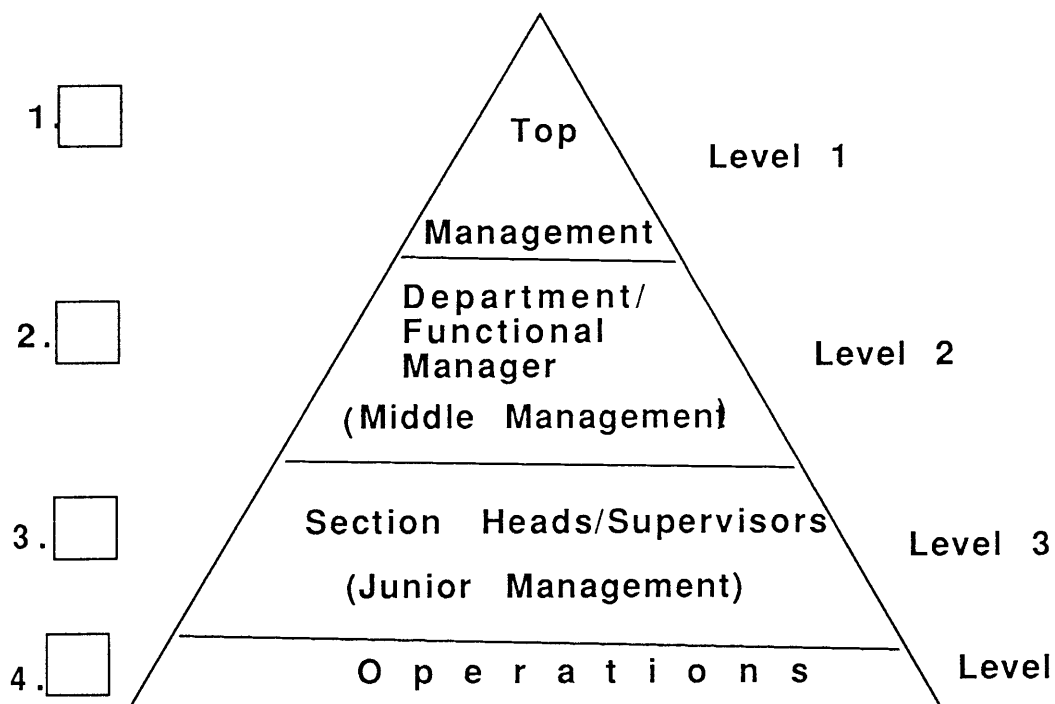
Note: The abbreviation MIS has been used throughout the questionnaire.

Thank you for participating in this questionnaire.

PART 1: DETAILS OF RESPONDENT

To assist us with our analysis and/or if we need to ask for clarification, please identify yourself below:

1. NAME: _____
2. POSITION AND GRADE (your grade as appeared in your pay slip): _____
3. DEPARTMENT/SECTION: _____
4. HOSPITAL/HEALTH CENTRE: _____
5. ORGANISATION: _____
6. TELEPHONE NUMBER: _____
7. In the following organisation hierarchy, how would you classify your management level? *(Please tick the one that most closely matches your level of management).*



PART 2: BRIEF EXPLANATION OF PROPOSED KEY ELEMENTS FOR THE SUCCESSFUL DEVELOPMENT OF MANAGEMENT INFORMATION SYSTEMS (MIS)

It is suggested that the following factors are all critical to the successful development of Management Information Systems (MIS) and these factors constitute the key elements by which MIS should be developed.

1. DETERMINATION OF CORPORATE NEEDS:-

Corporate needs are defined as the clear overall strategic goals and objectives of the organisation. Determination is concerned with establishing corporate needs and assessing how MIS can contribute to satisfying these needs.

2. USER ATTITUDES AND EXPECTATIONS:-

This key element is directed to whether users have positive or negative attitudes to MIS and what they expect to get from MIS.

3. MANAGEMENT COMMITMENT:-

This key element is directed to level of management commitment to the MIS and the importance attached to MIS by management at different levels.

4. USER INVOLVEMENT:-

Users involvement is concerned with how and when users take part in the development of MIS and the influence that users can/should exert over MIS development.

5. MEASUREMENT TECHNIQUES (e.g Cost-Benefit & Cost -Effectiveness Analyses)

Cost-Benefit Analysis is defined as a technique for assessing the desirability of a project through a systematic examination of the anticipated costs and benefits associated with the project. The goal of *Cost Effectiveness Analysis* is to identify the most efficient alternative that allows one to reach a pre-defined objective within a stated level of expenditure.

