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COMPUTER-BASED INFORMATION SYSTEMS AND THEIR USE BY MANAGERS IN SAUDI ARABIA AND THE UK

By

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A Doctoral Thesis
Submitted in partial fulfilment of the requirements For the award of
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1998

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ABSTRACT

Computer-Based Information Systems (CBIS) are now widely used for supporting business activities; they are recognised as a tool that can produce information for management decision-making. The present study has utilised both qualitative and quantitative methods of data collection to investigate the way computer-based information systems are being used for management purposes in Saudi Arabia. Some data have also been obtained in the UK to examine comparatively the impact of computer-based information systems on the work of managers in business organisations in Saudi Arabia and the UK. This examination has involved determining the uses that managers are making of CBIS, and evaluating levels of satisfaction.

The sample has covered a range of firms, but has concentrated particularly on oil companies and banks. The reason for this choice is that Saudi Arabia depends on these two for much of its economic activity. For the UK, the study has involved a small sample of three companies. The first was Shell, to compare with the Saudi Arabian oil companies. The other two companies were Astra and Andaris. These were selected as high technology companies which were expected to put considerable emphasis on computer-based information systems.

In order to fulfil the aims and objectives of this study, a research model was developed, which describes the characteristics of the approach for the study and the variables considered. The first stage of the subsequent investigation involved a questionnaire distributed in Saudi Arabia firms (72.1% of 1000 questionnaires were returned) and UK firms (74% of 140 questionnaires were returned). The second stage involved a series of interviews carried out in both Saudi Arabia (19 respondents) and the UK (11 respondents) with selected managers and selected computer centre managers.

The main findings of the study show that CBIS is already highly used in Saudi Arabia, but that some problems (e.g. with training) still remain. There also appear to be some differences between Saudi Arabia and the UK.
DEDICATIONS

I dedicate this thesis to the soul and spirit of my brother Ayed (may god redeem him). I had wished that he could have lived to see this work.

To my beloved wife Huda for her generous support and the sacrifices she has made for my sake.
ACKNOWLEDGEMENTS

I would like to express my sincere thanks and appreciation to a number of people without whose support and encouragement this work would not have been completed.

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I am also most grateful to Dr. R. P Sturges, for the great amount of time, help and support he has given me during this work.

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My sincere gratitude is extended as well to my wife, Huda, for her caring, compassion and many sacrifices during the difficult times I have encountered while undertaking this work. I am extremely grateful for her continued-shared responsibility, support and help to finish my study, and also for creating a good atmosphere while I was working at home.

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# TABLE OF CONTENTS

LIST OF TABLES vii
LIST OF FIGURES ix
ABBREVIATIONS x

## CHAPTER ONE: INTRODUCTION

1.1 Introduction ................................................................................ 1
1.2 Aim of the study ........................................................................ 6
1.3 Objectives of the study ............................................................. 6
1.4 Hypotheses ................................................................................ 7
1.5 Definitions ................................................................................ 8

## CHAPTER TWO: GENERAL BACKGROUND

2.1 Introduction ................................................................................ 11
2.2 Geography ................................................................................ 12
2.3 Climate .................................................................................... 15
2.4 History ..................................................................................... 15
2.5 Government ............................................................................. 17
2.6 Population ................................................................................ 19
2.7 Language ................................................................................ 20
2.8 Currency .................................................................................. 20
2.9 Education ............................................................................... 20
2.10 Economy ............................................................................... 25
2.11 Saudi Arabia development plans ........................................... 27
2.11.1 The first development plan (1970-1975) 28
2.11.2 The second development plan (1975-1980) 29
2.11.3 The third development plan (1980-1985) 30
2.11.4 The fourth development plan (1985-1990) 32
2.11.5 The fifth development plan (1990-1995) 33
2.11.6 The sixth development plan (1995-2000) 35

CHAPTER THREE: SAUDI ARABIAN ORGANISATIONS AND INFORMATION TECHNOLOGY

3.1 Introduction 37
3.2 Business organisation structure 38
3.3 The Royal Commission for Jubail and Yanbu 44
  3.3.1 Jubail 45
  3.3.2 Yanbu 47
3.4 Saudi Arabian Basic Industries Corporation 48
3.5 Saudi Arabian Oil Company 51
3.6 The Council of Saudi Chamber of Commerce and Industry 57
  3.6.1 Information Centre 58
  3.6.2 The Riyadh Chamber of Commerce and Industry 60
3.7 Banking 60
  3.7.1 Arab national bank 65
  3.7.2 United Saudi Commercial Bank 66
  3.7.3 The other banks 66
3.8 IT training centres 67
3.9 Arabisation 67
3.10 IT marketing in Saudi Arabia 70

CHAPTER FOUR: REVIEW OF PREVIOUS WORK

4.1 Introduction 73
4.2 Organisational support 74
4.3 Information technology and the manager 87
4.4 User satisfaction 95
6.10 Correlation between usage and individual impact 213
6.11 Correlation between satisfaction and individual impact 217
6.12 Infrastructure and support facilities 220
6.13 Correlation between support and user satisfaction 227

CHAPTER SEVEN: DATA ANALYSIS-THE UNITED KINGDOM QUESTIONNAIRE

7.1 Introduction 232
7.2 Background variables 233
7.3 Assessment of the computer systems 238
7.4 Managers and their systems 240
7.5 Usage of computer systems 242
7.5.1 Applications 242
7.6 Usage of computer systems for tasks 251
7.7 Correlations between applications and tasks 260
7.8 Correlations between type of usage and ease-of-usage 261
7.9 The impact of computer systems 263
7.10 Correlations between usage and individual impact 269
7.11 Correlations between satisfaction and individual impact 272
7.12 Infrastructure and support facilities 274
7.13 Correlations between support and user satisfaction 279

CHAPTER EIGHT: DATA ANALYSIS-INTERVIEW SURVEY

8.1 Introduction 281
8.2 Saudi Arabia 282
8.2.1 Computer centres 282
8.2.2 Managers 286
8.3 UK 289
8.3.1 Computer centres 290
8.3.2 Managers 292
LIST OF TABLES

Table 5.3 The major strengths and weaknesses of the three methods 137
Table 5.8A Saudi Arabia interviews sample 158
Table 5.8B Saudi Arabia questionnaire sample 159
Table 6.1 questionnaire distributed in Saudi Arabia 166
Table 6.2A Position of respondents 167
Table 6.2B Departmental distribution 168
Table 6.2C Managers' computer experience 169
Table 6.2D Managers' qualifications 170
Table 6.2E Managers' gender 170
Table 6.2F Managers' age 171
Table 6.3A Nearest computer systems 174
Table 6.3B Kind of computer system 174
Table 6.3C Handling of computer systems 175
Table 6.4A Managers' assessment of their computer system 176
Table 6.4B Managers' assessment of their systems and the value of CS 177
Table 6.9A Individual impact 207
Table 6.9B Organisational impact 207
Table 6.12A Last significant change 221
Table 6.12B Differences of the significance change 221
Table 6.12C Assistance and support 226
Table 7.1 UK sample 233
Table 7.2A UK managers' position 234
Table 7.2B UK managers' department distribution 234
Table 7.2C UK managers' experience 235
Table 7.2D UK managers' qualifications 236
Table 7.2E UK managers' gender 236
Table 7.2F UK managers' age 237
Table 7.3A UK managers' nearest computer system 238
Table 7.3B UK kind of computer system 239
Table 7.3C  UK handling computer systems  
Table 7.4A  UK managers reactions to their computer systems  
Table 7.4B  UK managers’ opinions  
Table 7.5.1  UK managers’ computer systems applications  
Table 7.6  UK usage of computer systems for tasks  
Table 7.9A  UK individual impact  
Table 7.9B  UK organisational impact  
Table 7.12A  UK last significant change  
Table 7.12B  Differences relating to the significance of the change  
Table 7.12C  UK assistance and support  
Table 9.2A  Managers’ background comparison  
Table 9.2B  Managers’ availability of computer systems  
Table 9.2C  Comparison of managers’ use of computer systems.  
Table 9.2D  Comparison of computer system applications usage  
Table 9.2E  Comparison of tasks usage  
Table 9.2F  Comparison of computer systems importance  
Table 9.2G  Comparison of significance change  
Table 9.2H  Comparison of support
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>A model showing how CBIS maybe used in problem solving</td>
<td>10</td>
</tr>
<tr>
<td>2.1</td>
<td>Map of Kingdom of Saudi Arabia</td>
<td>13</td>
</tr>
<tr>
<td>2.9</td>
<td>The structure of education and channel in Saudi Arabia</td>
<td>24</td>
</tr>
<tr>
<td>3.1</td>
<td>For SABIC Business structure in Saudi Arabia</td>
<td>40</td>
</tr>
<tr>
<td>3.2</td>
<td>For Al-Saudi Al-Hollandi Bank in Saudi Arabia</td>
<td>41</td>
</tr>
<tr>
<td>3.3</td>
<td>For Al-Saudi American Bank in Saudi Arabia</td>
<td>42</td>
</tr>
<tr>
<td>3.4</td>
<td>The Astra company structure in UK</td>
<td>43</td>
</tr>
<tr>
<td>3.5</td>
<td>The Banking structure in the UK</td>
<td>61</td>
</tr>
<tr>
<td>3.6</td>
<td>Banking structure in Saudi Arabia</td>
<td>63</td>
</tr>
<tr>
<td>3.6A</td>
<td>The structure of finance in Saudi Arabia</td>
<td>64</td>
</tr>
<tr>
<td>3.8</td>
<td>Saudi Arabian government report of IT imports</td>
<td>72</td>
</tr>
<tr>
<td>5.2</td>
<td>Research model</td>
<td>134</td>
</tr>
<tr>
<td>5.8</td>
<td>Questionnaire distributed in Saudi Arabia</td>
<td>160</td>
</tr>
<tr>
<td>5.9</td>
<td>Questionnaire distributed in the UK</td>
<td>162</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>AIS</td>
<td>Accounting Information System</td>
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<td>ANB</td>
<td>Arab National Bank</td>
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<td>ARAMCO</td>
<td>Saudi Arabian Oil Company</td>
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<td>CBIS</td>
<td>Computer-Based Information System</td>
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<td>CC</td>
<td>Computer centre</td>
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<td>CRT</td>
<td>Cathode Ray Tube</td>
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<td>CS</td>
<td>Computer System</td>
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<td>CSCCI</td>
<td>Council of the Saudi Chamber of Commerce and Industry</td>
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<td>DF</td>
<td>Degree of Freedom</td>
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<td>DSS</td>
<td>Decision Support System</td>
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<td>ECC</td>
<td>EXPEC Computer Centre</td>
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<td>EDI</td>
<td>Electronic Data Interchange</td>
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<td>EIS</td>
<td>Executive Information System</td>
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<td>E-MAIL</td>
<td>Electronic mail</td>
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<td>ES</td>
<td>Expert System</td>
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<td>ESS</td>
<td>Executive Support System</td>
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<td>EXPEC</td>
<td>Exploration &amp; Petroleum Engineering Centre</td>
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<td>GCC</td>
<td>Gulf co-operation Council</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>HP</td>
<td>Hewlett Packard</td>
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<tr>
<td>IBM</td>
<td>International Business Machine</td>
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<td>IC</td>
<td>Information Centre</td>
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<td>IMF</td>
<td>International Monetary Fund</td>
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<td>IPPS</td>
<td>International Payroll and Personnel System</td>
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<td>IS</td>
<td>Information System</td>
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<td>ISS</td>
<td>Information System Success</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
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<td>LAN</td>
<td>Local Area Networking</td>
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<td>MBD</td>
<td>Million Barrels per Day</td>
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<td>MIS</td>
<td>Management Information System</td>
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<td>MOP</td>
<td>Ministry of Planning</td>
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<td>MS</td>
<td>Microsoft</td>
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<td>MTBE</td>
<td>Methyl Tertiary Butyl Ether</td>
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<td>NDS</td>
<td>NetWare Directory Service</td>
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<td>OA</td>
<td>Office Automation</td>
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<td>OPEC</td>
<td>Organisation of Petroleum Exporting Countries</td>
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<td>P</td>
<td>Probability</td>
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<td>PC</td>
<td>Personal Computer</td>
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<td>PDS</td>
<td>Premises Distribution System</td>
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<td>RCCI</td>
<td>Riyadh Chamber of Commerce and Industry</td>
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<td>RCJY</td>
<td>Royal Commission for Jubail &amp; Yanbu</td>
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<td>SA</td>
<td>Saudi Arabia</td>
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<td>SABIC</td>
<td>Saudi Arabian Basic Industries Corporation</td>
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<td>SAMA</td>
<td>Saudi Arabia Monetary Agency</td>
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<td>SOCAL</td>
<td>Standard Oil Company of California</td>
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<td>SPAN</td>
<td>Saudi Payment System Network</td>
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<td>TAM</td>
<td>Technology Acceptance Model</td>
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<td>TDM</td>
<td>Total Design Method</td>
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<td>TRA</td>
<td>Theory of Reasoned Actions</td>
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<td>UIS</td>
<td>User Information Satisfaction</td>
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<td>UK</td>
<td>United Kingdom</td>
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<td>United States</td>
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<td>USA</td>
<td>United States of America</td>
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<td>USCB</td>
<td>United Saudi Commercial Bank</td>
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<td>WAN</td>
<td>Wide Area Networking</td>
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Chapter One

Introduction

1.1 Introduction

The computer, since its introduction into business in the 1950s, has exerted a considerable and increasing effect on many aspects of company operations, and it is changing the nature of work at all organisational levels. These effects were felt first in accounting and plant operations, but are now spread throughout business (Cragg et al, 1995).

Computers have come of age as a major contributor to effective management practice and every manager is significantly affected. This means that there is an increasing need for managers to understand
computer capabilities. At the same time, there is an increasing need for all managers to understand the broader relationships between their own managerial roles and computers.

Information technology (IT) is developing rapidly. In recent years, significant technological advances have been made, particularly with computer-based information systems (CBIS), which are having far-reaching effects in almost every sphere of economic activity and on a large number of occupations. At a time when questions of managerial skills and performance issues have aroused serious concern in most countries, it seems particularly appropriate that considerable attention should be paid to ascertaining the relationship between computer-based information systems and managerial performance.

Managers in business organisations face an increasing complexity in their roles and in the activities they are expected to perform. They are expected to plan, co-ordinate, communicate, control and make decisions in order to ensure the productivity and profitability of their organisations. They must also recognise the relationship between the external and internal environments which continually impact on their organisations. In order to do this, they must evaluate data collected from throughout the organisation, and transform the data into information, which can then be
used in problem-solving and decision-making and for the preparation and presentation of reports.

Information has become the new organisational resource: there are costs associated with its collection, processing and dissemination, and losses when the information collected is unable to be retrieved quickly and in a useful form. Rapid technological advancement has contributed substantially to the collection of more details and facts about an ever-increasing number of business activities and events. Business organisations are therefore now faced with new problems of information-handling and of managing the computer as a resource.

During the last two decades, information technology (IT) has become increasingly available to support managers in making decisions for planning, controlling and operating their organisations. Several studies from different countries (see chapter Four) have added to our understanding of the kinds of information technology used. This study concentrates on covering computer-based information systems. It will gather information on IT used by managers in Saudi Arabia, the assistance provided by such information technology, and the degree of satisfaction of managers with computer-based information systems (CBIS).
Before the proliferation of microcomputers, the cost of installing and maintaining a mainframe or minicomputer was very high, such that only large organisations, mainly in industrialised countries, could afford them (Vlahos, Ferratt, 1995). However, following the proliferation of microcomputers, user-friendly software packages, combined with managers' needs for better and faster information, have led to the use of IT by an increasing number of smaller organisations world-wide.

Information technology (IT) is becoming a strategic resource. The convergence of data processing, communications and automation technologies, the trend towards reducing costs in computing together with advances in software, provide businesses with new strategic options in a political and economic context which both needs technical innovation and is encouraging it. IT is being exploited by firms to make major strategic thrusts; it is becoming a driving force which is eroding and fusing boundaries within and between sectors, facilitating survival in smokestack businesses and fostering new organisations which make a business of information. Indeed, IT can be applied strategically in at least four different ways: to gain competitive advantage, to improve productivity and performance, to assist new ways of managing and organising, and to develop new businesses.
CHAPTER ONE

The Saudi Arabian government has established a national objective to modernise the country through technology transfer, especially information technology. As a result, Saudi Arabia has become the biggest importer of computers in the Middle East. Information technology, which consists of hardware, software and 'human ware' (training and support), is growing in importance as large organisations become increasingly dependent on computer-based information systems (CBIS) for their routine operations. Such information technology is having a profound and important effect upon Saudi organisations in the areas of strategy, finance and organisational change. As a result, they are becoming more cautious about computer systems and related software acquisitions. Top management are starting to realise that effective policies are required to enable organisations to control computer use better, and to obtain the expected benefits from their investments.

The purpose of this study is to provide empirical evidence relating to managers’ perceptions of the effects of computer-based information systems as a support to their decision-making, planning, controlling, and operation of organisations in Saudi Arabia and the UK. The results should also give some indication of what is best practice. This research will, it is hoped, contribute to the overall body of knowledge concerning the effective use of CBIS.
Chapter One

Introduction

1.2 Aim of the study

The aim of the study is to examine the impact of computer-based information systems (CBIS) on the work of managers in business organisations in Saudi Arabia, comparing this with the UK. This examination will involve determining the uses that managers are making of CBIS, and evaluating levels of satisfaction.

1.3 Objectives of the study

The objectives of the study are:

1. To examine the perceptions of managers concerning the value of computer-based information systems (CBIS) for their work, the impact of CBIS on the performance of their functions, and the effect on their organisation's overall performance.

2. To study the extent to which managers use CBIS, together with any problems they encounter in making such use.

3. To determine what kinds of CBIS applications are being used by managers, and to what extent such applications have an impact on decision-making in practice.
4. To study what infrastructures and support requirements affect managerial use of CBIS.

5. To examine how the use of CBIS differs between business organisations in Saudi Arabia and the UK, and on what factors any such differences depend.

6. To try and determine best practice in the use of CBIS, and to consider how such practice is best disseminated.

1.4 Hypotheses

1. Managers perceive CBIS as being valuable for their work.

2. Managers perceive CBIS as having an impact on their personal performance.

3. Managers perceive CBIS as having an effect on the overall performance of their organisations.

4. All managers use CBIS to the same extent.

5. All managers encounter same problems in using CBIS.

6. All managers use the CBIS applications.

7. Decision-making by managers is affected by the use of CBIS.

8. Infrastructural and support differences affect managerial use of CBIS.

---

1 Valuable means that CBIS assists the managers' work.
9. Use of CBIS differs between Saudi Arabia and the UK.

10. It is possible to determine best practice in the use of CBIS.

1.5 Definitions

A Computer-Based Information System (CBIS) is a computer system and computer application that is used for supporting business activities; it is recognised as a tool that can produce information for management decision making. Figure 1.1 suggests a simple model to explain how managers make decisions to solve their problems, and how information is used in making these decisions. Information is presented in both oral and written forms by an information processor. The computer portion of the information processor contains each of the computer-based application areas, which are as follows:

- **Accounting Information System (AIS)** is a transaction-processing system that gathers data describing the firm’s activities concerned with, for example, payroll, sales, inventory, or stock control, and transforms the data into information; the information is then made available to users both inside and outside the firm.

- **Management Information System (MIS)** is a computer system that helps managers with management functions and supports primarily structured decisions. It focuses on information which usually proceeds
from all parts of the organisation and which is necessary to aid
decision-making.

- **Decision Support System (DSS)** is an interactive, highly user-friendly
  computer system supporting management decisions that are semi-
  structured, or that cannot be specified in advance. Compared to MIS,
  DSS uses more analytical models and draws information from multiple
  sources. They are similar to management information systems except
  that they support unique decision-making which focuses on the
  continually changing conditions of the business environment.

- **Office Automation (OA)** includes all technology used in the
  preparation of documentation and its storage, retrieval and
  communication, such as word processing and electronic mail; it is
  common to the whole organisation.

- **Expert System (ES)** is a type of system which tries to use computers to
  solve problems that appear to require human-like intelligence.
Figure 1.1 A model showing how CBIS Subsystems may be used in problem solving
Chapter Two

General Background

2.1 Introduction

The purpose of this chapter is to provide a general framework for the needs of this study. To fulfil the aims and objectives of the study there is a need to understand first the basic background of Saudi Arabia in terms of computer systems development.

The first section of this chapter gives a brief general background about relevant aspects of Saudi Arabia. The second section discusses the main features of Saudi Arabia development plans and the main points relating to industry and industrialisation in the country. The third section discusses the economic background.
2.2 Geography

The Kingdom of Saudi Arabia is located in Southwest Asia (Figure 2.1). It occupies over 70% of the Arabian Peninsula. Encompassing a territory of about 2.25 million square kilometres, it is bordered to the west by the Red Sea, to the east by the Arabian Gulf, Qatar, Oman and Emirates, to the north by Jordan, Iraq and Kuwait, and to the south by Yemen.

The Kingdom is divided into five main regions. The Eastern region is the coastal area along the Arabian Gulf where the country’s main oil reserves are located. Some 13% of the Kingdom’s total population live in this highly urbanised region, which also includes the coastal conurbation of Hafuf, Dammam and the industrial city of Jubail. The Central region, which is often called Najd after its main feature, is an extensive plateau dissected by shallow valleys and prominent ridge formations. It contains about 25% of the total population and is where Riyadh, the capital city, and the city of Buraidah are located. The Western region, the Hijaz, accounts for approximately 34% of the population, most of whom live in the Holy cities of Makkah and Medinah, in Jeddah, and in the mountain resort of Taif. The South region, the Asir, is inhabited by about 16% of the population, the majority of whom live in villages in the mountains and along the coastal plains. Its main cities are Abha Jizan and Najran.
Figure 2.1 Map of Kingdom of Saudi Arabia, showing the cities discussed in the thesis
CHAPTER TWO  

GENERAL BACKGROUND

The North region accounts for about 12% of the population, with a relatively large proportion living in rural areas or in the cities of Tabuk, Ha’il, Sakakah, and Arar. The Rub Al kali (Empty Quarter) is a wide expanse of barren and unpopulated land to the South-east.

Riyadh and Jeddah are the two most important cities in Saudi Arabia. Riyadh is the capital and largest city, where all the ministries, the main centre of education, training, research and development, banking and government are situated. In addition, it is considered to be a very important trade centre for the Kingdom, because of its location in the centre of the Kingdom. The head-quarters of banks and the head-quarters of the Saudi Arabian Basic Industries Corporation (SABIC), the largest industrial entity, are located in Riyadh.