6. PERFORMANCE MEASUREMENT:-

This is measurement of the effects or changes to the organisation's performance that can be attributed to the introduction of MIS.

PART 3: QUESTIONNAIRE

Please circle the appropriate number (0-5) that most closely describes your level of agreement with the following key elements. Where:-

0 = Don't Know

1 = Not at all

2 = To a Small Degree

3 = To a Moderate Degree

4 = To a Large Degree

5 = Maximally/Essential

1. A variety of elements may be used to develop a Management Information System (MIS) - Please indicate the extent to which each of the following development key elements **SHOULD BE** used to develop MIS:-

<u>KEY ELEMENT</u>	<u>LEVEL OF AGREEMENT</u>					
1.1 Determination of Corporate Needs	0	1	2	3	4	5
1.2 User Attitudes and Expectations	0	1	2	3	4	5
1.3 Management Commitment	0	1	2	3	4	5
1.4 User Involvement	0	1	2	3	4	5
1.5 Measurement Techniques	0	1	2	3	4	5
1.6 Performance Measurement	0	1	2	3	4	5

2. Which of the following key elements would you consider to be the most useful/beneficial? *(Please indicate preference in order by ranking from 1-6, by entering "1" by your first preference, "2" by second, etc.)*

2.1 Determination of Corporate Needs

2.2 User Attitudes and Expectations

2.3 Management Commitment

2.4 User Involvement

2.5 Measurement Techniques

2.6 Performance Measurement

3. Would you agree with the proposed key elements for developing MIS ?

YES

NO

Don't Know

4. Would you suggest any additions to the proposed key elements ?

YES

NO

Don't Know

If YES, please specify:

5. Would you replace (or delete) any of the proposed key elements ?

YES

NO

Don't Know

If YES, please specify which key elements you would replace (or delete):

6. Do you have any further comments which you would like to make regarding MIS ?

THANK YOU FOR PARTICIPATING IN THIS SURVEY

Adel Ismail Al-Alawi

APPENDIX SEVEN

Covering Letter and the Second Questionnaire (Arabic version)



Ref.:

الرقم:

Date:

التاريخ

بسم الله الرحمن الرحيم

١٠ أكتوبر 1989م

الفاضل / الفاضله

تحية طيبة وبعد

الموضوع : استبيان
لتقييم نظم المعلومات
الإدارية المبنيه على استخدام
الكمبيوتر في إدارة المستشفيات

[وجهه النظر الإدارية لمعايير التقييم المقترحه]

نشكر لكم مشاركتكم الفعالة معنا في الإجابة على الاستبيان في
العام الماضي حيث كانت موضع تقديرنا واهتمامنا اثناء عملية
اعداد البحث التي هي جزء من متطلبات دراستي للحصول على درجة
الدكتوراه في نظم المعلومات الإدارية المبنيه على استخدام
الكمبيوتر.

المرفق بطيه استبيان اخر لاستكمال البحث المشار اليه. نرجو
التكرم بالرد على اسئلة هذا الاستبيان بدقه وموضوعية لماله من
اثر في رفع مستوى البحث وذلك في مده اقصاها 30 اكتوبر 1989.

هذا ونؤكد لكم ان جميع المعلومات التي ستقدمونها سوف تكون
بغايه السريه ولن تستغل الا لاغراض هذه الدراسة.

وفقنا الله في خدمة الجميع وشكرا جزيلا لتعاونكم.

المخلص

عادل اسماعيل العلوي

ملحوظة

لمزيد من الاستفسار يرجى
الاتصال بنا في جامعة البحرين على
هاتف 688308 او بمركز نظم المعلومات الصحية
بمستشفى السلمانية الطبي على هاتف 255555



استبيان

تقييم نظم المعلومات الادارية المبنيه على

استخدام الكمبيوتر

في ادارة المستشفيات

(وجهة النظر الادارية لمعايير التقييم المقترحة)

اكتوبر ١٩٨٩

عادل اسماعيل العلوي

جامعة البحرين

كلية ادارة الاعمال

ص . ب : ٣٢٠٣٨

هاتف : ٦٨٨٣٠٨

دولة البحرين

المقدمة

هذا الاستبيان هو ملحق لاستبيان سبتمبر 1988. الهدف من هذا الاستبيان هو التعرف على آرائكم حول معايير التقييم المقترحة لنظم المعلومات الإدارية (MIS)

نقدر تعاونكم في الإجابة على الاستبيان علما بان جميع الاجابات سوف تبقى في غاية السرية ولن تستغل الا لأغراض هذه الدراسة .