Jeddah is the second largest city, a major business centre and the largest port on the Red Sea. Jeddah is the main entrance to the country for the world market. Some of the SABIC organisations are located in Jeddah. Yanbu, Saudi’s second port and second industrial city, relieves pressure on Jeddah and provides the Kingdom with a terminal specifically for handling the growing amount of petrochemical exports.

The Eastern region is another important region, the most productive in Saudi Arabia. Oil is produced in this region. The most developed and
biggest industrial city is Jubail. Saudi ARAMCO, the biggest oil company in Saudi Arabia, and most SABIC organisations are located in the Eastern region. Dammam, the biggest city in the region, is the largest port on the Gulf, and the main oil shipments leave from Ras Tannurah.

2.3 Climate

Saudi Arabia is one of the driest countries in the world, only in the extreme north and south is the annual rainfall over 100 millimetres. The aridity is accompanied by great extremes of temperature, with wide variations both regionally and seasonally. The central region has hot, dry summers from May to October, with temperatures climbing to a maximum of 50°C, while the winters are cool and dry with night-time temperatures falling to near freezing. In contrast, the Western and Eastern regions have hot, humid summers, with maximum temperatures of around 42°C, and warm winters. However, there is air conditioning in all buildings in all parts of Saudi Arabia, so the temperature and humidity has not caused any problems for the introduction of IT.

2.4 History

The Arabian Peninsula is the birthplace of Islam and the site of some of the world’s oldest civilisations. The area’s early history is one of small trading centres surrounded by vast tracts of territory roamed by nomadic tribes. By the end of the sixth century, the Hijaz cities of Taif, Makkah
CHAPTER TWO

and Medinah had become prominent. Makkah, the birthplace of the
prophet Mohammed, and Medinah, the place of his burial, are centres of
pilgrimage for the Islamic world.

Politically, the Arabian Peninsula was unsettled until it came under the
nominal rule of the Ottoman Empire at the beginning of the 16th century,
but the Ottoman hold was never strong. At about the same time, contact
with Europe began with the arrival of Portuguese merchant adventurers,
who were followed in the 17th and 18th centuries by the British, Dutch and
French.

Saudi Arabia's royal family, Al Saud, traces its ancestry to Mani Ibn Rabi
Al Muraydi, who settled in the 15th century in central Najd, near the
modern city of Riyadh. In the early 18th century, the family became
devout supporters of Mohammed Ibn Abdul Wahhab, who preached the
purification of Islamic practices. After Ibn Abdul Wahhab settled in
Diriah in 1745, the Saud capital at the time, a period of 70 years followed
during which the Saud territories and the sphere of influence of Abdul
Wahhab's teachings expanded. By 1807, the emirate of Dirriyah
encompassed Makkah and Medinah, as well as much of the Najd.
However, in 1812 and 1813, the Ottoman Sultan's viceroy in Egypt
recaptured Medinah and Makkah, and the Najd capitulated in 1816.
Dirriyah was razed and the Saud ruler, Abdullah, was executed.
Abdullah's son, Turki, retook Riyadh in 1824 and the Sauds progressively regained the Najd until their territories again came under Ottoman influence in the 1870s. By 1891, Riyadh was in the hands of Mohammed Ibn Rashid, ruler of Ha'il. Consequently, the Sauds went into exile in Kuwait.

In 1902, Abdulaziz Ibn Abdul Rahman, often known as Ibn Saud, captured Riyadh and in 1913 Al Hasa was retaken. By 1926, the influence of Sauds extended to the Red Sea province of the Hijaz and again included Makkah and Medinah. By 1923, their territories had become the Kingdom of Saudi Arabia as the country is known today. King Abdulaziz reigned until 1953, when he was succeeded by his son, King Saud. He, in turn, was succeeded by his brother, King Faisal, in 1964 and in 1975 another brother, King Khalid, came to the throne. On his death in 1982, King Khalid was succeeded by the present King Fahd, custodian of the Two Holy Mosques and also Prime Minister. Prince Abdullah Ibn Abdulaziz is the Crown Prince and Deputy Prime Minister.

2.5 Government

Saudi Arabia has a monarchical government based on the Islamic religion. The powers and duties of the King are defined according to Shariah (Islamic) law. The King serves for the good of the people of Saudi Arabia and, although supreme authority rests with God, the
enforcement of Shariah law is the responsibility of the ruler. The King holds a weekly council (majlis) at which anyone may express a grievance or a request, and expect the ruler to act upon it. The King’s assignation as Custodian of the Two Holy Mosques serves to underline the fundamental importance of religion in Saudi Arabia.

The constitution is the Holy Quran and Shariah, there is no other constitutional charter. The Quran is the Holy book of Islam. A Council of Ministers, established in 1953 and presided over by the King, holds both legislative and executive power in the Kingdom. The Custodian of the two Holy Mosques, King Fahd Ibn Abdulaziz, heads the government as Prime Minister and President of the Council of Ministers. His brother, Crown Prince Abdullah Ibn Abdulaziz, is Commander of the National Guard and First Vice-President of the Council, as well as Deputy Prime Minister.

The main functions of the Council of Ministers are to offer advice to the King and to be responsible for government agencies and ministries. However, final approval of Council decisions rests with the King. The King appoints the Council’s members. In a royal decree issued in August 1993, the Custodian of the Two Holy Mosques, King Fahd, restricted the term of office of Council members to four years, with the possibility of extension for another two years only.
CHAPTER TWO

GENERAL BACKGROUND

For administrative purposes, the Kingdom is divided into 14 emirates. Each emirate is divided into sub-emirates, and urban and rural districts. On 21 August 1993, King Fahd announced the membership of a new Consultative assembly (Majlis Al Shura), a public forum consisting of 60 members, which, in 1997, he raised to 90 members, drawn from the religious, business, government and academic communities. Perceived, both internally and externally, as a very important development in the context of government in the Kingdom, the Assembly will be able to adopt recommendations by majority decision.

Saudi Arabia is a founder member of the United Nations, the organisation of Petroleum Exporting Countries (OPEC), the Gulf Co-operation Council (GCC), and other international and Arab organisations. In 1978, an additional seat on the board of executive directors of the International Monetary Fund was created for Saudi Arabia.

2.6 Population

The census of population of October 1992, the first census since 1974, estimated Saudi Arabia’s total population at almost 17 million, of which some 73% were Saudi nationals. At about 3.4% per annum throughout the 1980s, population growth is high by world levels, but this growth rate is likely to decline in the 1990s.
2.7 Language

Arabic is the official and universally used language in Saudi Arabia, but many officials, businessmen and merchants understand English. The government requires that all correspondence be in Arabic, while accepting parallel documents in another language. As Saudi law is applied to all commercial and contractual disputes, regardless of where the contract was originally drawn up, and as the Arabic text of a contract is considered binding, it is imperative that translations are accurate.

2.8 Currency

The currency of the Kingdom is Saudi Riyal (SR) which is convertible and divided into 100 halalas. The current exchange rate is 3.75 Saudi riyals per one U.S. dollar ($1=3.75 SR), and around six Saudi riyals per one U.K pound, which is the average rate since 1990 (£1=6 SR).

2.9 Education

Before 1924, formal education was limited to a few major cities in the country. The first Directorate of Education was founded in 1924 as a government authority in charge of all education levels within the country. That was the nucleus for the first modern educational institutions in Saudi Arabia. A comprehensive national system of education did not appear until the founding of the Kingdom of Saudi Arabia in 1932. By then, the
responsibilities of the Directorate of Education had become more extensive and covered all educational affairs in the country. In 1974, the total number of schools in the country did not exceed 65 at all levels, and the total enrolment was about 10,000 male students.

Education is free of charge at all levels, including higher education. The Ministry of Education is largely responsible for all male education below the university level, while the General Presidency of Girls' Education, which was established in 1960, is responsible for all female education in the country below university level.

The Ministry of Higher Education was established in 1976 to be responsible for both higher education through the existing universities and for scholarships and all educational mission offices abroad. Higher education up to degree level is given in universities and other faculties under the General Presidency of Girls' Education, and also in military academies under the Ministry of Defence and Aviation, the Ministry of the Interior and the National Guard. There are seven universities, where students are educated to the level of bachelors, masters and doctorate degrees in many fields.

Three government agencies contribute to the development of human resources (MOP 1985):
CHAPTER TWO

GENERAL BACKGROUND

- The Civil Service Bureau, which is responsible for providing suitable manpower to the public sector, for employment regulations, for training co-ordination, and for manpower statistics related to civil servants.

- The Deputy Ministry of Labour Affairs, which provides services related to private sector employment, including labour statutes, settlements of disputes, labour offices, industrial safety, and labour market information.

- The Secretariat of the Supreme Manpower Council, which is responsible for developing and providing manpower information, studying manpower strategies and policy options, and co-ordinating the manpower-related activities of all government agencies.

The principal agency for scientific research and technological development is the King Abdulaziz City for Science and Technology, which is located in Riyadh. It works with universities in the promotion of scientific research and development projects and in the establishment of databases which cover current research projects, researchers and publications.

Technical education is the responsibility of the General Organisation for Technical Education and Vocational Training. Responsibilities include all matters pertaining to technical education in industry, agriculture, and
CHAPTER TWO  GENERAL BACKGROUND

commerce. It can also initiate vocational and technical training specified by the Supreme Manpower Council, from which it receives policy direction concerning needs not met by other government agencies. Vocational training centres are supervised and controlled by the Vocational Training General Administration at the Ministry of Labour and Social Affairs. See Figure 2.9 for the educational structure details. Issues relating to IT education in Saudi Arabia, will be discussed in a later chapter.
Figure 2.9 The structure of education and channels of responsibility in Saudi Arabia
2.10 Economy

Possessing the world’s largest oil reserves and accounting for about 10% of the world’s total oil production, Saudi Arabia has supported its economic development with its earnings from oil. Although the oil sector continues to be a dominant factor in economic growth, its contribution to the gross domestic product (GDP) has been declining, from 55% in 1977 to 33% in 1993, in the face of a volatile world oil market and the recent expansion of the non-oil sector. In 1992, GDP stood at some US$121 billion, representing more than one quarter of the total GDP for all Arab countries, and per capita income was approximately US$7,120.

During the 1990-93 period, both the oil and the non-oil sectors showed continued growth, but markedly different performances. The recent volatility of the world oil market, which was initially caused by the 1990-91 Gulf war, led to a 26% increase in the Kingdom’s oil production in 1991, oil output has since continued at around 8 million barrels per day (mbd). However, the continuous fall in oil prices in 1993, from US$19 per barrel in March to approximately US$13 per barrel in December, resulted in a significant decline in oil revenue. In contrast, growth in real non-oil output, fell 3% from 1991 to 2% in 1992, and to 1% in 1993. Real GDP growth was 10% in 1991 and 3% in 1992, and is estimated by the Saudi Ministry of Finance and National Economy to have been 1% in 1993. The International Monetary Fund (IMF) predicted that economic
growth over the 1994-98 period would be driven to a greater extent by private sector investment other than in oil. It has been estimated that real GDP should achieve an average growth of 1.5-2.5% during this period, if oil production is sustained at 8 mbd and oil prices recover.

Oil sector revenue continues to be the major source of funds for government expenditure on economic development and, consequently, a significant factor in the growth of the non-oil sector. Although the non-oil industries are now less dependent on the public sector as a source of business than in the mid-1980s, a large proportion of their sales revenue is derived from public sector related activities. Therefore, government efforts to restrain public spending in the face of weak oil prices will dampen growth rates in all sectors of the economy.

To lessen dependence on oil as the major source of revenue, the nation has looked to other industry not only to be self-sufficient, but also to play a larger role in the economic growth of the Kingdom. The pace of industrialisation began to accelerate in the 1960s. The average rate of growth of manufacturing, excluding oil refining and construction, was over 11% annually from the early 1960 to mid 1970s (Nyrop 1982:297). Its reserves of low cost hydrocarbons makes Saudi Arabia an excellent location for the production of petrochemicals, and secures its long-term competitive advantage. At the same time, Saudi Arabia is developing a
number of diversification strategies aimed at expanding its oil-related industries and developing other producing sectors of the economy. The policy objective is the identification and support of those sectors contributing to diversification that generate foreign exchange or lead to import savings. The policy also intends to take full advantage of relevant advances in technology.

2.11 Saudi Arabia development plans

The development plans in Saudi Arabia began in 1958 as a result of the crisis which occurred in 1955-1957. The latter was a consequence of government budgetary deficits caused by the inability of the national income to meet the increased expenditure of the government (El-mallakh, 1982). The deficits resulted in large-scale government borrowing, inflation, balance of payments deficits and a fall in the rate of exchange of the Riyal.

An economic committee was established to create the basis for economic development in Saudi Arabia. In August 1970, the central planning organisation, established by Royal Decree on the 19th of January 1965, submitted to the King the first five-year development plan. These five-year plans have been updated regularly, and are discussed in the rest of this section.
CHAPTER TWO

GENERAL BACKGROUND

2.11.1 The first development plan (1970-1975)

The general objectives of economic and social development policy for Saudi Arabia are to maintain its religious and moral values, and to raise the living standards and welfare of their people, while providing for national security and maintaining economic and social stability. In the first development plan these objectives were to be achieved by:

- Increasing and developing the rate of growth of gross domestic product
- Developing human resources so that the various elements of society were able to contribute more effectively to production and to participate fully in the process of development
- Diversifying sources of national income, and reducing dependence on oil through increasing the share of other productive sectors in gross domestic product.

To diversify the economy and reduce the dependence on oil, the government aimed to increase the role of other productive sectors, especially industry and agriculture. To do that the government needed to rely upon the private sector.

To encourage the private sector to increase its production and to participate as much as possible in the process of development, the
government adopted the following policies, specifically with regard to computer systems:

- Information and technical assistance would be expanded to help the private sector improve its efficiency
- Market information would be improved and increased
- The need to expand company information in the company registration systems was acknowledged, the database would be expanded and accompanied by more prompt dissemination of the information gathered
- Standard measures and specifications along with quality control would be enforced
- The means for the supply of trained and skilled manpower would be improved.

The government decided to issue a statement of National Industrial Policy for the encouragement of industrial production, as well as regulations for the protection and encouragement of national industries. At the same time, the government planned the establishment of an industrial bank.

2.11.2 The second development plan (1975-1980)

The second development plan retained some of the elements of the first plan, but with additional emphasis on developing the physical infrastructure to support the achievement of the specified objectives.
Thus, the main objective of the second plan was to facilitate and support the expected rapid economic growth by creating the conditions necessary for the quick and efficient completion of the infrastructure, and by providing business services and supplies. To this end, two policies were adopted: that of maximum freedom from restriction within the operation of the private sector, except where conflict might arise with social or efficiency objectives; and that of minimum public sector involvement to support private sector development.

However, the government policies focused mainly on development in the hydrocarbon-based industry and in other industries where the Kingdom had, and still has, a comparative economic advantage. The government bodies concerned with industrial development continued and developed policies for enhancing the participation of private enterprise within the guidelines of the Industrial Policy of 1974. Among these policies was continuous reviewing of the improvement of dissemination of information relating to the various aspects of the Kingdom's industrialisation.

2.11.3 The third development plan (1980-1985)

At the beginning of the third plan, Saudi Arabia ranked as one of the world's foremost financial powers, with great international strength arising from monetary wealth and an economic role as the major oil
exporter to the free world. Major physical constraints on development, while not completely eliminated, had been reduced significantly at the start of the third plan. Inflation had been controlled and, as a consequence, most, but not all, of the population was able to have a much higher standard of living than at the beginning of the second plan. Although the long term goals for development remained unchanged, the strategy for the third plan was noteworthy in the emphasis on new focal points, some of which considerably modified the trends and modes of operation of the first two plans. The major strategy for the third plan had three fundamental objectives:

- Structural change in the economy
- Increased participation and social welfare in development
- Increased economic and administrative efficiency.

The structural change in the economy was to occur through policies directed at three main areas of economic activity: oil and gas production; the development of productive sectors of agriculture, industry and mining; and the development of all Saudi infrastructure, such as telecommunication, transportation and electricity.

Development of the production sectors was seen as vital in terms of the government’s long-term objective of diversifying the economy. Government policy continued to be one of support for the private sector,
which was seen as essential for undertaking the development of these areas. This support under the third plan was intended to provide information and establish the results of research, to provide an appropriate financial framework and incentives for investment, to take care of infrastructural needs, and to establish priority areas for investment.

2.11.4 The fourth development plan (1985-1990)

The long-term objectives remained the same in the fourth development plan as in the three previous plans. Indeed, the objectives of the fourth plan were formulated to ensure continuity with the strategy of the third plan. Their emphasis, as in the third plan, was on efficiency in the use of resources, and on the development of producing sectors and of human resources. The major objectives of the fourth plan were to:

- Continue structural change in the economy in order to diversify the economic base by reducing dependence on oil as the main source of national income, and by giving due emphasis to other industry and agriculture
- Encourage the rapid development of the private sector as the principal mechanism for achieving economic diversification
- Improve the economic efficiency of the government sector
- Complete the infrastructural projects necessary to achieve long-term economic and social development goals
CHAPTER TWO  

The policies to be adopted by the government in respect of the private sector were to focus on:

- Increasing the opportunities for the private sector to acquire, manage and operate projects currently undertaken by the government
- Encourage the private sector to participate in financing development
- Encourage the private sector to invest in new areas and establish more joint-stock companies
- Ensure that government policy concerning the private sector was appropriate to prevailing conditions.

However, the major policies were to encourage foreign investment and involvement in partnership with Saudi investors, and to continue to support and stimulate the future development of industrial infrastructure and support services.

2.11.5 The fifth development plan (1990-1995)

The fifth plan reaffirmed the broad objectives established in the fourth plan, but they were to be achieved via a substantially different set of development policy initiatives. After two decades of development planning, most of the long-term and short-term objectives had been almost completely achieved. The physical and institutional foundation of
a modern economy had been established, a wide range of social services had been provided throughout the Kingdom, and the basis for a diversified, productive economy had been established in industry, agriculture, mining and financial services. The challenge now was to accelerate the process of economic diversification to achieve a more developed economy and society. In the previous two decades, the private sector had played two major roles in development: as a participant in development projects, and as a provider of services to government, consumers and businesses. With the new phase of development and the need for economic diversification, the private sector was expected to assume a more leading role in future development. The government therefore encouraged the private sector to play a bigger role in some areas where the government had thus far taken the lead, such as utilities, transportation and some government services. One of the major areas in the development of opportunities identified by the government for the private sector was the need for specialised business activities. These could arise, for example, in marketing, finance, accounting, management, business, and information technology.

The government objectives now placed emphasis on: maximising the domestic transformation of natural resources, particularly oil derivatives and petrochemicals, for which Saudi Arabia still enjoys a comparative advantage; encouraging import substitution and export-oriented
CHAPTER TWO  GENERAL BACKGROUND

industries; and strengthening industrial co-operation among the Gulf countries, in order to benefit from foreign technology and expertise.

To achieve these objectives the government established, among other things, policies to:

- encourage Saudi industries to develop their own industrial research capabilities
- To utilise technical services provided by international organisations
- To provide export credit
- To improve the quality of statistical information and statistical analysis, establish economic indicators, and conduct surveys in line with the needs of the Kingdom's industrial sector.

2.11.6 The sixth development plan (1995-2000)

The strategic principles of the sixth development plan are similar to those of the previous plans; it places special priority on:

- Enhancing the Kingdom's defence capabilities and deepening the citizens' sense of nationalism
- Rationalising government expenditure, with greater dependence placed on private sector activities, which is to be achieved by increasing the government's administrative efficiency and encouraging private capital participation in national investment
CHAPTER TWO  GENERAL BACKGROUND

- Developing human resources skills through improved education and training to meet the requirements of the private sector and the state's development objectives, and reducing the country's reliance on expatriate labour

- Expanding infrastructural facilities to keep pace with population growth.

The main objective of all the six plans was to facilitate and support the expected rapid economic growth by continuing to achieve the long-term objectives for the national economy. The sixth development plan gives priority to the resumption of a moderately rapid, but steady economic growth, and the achievement of internal and external balances through the progressive elimination of both the budget deficit and the current account deficit. These priorities will be pursued through the continued structural diversification of the economy to create more employment opportunities for Saudi nationals, and the development of practical policies for privatisation. The sixth development plan also attributes to the private sector an important role in mobilising its resources for the development of the national economy. The main themes of this sixth plan are to increase the rate at which non-Saudis are being replaced by Saudi nationals (Saudization), the opening up of more opportunities for private sector investment, and the achievement of greater economic efficiency in the government and private sectors.
3.1 Introduction

Information technology (IT) in Saudi Arabia (SA) is still a relatively new technology, though it has rapidly diffused through both private and public organisations. Many Saudi organisations have already introduced IT in some form or another to support and improve the efficiency and effectiveness of their functions.

The oil companies introduced information technology before the banks in Saudi Arabia indeed they acted as cutting-edge institutions in this respect and have more experience in the use of IT for management purposes.
The background of national developments in Saudi Arabia was described in chapter 2: we now turn to a study of the background of IT in Saudi business organisations. The discussions will cover business organisational structure in Saudi Arabia and the use of IT in Saudi organisations, in order to provide a background for these organisations and to help understand their developing application of hardware and software. This will also give a picture of the business organisations which have been studied for this thesis. However, due to the rapidly changing technological environment, some of the specific activities described in this thesis may already be partly out-of-date.

3.2 Business organisation structure

The oil companies and banks in Saudi Arabia play a major role in Saudi economics and financial affairs. The private sector in these fields makes a large and increasing contribution to the economy of the nation. Although Saudi Arabia has large oil reserves, this is a depleting resource. Thus it is necessary for the government to provide economic strategies to reduce the dependency on oil, even though this industry will remain of major significance for some time to come.

The business organisational structure in Saudi Arabia is different from the structure of businesses in a developed country, such as the UK. A detailed comparison is impeded by the fact that, it is difficult to find out about
business structures in Saudi Arabia, because these are not made publicly available. The reason for not publishing details of organisational structures is that these are regarded as confidential: a situation that does not normally exist in the UK.

The present study has managed to elicit details of organisational structures in Saudi Arabia. Figures 3.1, 3.2 and 3.3 represent typical examples of the frameworks that have been found. These may be compared with Figure 3.4, which provides an example of the framework found for a UK organisation. There is some difference between the structures found in Saudi Arabia and the UK. For example, the former tend to be more hierarchical. These differences seem to relate to the different environments existing in the two countries.
Figure 3.1: SABIC business structure in Saudi Arabia
Figure 3.2 For Al-Saudi Al-Hollandi Bank in Saudi Arabia.