تعريف نظم المعلومات الإدارية (MIS)

لهدف هذا الاستبيان يمكن تعريف نظام المعلومات الإدارية MANAGEMENT INFORMATION SYSTEM (MIS) على انه نظام يقوم بمعالجة البيانات المرتبطة بالعمليات الروتينية بالإضافة الى القدرة على تقديم موجز للمعلومات من خلال تكامل وربط للمواد المتوفرة من أكثر من نظام عملي روتيني . (سأستخدم كلمة MIS اختصارا لنظم المعلومات الإدارية في هذا الاستبيان).

شكرا على تعاونكم في المشاركة بهذا الاستبيان
ووفقنا الله في خدمة الجميع ...

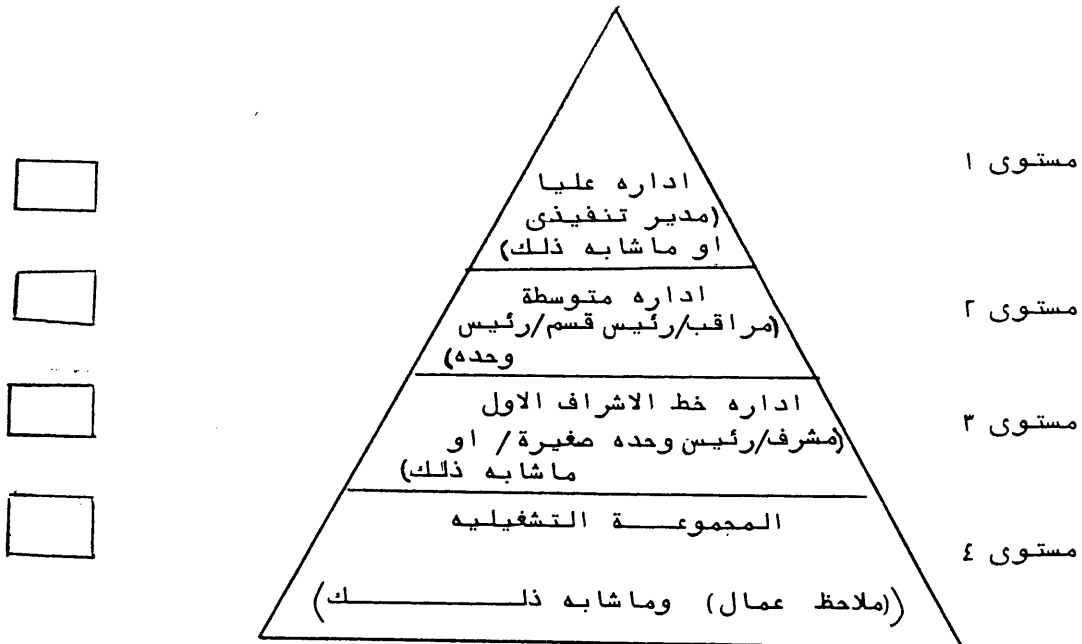
القسم الاول : تفاصيل الإجابة :

لمساعدتنا في التحليل وعند الحاجة لمزيد من التوضيحات الرجاء
ان تعرف عن أنفسكم كالتالي:

- 1- الاسم : _____
- 2- المركز والدرجة : (درجتك كما هي مدونه في اشعار الراتب)

- 3- الدائرة / القسم : _____
- 4- مستشفى/مركز صحي: _____
- 5- المؤسسة /الوزارة : _____
- 6- رقم الهاتف : _____

7- في الشكل الموضح ادناه ، كيف تصنفون مستواكم الإداري؟
(يرجى وضع علامة ✓ في الخانة التي ترونها مطابقة
لمستواكم الإداري).



القسم الثاني:

شرح موجز للمعايير المقترحة لتقييم نظم المعلومات الإدارية (MIS):

من المقترح ان العوامل التالية هي العوامل المؤثرة في التنفيذ الناجح لنظم المعلومات الادارية وهذه العوامل تشكل المعايير التي من خلالها يمكن تقييم ال (MIS).

1- تحديد احتياجات المؤسسة:

يمكن تعريف احتياجات المؤسسة على انها الاهداف الاستراتيجية الواضحة والكاملة للمؤسسة. عملية التحديد مرتبطة بمدى مشاركة ال MIS في تلبية احتياجات المؤسسة.