**SHB Organizational Chart**

- Managing Director
  - Deputy Managing Director
  - Legal & Board Secretary
  - Director BDG

- AGM-CIB
- AGM-HER, ER
- AGM-RES, M&E
- AGM-RESN CR & Ops
  - AGM-HR
- AGM-OFC SMD
- AGM-CH & ADMIN
- AGM-TREASURER
- AGM-MS
- AGM-INVESTMENT

- BDG CR
- PCO
- CBG, CR
- PBG, ER
- PBG, M&E
- PBG, CR
- FIC
- BDG, ER
- Electronic Banking
- RAD CR
- RAD ER
- Administration
- Chief Dealer-Interbank
- BDO, Program Director
- CSRU
- Funds
- Treasury Ops
- MTL Brokerage

- CBG, M&E
- PBG, ER
- CBG, ER
- CBG, CR
- CBG, ER
- REG, SERV & Opt, ER
- REG, SERV & Opt, ER
- CPCG & Trade Services
- Vacancy Marketing
- OAD
- RAD MR

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February, 1997
Figure 3.3 for Saudi American Bank in Saudi Arabia
Figure 3.4: The Astra Company structure in the UK.
3.3 The Royal Commission for Jubail and Yanbu

The Royal Commission for Jubail and Yanbu (RCJY) was established in 1975 to create twin industrial cities in the eastern and western parts of the Kingdom. The creation of a viable industrial base, which will reduce Kingdom’s reliance on oil revenues as the main source of income, has been a cornerstone in the economic development strategy of Saudi Arabia. The transformation of the desert into two bustling industrial cities at Jubail and Yanbu over the last two decades is a testament to the government's continuing commitment to establishing a diversified industrial base.

The twin cities of Jubail and Yanbu are now strategic sites for hydrocarbon-based and energy-intensive primary industries, and they exploit the country’s natural resources to their fullest advantage. Development of basic industries in Jubail and Yanbu is the responsibility of the Saudi Basic Industries Corporation (SABIC) and Saudi ARAMCO. The Kingdom is working to meet 5-6 percent of world demand for petrochemicals (MOP 1996).

Prior to the establishment of these two industrial cities, a series of industrial areas were constructed within large populated cities, with all the infrastructure needed for establishing a consumer goods industry. One of the purposes was to accommodate easy marketing and distribution.
within the large populated areas, and to supply the substantial manpower, housing and services required. The major development was again concentrated in Jubail and Yanbu because of the consequent economies of scale and the technological inter-dependencies in the hydrocarbon and basic industry sectors.

All but two of the 16 SABIC ventures are located in the two cities. By 1992, 16 primary industries covering products such as ethylene, MTBE (methyl tertiary butyl ether) and urea, with a total invested capital of US$14 billion, had been set up in Jubail, and four secondary industries and 67 support/light manufacturing industries were operational. Although Yanbu is less developed than Jubail, it has export terminals for crude oil and liquefied natural gas, and domestic and export refineries. Both industrial cities offer sites with low rents and low cost utilities, as well as a wide range of infrastructural facilities for health care, education, telecommunications, transport and recreation.

3.3.1 Jubail

Jubail has a data centre, and the most of the new computer capability is devoted to municipality-oriented applications. The procurement department has its own HP 3000, dedicated to the management of its suppliers and purchasing activities. Systems cover particularly finance,
including modules for payroll, cost and commitment and an integrated financial management system that tracks budget and costing data.

The personnel data system is used to record, monitor and report on all aspects of the personnel functions. Recreation and home leave, employee profiles, salary administration and planning, and employee benefits and contracts are typical modules.

The batch mode revenue billing system includes 15 modules covering medical, telephones, power, water, and accommodation, combined within a control module which prepares a total invoice, outstanding invoice payments and account balances.

The project cost accounting systems cover costing, scheduling, manpower planning and other project management modules. The on-line assets and spare part control system cover all assets: the spare parts modules are batch-oriented and provide straightforward list locate system. The land use system is a geographical database used to record survey data on all RCJY land in the Jubail locality. A tracking system, called COMMAND, records land use through the economic development, planning and development regulation stages. It records and monitors all leases, and vendor information modules provide procurement control support for all acquisitions and contracts.
CHAPTER THREE  SAUDI BUSINESS ORGANISATIONS AND IT

The RCJY hospital has a range of medical support packages, running on two 8MB Prime 850 units, and other equipment includes two Wang VS 100s, an ICL 2905, a Wang VS 80 and two HP3000.

3.3.2 Yanbu

The Yanbu centre had a HP3000 and three HP1000s, which have now been replaced by a 4MB Prime 850. The four units were connected in a high-speed ring configuration to support 220 CRTs. A wide variety of municipality oriented applications were developed, including land use, population and census, port control, warehousing and power consumption.

In addition, an IBM 4331 has been installed, and the engineering department has a DEC VAX 11/70 machine that is used for a geographical database to support a comprehensive cartographic system. Applications include a large number of modules which handle all aspects of project administration. Examples of this include personnel and payroll.

There are several integrated modules in the family of systems, including revenue accounting—which bills contractors for their use of health, education and telephone services—invoice control, accommodation control—which details the occupancy of housing and produces billing data,
and billing for electricity and water—which are initially prepared on an IBM 4331 machine.

A DEC VAX 11/780 is dedicated to running geographical data and an inventory of maps for the engineering department. A variety of standards engineering packages are processed on the HP equipment.

Applications running on the Prime 850 include budgeting, a spread sheet facility, graphics, an Arabic language payroll system for RCJY employees, statistics, simulations, and document retrieval.

A fully integrated maintenance management system is in place, which comprises modules for purchasing, inventory, warehousing work, order management and equipment maintenance. Two HP1000 machines are configured to support the ARTEMIS project management package.

3.4 Saudi Arabian Basic Industries Corporation
The Saudi Arabia Basic Industrial Corporation (SABIC), the Kingdom’s largest industrial entity, was established by the government in 1976 to help the private sector develop basic industries. The extensive industrialisation programme undertaken by SABIC is considered a milestone in industrial development especially, in creating viable basic
CHAPTER THREE  SAUDI BUSINESS ORGANISATIONS AND IT

and support industries which utilise the local resources of hydrocarbons and minerals as raw materials.

By the end of 1995, SABIC had established 16 basic and support industries having annual production capacities of about 22.11 million metric tons of petrochemicals, plastics, fertilisers, metals, industrial gases, etc. SABIC now has a 5% share of the world petrochemical market, with key areas of production in basic and intermediate chemicals, thermoplastic polymers, fertilisers and metals.

The total manpower employed by SABIC and its affiliated companies in 1995, stood at 12,084 employees, of whom, 63.4 percent were Saudi nationals.

SABIC is operating an IBM 4341/11 machine. In addition, an NCR8140 microcomputer is used for budgeting and financial applications, and since the objective of the corporation is to gather information on all SABIC operations, the principal use of the IBM machine is for a market database. In 1995, the computer centre changed from a 3MB IBM 4331 to an 8MB IBM 4361 running under DOS/VSE. The configuration supports about 30 CRTs in SABIC headquarters. The systems available include the G/L system, which is Arabized and available via online access. An International Payroll and Personnel System (IPPS) package was
purchased and modified to meet the needs of SABIC. It contains a full range of modules dealing with salary, deductions, overtime, automatic cheque writing, etc. In addition, the organisation is using wide a range of personal computers with different configurations, Pentium, 486 and 386s.

In 1997, SABIC headquarter networking infrastructure used a fibre backbone and UPT cabling (category 5) structure based on the AT&T SYSTIMAX premises distribution system. Local Area Networking (LAN) used in the SABIC headquarters on a campus-wide basis (connected by fibre backbones) to a Wide Area Networking (WAN) (connected by bridges through PTT dial-up lines and by communication servers through X.25 services). The network is used mostly for database applications, access and e-mail. SABIC employs networking between some branches using X.28 dial-up and X.25 dedicated services, and also with SABIC international offices (e-mail only). SABIC access some public databases at King Abdulaziz City for Science and Technology and at the Public Administration Institute through dial-up lines. However, SABIC has no networking with any other company at all.

The software used to manage the network and applications is Manage Wise and Microsoft SMS. Most applications used for daily work in SABIC are developed in-house, and there are also client/server applications. Support software includes Clipper and Oracle.
3.5 Saudi Arabian Oil Company

On May 29, 1933, the government of the Kingdom of Saudi Arabia signed the basic concession agreement with the Standard Oil Company of California (SOCAL). This original concession agreement has since been revised several times. In 1973, the Kingdom acquired a 25% participation interest in Saudi ARAMCO (Arab American Company), which increased to 60% in 1974. In 1980, the participation interest was increased to 100%, when the Kingdom bought all of Saudi ARAMCO’s assets (MOP 1996).

On 13 November 1988, a Royal Decree was issued to form the Saudi Arabian Oil Company (Saudi ARAMCO) and to assume the managerial and operational responsibilities to be carried out for the government. A Royal Decree was issued in July 1993 to sanction a decision by the Council of Ministers to merge into the company all of the Kingdom’s oil refineries and petroleum product distribution facilities. With these added duties, Saudi ARAMCO became responsible for virtually all of the Kingdom’s petroleum activities, from exploration and production through refining, transportation and marketing.

By 1995, Saudi ARAMCO’s work force, totalled nearly 57,800 employees. This was 11,500 more than in 1994, primarily due to manpower additions from the acquisition of the Yanbu, Jeddah, Riyadh and Rabigh refineries, petroleum product distribution bulk plants and air
fuelling units. The work force represented more than 50 nationalities, although by far the largest numbers were 46,200 Saudis. Saudis held nearly 100% of the company’s senior management positions, and 74% of the company’s 2,500 supervisory positions.

Saudi ARAMCO’s training programme aims at transferring technology to the Saudi work force. These programmes are being implemented by a permanent training staff at nine main industrial training centres, eight main job skills training centres and seven training centre branches. Saudi ARAMCO provides training to several thousand Saudi employees each year. Training programmes include study courses, on-the-job training, university grants, courses in developing professional excellence and post-graduate studies. The company has continued its programme to enhance productivity and to improve work performance through training its supervisory staff. The objective of the training programme is to guarantee that Saudi employees are expertly trained so that they can handle all levels of jobs across the company. This effort already has paid handsome dividends. For a number of years, Saudis have held nearly all of the company’s management positions, as well as all of the operating posts at production facilities. A number of management, professional and technical programmes are offered to produce world-class specialists, to upgrade job skills and to keep employees current with new technology. Expatriate specialists are hired to meet specific company needs and many
of these employees share their professional skills as mentors to young Saudi employees. The procedure of pairing specialists with Saudi professionals has been formalised in the specialist development program. The programme prepares employees for careers as Saudi ARAMCO’s technical experts in engineering and computer fields through concentrated, hands-on experience.

The Saudi Arabian Oil Company (Saudi ARAMCO) installed the first mainframes in 1957 and, during the 1960s, started to expand its computer facilities further. Saudi ARAMCO now has one of the largest facilities in existence, with a total expenditure in excess of $250 million for hardware alone, including seven IBM mainframes, added to the 370/168 and four 3033s on site. Other hardware will be added yearly. These units drive the Exploration & Petroleum Engineering Centre (EXPEC) system, which is a sophisticated support service for the organisation of field activities. In 1989, Saudi ARAMCO installed a CRAY-2 supercomputer. In addition, Saudi ARAMCO has a range of personal computers, which are mainly used by managers. The Al-jorasi Company continues to supply Apple Macintosh machines to Saudi ARAMCO.

The Exploration and Petroleum Engineering Centre (EXPEC) has played a crucial role in Saudi ARAMCO’s recent exploration successes. The facility has also served as an extremely useful tool for petroleum
CHAPTER THREE  SAUDI BUSINESS ORGANISATIONS AND IT

engineers in charting a programme to return maximum sustained crude production capacity to ten million bpd and in mapping the delivery of more gas into the Master Gas System. Since opening in 1982, EXPEC and its associated Laboratory Research and Development Centre have enabled the company essentially to eliminate its dependence on upstream (exploration and producing) technological support from other oil companies. Exploration data collection, processing and interpretation all take place within relatively close proximity, enhancing co-ordination, improving efficiency and speeding the pace of work.

Using the expertise and advanced technology at EXPEC, the company can produce most efficiently required volumes of oil and gas at minimum cost while maintaining the best possible reservoir conditions. The use of advanced three-dimensional (3D) seismic technology, for example, has benefited both exploration and production. Because it involves a much higher-density field coverage than two-dimensional seismic data acquisition, and because of the large size of the Kingdom’s fields, 3D seismic surveying generates huge volumes of digital data which are processed and analysed at EXPEC. These data have been used to uncover new oil reserves where earlier exploration proved unsuccessful, and to optimise field development in areas with reservoir complexities. EXPEC also introduced horizontal well drilling technology to Saudi ARAMCO in 1991. This technology has allowed the production of significantly more
petroleum per well from both onshore and offshore fields than is possible using conventional vertical drilling techniques.

The EXPEC Computer Centre (ECC) employs the latest technology, both hardware and applications software, to improve Saudi ARAMCO’s profitability and overall competitiveness in the industry. To achieve the most efficient use of resources, Saudi ARAMCO is constantly seeking applications for emerging computer hardware and software technologies. The ECC’s supercomputer network consists of two supercomputers and numerous high-end workstations linked through a high-speed communications system. Another advanced computer provides general purpose scientific capabilities for specialised studies and data management, and serves as focus for communications with the company’s remote field operations throughout Saudi Arabia. Computer capacity has increased dramatically to provide the required functions for exploration and producing technology. Since the ECC opened, its computing capacity has increased 300 times, while on-line data storage capacity has grown by a factor of ten. This powerful computing environment allows the company to process and interpret all seismic well-bore data. It also makes possible simulations of all reservoirs, using sophisticated 3D reservoir modelling techniques, and assists in designing production facilities.
In 1997, the Saudi ARAMCO networking infrastructure was using the digital microwave and fibre optic systems with preference for SDH over PDH. The transmission backbone provides an infrastructure that supports most of the Wide Area Network connectivity. Moreover, X.25 packet data network infrastructure is implemented to provide connectivity to remote plants that are located out of the company transmission backbone LAN and for the outbuildings backbone. Wiring inside buildings utilises the AT&T Premises Distribution System (PDS) and Category 5 UTP copper cabling. Inter-networking protocols are implemented via the use of multi-protocol routers (e.g. CISCO), while the strategy is to reduce protocols and to migrate to the TCP/IP standard. Local Area Networking (LAN) topologies are migrating from the Token Ring and the Ethernet to the ATM. With the advent of Client-Server technology operating in a distributive computing environment, the need for network standards is mandatory, and this is achieved by the implementation of such software as Novell NetWare version 4.XX.

All the company business sites are linked to a reliable data network to ease communications. Saudi ARAMCO has international networking with Saudi ARAMCO overseas offices using leased data circuits which connect overseas offices to the company network. The corporate networks are used for many current and planned business applications that give desktop access to a range of services, such as E-mail, enterprise
web, shareable resources, corporate data, and the Internet. There are gateways which link specific users to designated services, such as the Internet gateway to the CompuServe and the connections of remote plants to the Saudi PTT X.25 network.

Most of the applications employed by users for their daily work, such as message routing services, provide for the exchange of messages across the network. Examples are APIs (applications to request messaging services, e.g. Microsoft Windows, Graphical User Interface), MTA (to store and forward messages), E-mail and public carriers to provide inter-company messaging facilities. Software applications include MS Exchange and NetWare Directory Service (NDS). Directory services provide repositories for the resources, e.g. people, computers, printers, data directories, data sets. Security services allow the identification of users of the network and protect the services on the network; software applications include Novell NT.

3.6 The Council of Saudi Chamber of Commerce and Industry

The Council of the Saudi Chamber of Commerce and Industry is located in Riyadh, alongside the Riyadh Chamber of Commerce and Industry. It is stipulated that they must provide the information needed to create the
CHAPTER THREE  SAUDI BUSINESS ORGANISATIONS AND IT

necessary climate for development, and to encourage the private sector to increase its participation in the development process. This includes:

- Collecting and distributing statistics, research data and information relating to industry and commerce to government organisations.

- Presenting suggestions, regulations, orders, and instructions related to protecting the national industry and commerce from foreign competition.

- Advising industry and commerce about the most important countries and areas for import and export, and the best ways of industrial and commercial development.

- Identifying and resolving commercial and industrial problems and disputes.

- Making industrialists and businessmen aware of new investment opportunities and co-ordinating with specialist organisations.

- Encouraging the utilisation of international and local specialist houses and investments in joint projects in industry and agriculture.

3.6.1 Information Centre

This centre is designed to be a strategic national data bank for commerce and industry, connected with the Council of the Saudi Chamber of Commerce and Industry (CSCCI) data centres via a communication network, and able to exchange information with Gulf and other
The basic goals of the information centre include:

- To collect and store information about commercial, industrial, agricultural and economic activities in Saudi Arabia.
- To provide the CSCCI with needed information and to transfer enquiries via the communication networks between the mainframes of the CSCCI information centre and those of individual information centres at the other CSCCI in different cities.
- To issue all kinds of Saudi Arabia business directories, such as the commercial Saudi Arabia agencies directory and the Saudi exports directory, along with government orders and guidelines to protect and encourage the private sector.
- To exchange information with Gulf and international information centres that are participating in commercial research and studies.
- To provide governmental organisations with data and information about commerce, industry and economics.
- To provide Saudi businessmen and industrialists with the information needed to help them in their investments.

The Information Centre uses a wide range of computer systems, communication equipment and applications to produce this information.
3.6.2 The Riyadh Chamber of Commerce and Industry

To cope with the progress in the development of Saudi Arabia and the increased number of agencies and companies in all commercial sectors, the Riyadh Chamber of Commerce and Industry (RCCI) introduced computers in 1979 in order to increase its ability to provide a better service to its members.

These computers have been used for storing and classifying information about RCCI members. This has led to the publication of a commercial directory in both Arabic and English that includes all agencies and companies working in Riyadh, and which lists all members of the RCCI.

3.7 Banking

The Saudi Arabian Monetary Agency (SAMA) reports to the Ministry of Finance and National Economy. It is responsible for all the normal functions of a central bank, and acts as the fiscal agent of the government, with responsibility for exchange rate policy and monetary and prudential control of financial institutions in the Kingdom. SAMA is in a strong position to exercise control over inflation, as money supply growth is determined principally by the level of government spending, private sector credit expansion, and the balance of payment deficit or surplus.
SAMA co-ordinates and regulates the commercial banks, as well as the specialist credit institutions established to channel development funds to specific activities.

SAMA acts in similar way to the Bank of England in the UK, which is the central bank of the United Kingdom. The Bank of England acts as banker to the Government and to other banks; as the central note issuing authority; as agent of the government for important financial operations; and as adviser to the Government on many aspects of financial policy. The bank also undertakes the management of the National Debt and, as the agent of the Treasury, the administration of exchange control. The banking structure in the UK is outlined in Figure 3.5.
All Saudi Arabian (SA) commercial banks have become computerised, and compatible systems have been installed by merchant banking operations and other financial agencies in SA. With computerisation either complete or in progress across the retail banking system in SA, attention has been given to SA money market operations and teller machines. Transactions at this level are far more complex than in domestic banking, involving bonds and exchange dealings in several currencies simultaneously. There is no direct parallel to these activities in other areas, making it necessary to develop specialised software for international trading.

There have been some problems associated with the hardware requirements for Arabized screens and printers. The system has also had to accommodate the different working week, which presents problems associated with currency exchange during weekends in other parts of the world. There are implications for handling currency profit and loss, though this is only one part of the necessary management of risk.

By the 1990s, Saudi banks had come to use IT in the following areas (Al-Mansour, 1992):

- **ATM/POS**: ATMs are connected to the Saudi payment system network (SPAN).
- **ESIS**: stock market dealing through centralised units.
• ESISNET: stock market dealing through bank branches.
• EFT/EDI: a new system planned by SAMA, which will automate monetary transfers between local banks.
• Home banking.
• Fully automated branches.
• Credit cards.

Figure 3.6 Banking Structure in Saudi Arabia
Figure 3.6A The structure of finance in Saudi Arabia
3.7.1 Arab national bank

The Arab National Bank (ANB) is one of the banks which is co-ordinated by SAMA. The headquarters of the bank is located in Riyadh, and it has many branches in cities all over the country.

The bank started computerisation in 1980 with a major exercise, involving the on-line interconnection of more than 100 branches of the bank across SA, through three regional computer centres in Riyadh, Jeddah and Al-khobar.

The network was based on the US DECs 16-bit PDP-11 minicomputers and its 32-bit super-mini VAX machines. The ANB’s first priority was to introduce computerisation at branch level, bringing customer accounts information onto the system. Data held on the local mini-computer provided a complete record of transaction for each customer.

The software can support many types of accounts, dealing with a range of currencies. Holding accounts information directly on-line has implications both for the customer and the bank. Since transaction details are updated immediately from teller CRTs, the customer is able to monitor movements through an account the moment they occur. The benefit to the bank is in maintaining more effective control over the potential problem areas in retail operations.
3.7.2 United Saudi Commercial Bank

The United Saudi Commercial Bank (USCB) is also co-ordinated by SAMA: its head management is located in Riyadh. It was formed as a result of merging three overseas banking houses in Saudi Arabia.

Computer facilities were seen as essential for its branches. While there is a strong case for developing custom-built software, the speed with which the USCB system has had to be installed made a package solution inevitable. The package was installed as part of a turnkey project on IBM system/34 minicomputers in each branch.

3.7.3 The other banks

The other banks in Saudi Arabia are Al-Saudi Al-Fransi, Al-Rajhi Banking & Investment Corporation, Al-Saudi Al-Hollandi, Al-Jazira, National Commercial, Riyadh, Saudi American, Saudi British, Saudi Investment, and Saudi Cairo (this bank was united with the United Saudi Commercial Bank in September 1997), and all of them use ATMs.

The banks are in competition with each other in the provision of better-automated services for their customers, in order to increase deposits and investment opportunities. Most banks have their own mainframe computer centres, but all use mini and micro-computers for cashiers and administration, as well as for ATMs.
CHAPTER THREE     SAUDI BUSINESS ORGANISATIONS AND IT

The Saudi British banks have recently had their systems upgraded by the Arab Electronic Company (ARDICO). All the old CRTs were replaced with the advanced CTOS Unisys workstations running specialised support software. ARDICO has also supplied the same workstation to seven other banks.

3.8 IT training centres

There are about 25 private sector training centres in Riyadh alone, teaching a wide range of computer subjects. These centres are controlled by the Ministry of Labour and Social Affairs. An example of such a training centre is the International Academy of Administration and Computers. It is responsible for providing management expertise for the private sector, specialising in management, computers, finance and banking using IT. The centre is located in Riyadh and ten American universities have approved its curriculum. The objective is to graduate students and then send them either to the USA for graduate work, or to work in any of the companies.

3.9 Arabisation

The Arabisation of IT products means incorporating the Arabic language and its many true writing fonts into the existing IT hardware and Latin language applications software. Such joint involvement of Arabic and
Latin is regarded as having reached an acceptable stage when the computer hardware and applications software allow users to do the following:

- Insert Latin text into Arabic and vice-versa
- Handle applications software in Latin only, in Arabic only, or in both, with the same effectiveness and capability as in Latin only.