2- مواقف وتوقعات المستخدمين:

هذا المعيار يعتمد على تقييم مواقف المستخدمين من ال MIS فيما كانت ايجابية او سلبية وما يتوقعون الحصول عليه من استخدام ال MIS.

3- الالتزام الاداري:

هذا المعيار يعتمد على تقييم مستوى الالتزام الاداري بال MIS والاهمية المتعلقة بالمستويات الادارية المختلفة في الالتزام بل MIS

4- مشاركة المستخدمين:

مشاركة المستخدمين تتعلق بتحديد كيفية وتوقيت اعطاء المستخدم دوره في تطوير ال MIS بالإضافة كتأثير الى المجهود الذي يبذله في عملية تطوير ال MIS.

5- قياس التقنيات المستخدمة في تقييم نظم المعلومات (مثلا تحليل التكلفة / المنفعة وتحليل فعالية التكلفة):

يمكن تعريف تحليل التكلفة / المنفعة على انها قياس تقييمي لمرغوبية المشروع من خلال دراسة نظميه للتكلفة والمنفعة المتوقعة من المشروع. الهدف من تحليل فعالية التكلفة هو ايجاد البديل الأكثر فعالية والذي يسمح بالحصول على اهداف معرفة مسبقه ضمن مستوى محدد من الإنفاق.

6- ادخال نظام ال MIS وقياس اداء المؤسسة بعد ذلك:

هذا القياس هو للتأثيرات او التغييرات في الاداء الناتجة عن وضع ال MIS موضع الاستخدام.

القسم الثالث: الاستبيان

يرجى وضع دائرة حول الرقم الذى يمثل اجابتك وموافقتك
مع الملاحظه بان الرقم :

- =0 لا اعلم/ لا ادري
=1 ابدا لا اوافق
=2 اوافق الى حد ما
=3 اوافق بدرجة متوسطة
=4 اوافق بشده
=5 اوافق الى اقصى حد

1- هناك عدة معايير يمكن استخدامها في تقييم نظم المعلومات الادارية . يرجى الاشارة الى المدى الذى يجب استخدام كل من المعايير المقترحة التالية في تقييم نظم المعلومات الادارية .

<u>المعايير</u>	<u>مستوى التوافق</u>
1.1 - تحديد احتياجات المؤسسة	0 1 2 3 4 5
2.1 مواقف وتوقعات المستخدمين	0 1 2 3 4 5
3.1 الالتزام الاداري	0 1 2 3 4 5
4.1 مشاركة المستخدمين	0 1 2 3 4 5
5.1 قياس التقنيات المستخدمة في نظم المعلومات	0 1 2 3 4 5
6.1 ادخال نظام الـ MIS وقياس اداء المؤسسة بعد ذلك.	0 1 2 3 4 5

2- اي من المعايير التالية تعتقدون انها الاكثر نفعا وفائدة
(يرجى الاشارة الى الاختيار المفضل بوضع الارقام من
1-7 بالترتيب حيث رقم 1 يشير الى الاختيار الاول ، رقم 2
الى الاختيار الثاني وهكذا ..)

☐

1.2 تحديد احتياجات المؤسسة

☐

2.2 مواقف وتوقعات المستخدمين

☐

3.2 الالتزام الاداري

☐

4.2 مشاركة المستخدمين

☐

5.2 قياس التقنيات المستخدمة
في نظم المعلومات

☐

6.2 ادخال نظام الـ MIS وقياس
اداء المؤسسة بعد ذلك

3- هل توافقون على المعايير المقترحة لتقييم الـ MIS

نعم ☐ كلا ☐ لا اعرف ☐

4- هل تقترحون اي اضافات على المعايير المقترحة

نعم ☐ كلا ☐ لا اعرف ☐

اذا كان الجواب نعم فالرجاء ذكرها

5- هل تفضلون تبديل او الغاء اي من المعايير المقترحة ؟

نعم ☐ كلا ☐ لا اعرف ☐

اذا كان الجواب نعم، فالرجاء توضيح المعايير التي
تقترحون تغييرها او الغائها..

6- هل لديكم اي تعليقات او ملاحظات اضافية تودون ذكرها
بالنسبة لـ MIS.

شكرا على مشاركتكم في هذه الدراسة

عادل اسماعيل العلوي

اكتوبر ١٩٨٩