The Arab computer market has known different levels of development in the past few years. The Gulf market is the most sophisticated, now using fourth generation computers and languages. Most large organisations use computers involving foreign languages, and banks and financial institutions depend upon foreign software packages due to the nature of their work. However, the need for Arabized hardware and software has expanded dramatically in recent years as a result of increased technological awareness and the realisation of the economic gains that can result from introducing computers in the workplace (Aboud, 1992).

Arabisation is a regional effort to provide Arabic language equivalents to scientific and technical expressions, and also to software usage. It is vital to conduct joint efforts within the Arab world to unify computer fundamentals in order to reach unified standards and policies for collective use, so that computers can communicate and share information in one language. This language must have the same characters, letters, numbers and expressions, and give a clear standard to Arabic software.
designers, so that they can design programs that can easily be used throughout the Arab world, even with different types of equipment (Al malaq and Al Jebrien, 1990).

The use of Arabized packages has expanded and is now beginning to satisfy most of the market needs, even though the programs were not originally written in Arabic. However, most packages suffer from deficiencies in translation, and from the fact that tabulation and character movement is from right to left in the Arabic style. There are no fully Arabic operating systems, but most popular databases, word-processing, and office automation packages have been successfully Arabized. Unfortunately, these are mostly concentrated on PCs rather than on the mainframe equipment used in big organisations.

Within Arabisation, there are two problems areas: the lack of Arabized software and the lack of Arabic standards. The need for Arabized software is particularly important for any organisation whose activities are focused solely within the Middle East. It was noted in the present study that the issue of Arabisation is less applicable to large banks, which use international software and are forced to comply with international standards. Arabized software is being developed by both software houses and the in-house IT departments of large organisations. Well-known
CHAPTER THREE  
SAUDI BUSINESS ORGANISATIONS AND IT

products, such as MS-DOS, MS-WINDOWS and MS-OFFICE, have been successfully Arabized.

3.10 IT marketing in Saudi Arabia

IT products and services were introduced gradually into the Saudi market. Marketing the Western PC started in the late 1970s, and continued until the mid-1980s. In 1979, the Saudi market imported £34 million worth of IT products, rising to £167 million in 1982 (Jifri, 1994). However, the value of such imports decreased again (see Figure 3.8) to £120 million in 1985 (Jifri, 1994). The slow-down related to the difficulties of marketing computers which would only work with the Latin alphabet, and had no support for the Arabic language. The second difficulty in marketing the PC in Saudi Arabia was the lack of knowledge concerning computers amongst the population. These two difficulties were the main deterrents to marketing the PC at that time. Consequently, the PC market was limited to professionals who had had previous experience with computers, such as academics, doctors in hospitals, and pharmacists.

Concerning the value of IT sales and imports to Saudi Arabia, Canon distributors in Saudi started in 1992, with sales of around £67 million in the Saudi market. The sales of IT products in Riyadh City alone was £34 million, nearly half of total sales in all of Saudi Arabia. This means that one firm in Saudi Arabia in 1992 sold one-third (in monetary terms) of
what the whole country imported as IT products in 1982, and about 50% of what the whole country imported in 1985. The Saudi Computer Exhibition of 1993 in Riyadh, which was attended by 248 firms from 22 countries, saw business of about £15-16 million concluded. Alalamih reported their volume of sales for 1992 was £90 million. Most of the imports of IT were from the USA, Europe, China, and Japan. Taking the UK as an example, IT exports to Saudi Arabia in 1990 were worth £14.974 million, and in 1991 worth £19.210 million.
Figure 3.8 Saudi Arabian Government Report of IT Imports in 1991

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>USA</th>
<th>UK</th>
<th>JAPAN</th>
<th>CHINA FORMOSA</th>
<th>SOUTH KOREA</th>
<th>GERMANY</th>
<th>FRANCE</th>
<th>BELGIUM</th>
<th>SWITZERLAND</th>
<th>THAILAND</th>
<th>SPAIN</th>
<th>SINGAPORE</th>
<th>CHINA MAINLAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>£</td>
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<td>19,210,00</td>
<td>6,160,206</td>
<td>5,472,285</td>
<td>24,025,099</td>
<td>2,316,246</td>
<td>1,748,384</td>
<td>1,428,464</td>
<td>709,193</td>
<td>611,024</td>
<td>405,327</td>
<td>216,105</td>
<td>156,666</td>
</tr>
</tbody>
</table>
4.1 Introduction

The focus of this research is computer-based information systems and managers working in business organisations. Since microcomputers became readily available, more and more firms of all sizes have computerised, with accounting systems being the most common application area (Cragg et al, 1995). However, Saudi Arabian small business is still suffering from a shortage of IT as is true of small firms in most other countries. In addition, preliminary studies for this thesis indicated that a shortage of IT skills has also hit small companies in Saudi Arabia. Even in the UK, skill shortages, with an acute lack of
expertise in IT and computing, are affecting the ability of small businesses to compete (Buckley, 1998). The research for this thesis has therefore concentrated on larger companies only (see chapter 3, and chapter 5 for more details), since these provide a picture of best practice in each country. The present chapter reviews work relating to the primary areas of this study, which should form a basis for a discussion of the main problems to be studied. A wide-ranging search was conducted, but the literature used was mainly restricted to that from 1990 onwards. The reason for this was the rapid rate of change of information technology, including computer systems (see chapter 1), which means that earlier studies are often out-of-date.

4.2 Organisational support

The objectives and advantages of organisational support for computer users, including managers, as given by Carr (1988, p.64), are as follows:

(1) more resources are applied to the application development backlog,
(2) the user gets involved with the solution, not just the problem, and
(3) actions replaces waiting.

Benefits of supporting users include:

(1) increased motivation and better use of professional talent,
(2) timely availability of information,
(3) the ability to analyse business problems more thoroughly, and
(4) increased productivity of office staff, both professional and clerical. McLeod (1995, p.4) concludes that 'managers should be computer literate, but, more important, they should be information literate'. Managers' support refers to the activities that serve to enhance the development and the improvement of managerial activities within the organisation. As noted by Davis and Olson (1985, p.421), 'one of the most powerful capabilities supplied to users is the facility to develop their own applications'.

Information centre

One resource which has been developed for this purpose is the special-purpose Information Centre (IC), which offers a co-ordinated, formalised system of supporting computer users. It was originated and piloted by IBM-Canada in the industrial world, as a means of gaining relief from a growing backlog of data services requests. After its internal success, IBM presented the concept to its customers as an alternative to the stagnation being experienced in the field of application software creation (Carr 1988).

Hammond (1982, pp.131, 133) of IBM, in his landmark articles on ICs, gives the following description:
‘An information centre (IC) is a portion of the information system (IS) development resource, organised and dedicated to support the users of IS services in activities such as report generation and modification, data manipulation and analysis, spontaneous inquiries, etc. The fundamental premise underlying an IC is that, if provided with proper education, technical support, usable tools, data availability, and convenient access to the system, users may directly and rapidly satisfy a portion of their business area requirements that depends on an IS environment.... The objective of an IC is to provide users access to data on their own terms so that they can solve their own business problems. It is typically accomplished by providing a set of packaged tools and data availability (with appropriate training and consulting support) to the users enabling them to gain the power of the computer in a relatively easy and timely fashion.’

The computer centre, or information centre, is not always known by these names, but has different names in different companies. For example, some companies call it the information systems department, others call it the information science or computer department, and so on. Such departments have differing histories, and differing
responsibilities. However, in most companies, they have come to take on the functions defined above for an IC.

Information systems/IC exist in the context of an organisation; they do not operate in isolation. There are a number of definitions of organisations. For our purposes, an organisation is a rational co-ordination of activities of a group of people for the purpose of achieving some goal. The activities of the group of people are co-ordinated; that is, there is a joint effort. In some organisations, a division of labour and a hierarchy of authority provide for the rational co-ordination of activities. The definition also includes the goals of the organisation; there are many different types of organisation with different kinds of goals.

Recently, the role of ICs in aiding computer users in several organisations has been evaluated. Khan (1992) found that: (i) several organisations had established ICs to guide and support users, (ii) the ICs standardised the hardware and software environment, and provided training and technical support, and that (iii) the organisations had yet to introduce control procedures to monitor users' activities. The challenge for information centre managers is to satisfy the demands of users while simultaneously advancing computer users' computing strategies so that
they can effectively support the competitive position of the organisation (Henderson et al, 1986; Gunton, 1988).

As an example, Igbaria (1992) found that organisational support plays an important role in encouraging managers in Taiwan to use the available computers. He found that the computer centre had a positive effect in helping users build a computing infrastructure, both by developing a wider selection of software tools to be potentially useful in the future, and by applying computer technology to support a wider variety of business tasks. His results emphasise the importance of training programmes in promoting computer usage.

Information centres can offer a range of support for managers to encourage them to use the computer systems properly. For example, Igbaria (1993) found that both information centre support and management support are influential in helping managers to utilise a computer system by encouraging them to use the system, and by providing a wider selection of different types of useful software tool. By offering substantial educational programmes, and applying IT to support a wider variety of business tasks, managers are encouraged to make full use of IT in all possible areas of their work.
The information centre can also give different types of help to managers and to the organisation. It can help with any problems related to the computer systems, and can give advice to the managers when they are facing problems. For example, Pitt et al (1995) have remarked that the information systems department performs such functions as responding to questions about software products, providing training, and giving equipment advice. They note that providing information is a fundamental service of an IS department, and that it should monitor and try to improve the quality of service it delivers.

Turban et al (1996, p.691) summarised the purposes and activities of the information centre in terms of three main functions:

1) To provide assistance to end users, including managers, in dealing with computing problems
2) To provide general technical assistance, and
3) To provide general support services.

Training
Training is one of the organisational supports provided for staff. Training can be done internally or externally, by other organisations. This can be one of the tasks undertaken by the computer centre. Moss-Jones (1991) found that managers would make more and better uses of technology if
they were trained to do so. Eastwood (1991) quoted Brian Hartland, marketing director for Comshare Canada, ‘There are executives out there who have a strategic perspective, who are not computer literate and are not about to get computer literate, who have an increasing need to get information delivered to them in a usable fashion’. Eastwood (1991) also stressed that education is a key factor before any computer system is introduced, and that the introduction of new technology must be preceded by a training programme.

An important emerging trend in training is the concept of just-in-time training. Training in new technology is much like learning a foreign language; ‘If you do not use it, you lose it.’ Consequently, training should be scheduled as closely as possible to the time when trainees will begin to use the new system (Turban et al, 1996, p.465). Similarly, regular training helps the managers to keep up with systems and helps to make the systems easy to use. As an example, Mutschler et al (1990) found that the amount of training and the ease of access to a computer are the two most important factors relating to computer use. They suggest that, if organisations want to introduce computers, they must provide sufficient training for managers, involve professionals in the development of the information system, provide easy access to the
technology, and attend to the structural factors of the organisation that can facilitate or impede the adoption of a new technology.

Organisational support for managers can help them to become computer literate, which means that they can make different uses of systems. There can be range of different organisational support. For example, Igbaria et al (1996) found that organisational support correlated positively with user training, suggesting that one facet of such support is both to provide users with higher levels of training in computer practices and to encourage them to make use of this provision.

Managers need to understand how decisions based on computer systems are made, and how to use any decision-support capabilities. It is usually advantageous to have representatives (possibly project team members) from the different departments participate in developing managers' documentation (e.g., user procedure manuals) and in actually training users on the system (Turban et al, 1996). Managers are often less intimidated by computer technology if a new information system is explained to them and documented for them by someone from their own department, rather than by an outside computer technician (Turban et al, 1996). The understanding of how to use the computer systems and system accessibility also play a role in the use of the computer systems.
CHAPTER FOUR REVIEW OF PREVIOUS WORK

For example, Mawhinney et al (1990) noted that practitioners who are involved in developing, implementing and supporting PC systems used by managers should observe that, in many cases, computer training and system accessibility play a large role in computer system use. In addition, Huarng (1995) remarked that the more understanding managers have of the system development approach, the more precisely they could control their allocation of resources.

Interaction with support staff

Support by specially designated staff seems to be the preferred approach, because they understand precisely what the manager needs. Kraemer et al (1993) have noted that managers who are most satisfied with the usefulness of computer-based information are those who use support staff to mediate their computer-based information environment, rather than those who use the computer to access information directly. Such indirect use of computing may be the most appropriate mode for many managers at present. It follows that the focus of design efforts for information systems for managers should be as much on these intermediaries as on the executives themselves. Jones et al (1997) remarked that the greatest proportion of office activity directly involves collaboration with, or support of, other skilled colleagues.
It is usually advantageous if managers are familiar with systems development work, as it can help them in many different ways. Thus it can help in making plans for training, or in devising procedures for systems use. For example, Smith et al (1992) suggested that managers' effective decision-making can only be achieved if they are familiar with systems development work, and, therefore, managers must take the time to understand the information technology environment and its methods, and should review IT plans closely. They must also make the effort to establish a good personal relationship with IT staff. This does not mean becoming an IT person, rather it means recognising IT issues and decisions as an important part of a manager's training. Smith et al (1992) also remarked that one very effective way of maintaining the necessary level of involvement in a particular systems development project is through adopting a policy of collaboration. This involves seating members of the full-time IT and user staff together for the duration of a project. This not only facilitates project-related communication between the two groups, but also encourages IT personnel to learn more about business.

**Level of computer literacy**

Computer experience should assist the users in making full and appropriate use of the computer systems. Igbaria et al (1995) noted that
amount of computer experience is strongly correlated with computer usage. They also remarked that the amount of computer experience influences perceptions of usage and satisfaction. Consequently, computer experience plays an important role in ensuring managers are satisfied with the use of computer systems. Abdul-Gader (1996) affirms this, adding that computer experience and skills are vitally important factors for the level of user satisfaction with computer systems.

Improvements, both in the systems and in the managers' abilities to use them, should lead to an improvement in the use of computer systems. Schervish (1993) confirms this, suggesting that improved system design and worker education should have the dual focus of improving the product of information systems and the process of decision making. Furthermore, IT training can help managers to use the computer systems for a range of other tasks in the organisations.

Quality

Maximum system quality and information quality should encourage individuals to use the systems available. It should also help encourage staff to obtain maximum benefits from the available computer systems. Briggs et al (1993) have remarked that critical determinants of success related to the quality, extent and nature of the collaboration between
agency practitioners, managers at all levels, and system designers. They also note that the ease of use of computer systems, and the assistance provided by the system are directly related to the level of satisfaction of the manager. Thus, if the system matches the needs of the manager, this encourages the manager to make use of the system in his/her work. Ameen (1990) has pointed out that the systems techniques should match requirements with information processing needs. It was also suggested that managers who found the information from the computer systems helpful, and capable of increasing the speed of their work, would keep using the systems and so improve their performance. Vandenbosch et al (1995) noted that information quality and technical quality are both important factors in organisational performance.

The involvement of the managers in system design should help them in their use of the systems for their work. The managers know what kinds of function are required for their work. Fulfilment of their wishes would obviously help to improve the systems and the information to be used in their work. Ghorab (1997) has also pointed out the need for banks to cultivate user involvement in decisions relating to the adoption of technologically sophisticated systems. At the same time, the newer systems should motivate managers to use the computer systems more, which should in turn, help to improve the quality of their work. Smith et
al (1992) stated that new technology has led to a series of information system processes intended to identify the company's business data needs, and to plan, control, and implement them. Processes can also influence the end product, since information system personnel largely follow the principles of scientific management. Consequently, they tend to produce highly structured jobs, procedures, and output. The way data is presented can limit its range of uses and may reflect many unconscious decisions and assumptions, in the same way that systems impose certain ideas about work.

Successful application
There is very little understanding of the key factors which influence success (or failure) of CBIS in organisations, especially those in the third world. Odedra-Straub (1993), in his study in Africa, found that the critical factors affecting the lack of success of CBIS were poor infrastructures, lack of foreign exchange to buy spare parts, poor supplier services, scarce education and training facilities (and therefore lack of skilled personnel), and lack of management commitment and cooperation. However, the relative importance of these factors varies from organisation to organisation and country to country.
CHAPTER FOUR REVIEW OF PREVIOUS WORK

It is usually advantageous if the managers are prepared to accept changes in the system. As an example, Kimble et al (1995) found that managers are not always prepared for the long time-scale over which change takes place, nor for the many twists and turns of the change process. They added that the problem does not lie in the technology alone, nor solely in the nature of the social values that shape the context in which it is developed, but also depends upon how the managers, themselves, choose to use the technology.

4.3 Information technology and the manager

The information output of computers is used by managers, and by persons and organisations within the firm’s environment. Managers are found at all organisational levels of a firm and in all functional areas. Managers perform functions and play roles, and need skills in communication and problem solving in order to be successful. McLeod (1995, p.5) observed that ‘managers have paid increasing attention to information management during recent years, for two main reasons. First, business activity has become increasingly complex. Second, the computer has acquired improved capabilities.’
CHAPTER FOUR REVIEW OF PREVIOUS WORK

Computer use around the world

Managers are involved in a wide range of decisions about technology, decisions that are vital to the success of the organisation. Some 52 percent of capital investment in the US is in information technology, excluding software (New York Times, December 3, 1995). Lucas (1997, p.10) quoted Business Week estimates that there are 63 PCs per 100 workers in the US (including machines at home), and others have estimated that one in three US workers uses a computer on the job. A recent survey of 373 senior executives at large US and Japanese companies found that 64 percent of the US managers said they have to use computers in their jobs (Lucas, 1997, p.10). Other surveys in the USA have estimated that as many as 88 percent of managers use computers (Lucas, 1997, p.10). Because this technology is so pervasive, managers at all levels and in all functional areas of firms in the USA and comparable countries are involved with IT.

In most of the countries, managers are fully aware that the computer system has an important role in helping individuals and organisations with their work. Stewart (1990), considering the UK, predicted that the ratio of computer systems to office workers was already approaching an average of one to one. Kimble et al (1992) in a study conducted in the North East of England concluded that computer systems help the
managers' work, and that the growth in use of such systems has frequently been mentioned as having major implications for managers. In Finland, Jaakkola et al (1991) found that information technology developments in the Finnish manufacturing industry had changed the industrial structure and daily routines of companies and helped the industries with the controlling of jobs.

In different types of business companies, whether in manufacturing or marketing, the technology is being used in a variety of ways, to reduce labour, improve quality, provide better customer services, or to change the way the firm operates. As an example, Chung et al (1993) in Hong Kong found that manufacturers revealed differing expectations and attitudes about the use of decision support systems for production planning and control, and that IT applications were used for different tasks. It was realised overall, however, that IT helps managers with their work. Vlahos et al (1995) conducted a survey in Greece, and their findings show how managers in that country use computers to support decision-making. The results indicated the average number of hours per week that managers at three different levels spent using their computers. First-line supervisors, at the lowest level, logged about twice as much computer time as managers at other levels. Top-level managers reported slightly more use than middle-level managers.
CHAPTER FOUR  
REVIEW OF PREVIOUS WORK

Managers and differences in use

Although several studies have reported on the types and amount of IT use, there is little information about the value of various types of CBIS in supporting managerial work. An early study (Rockart et al, 1982) of top executive information systems (EIS) revealed that they were valuable in supporting managerial work in the areas of planning and control. Another study (Ferratt et al, 1988) of managers who frequently use IT concluded that many of these managers ‘strongly believe they are getting valuable support for their managerial work from their direct use of IT’.

Moss-Jones (1991) investigated how Information Technology was changing the nature of managers’ work. He found that IT is a destabilising force, pushing organisations toward a more fluid, responsive culture which he calls ‘the adaptive milieu’. The ubiquity of data access within an adaptive milieu appears to stimulate rapid decision-making and fast action. Thus managers are prompted to react quickly, and forced to decide autonomously which information to use and the priorities of the moment.

The computer systems can involve, and be used for different work activities and different tasks. Mutschler et al (1990), in a study of computer system use in human service agencies, found that only a small percentage of human service agencies do not use computers. In this case,
the tasks mainly supported by computers were in such areas as accounting and statistics. Eastwood (1991) noted, at a more general level, that the use of computers was becoming increasingly focused on satisfying business requirements and, consequently, senior executives were requesting more information upon which to base their business decisions.

As business environments have become more uncertain, information processing has become more complex than ever. Managers must forecast, plan, and make decisions on the basis of a myriad of possible alternatives and outcomes. Because of this complexity, computer proficiency has become an important asset for many business managers. Some may even argue that a company’s survival may depend upon its managers’ ability to work in a computerised environment. Rosenbaum (1992) has suggested that computing can only be understood by understanding the forces that shape organisational decision makers’ ideas about what computing should be applied to, how it should be applied, and how it should be managed.

Managers at all levels of management may need to use computer systems for their work. They use it for different jobs, for different tasks, and often for different amount of times. Kim et al (1994) found that upper-level
managers consider themselves as skilled or expert in computer use as the managers from lower levels. They also found that upper-level managers primarily use office systems and database systems; middle managers primarily use office systems and financial type systems; lower-level managers use database systems, for the most part. Job tasks supported by computer software are primarily data analysis at the upper level, planning for the middle-level, and report generation among lower-level managers.

The accessibility of hardware varies from one study to another. For example, a low amount of access was found in a study of knowledge workers (including some managers) in Saudi Arabia (Rahman et al, 1993), where participants shared personal computers. However, a high level of use was reported in a study from Taiwan (Igbaria, 1992), where about 50% of respondents used a microcomputer for two or more hours per day; and the non-managers used IT more than managers.

Gulf States and IT

In the Gulf States, in general, and in Saudi Arabia, in particular, there is a shortage of studies related to information technology. Some of the older studies have had to be considered, since it proved difficult to find more up-to-date results. Although, the older surveys may not give a clear
picture of the situation of IT now, they may help a little in terms of attitude and problems. Changes and the development of IT have already made a big difference to the situation of IT in Saudi Arabia (see chapter 3 for more details). Abdul-Salam et al (1986) described the benefits of computer systems for management development in Saudi Arabia, suggesting that it helped the business to gain more organisational control. They also indicated that the computer systems are a good way for the organisation to help the staff control their duties. They noted that computer systems have helped the management by providing both more information and faster information, and have also helped the management to take decisions.

Tarreq (1985) described how management and information can be integrated together. The computer system helps to provide information of better quality, faster, and more accurate, which means that the computer system assists individual and group development. He added that computers provide the information for decision-making which allows more accurate decisions be made. This means that accurate decisions can be arrived at if the information provided is accurate; the quality of information helps produce quality decisions.
In different organisations in Saudi Arabia, the computer system has been used for different tasks. Thus, Ali (1990) has noted that, in the Saudi Arabian Ministry of Defence and Aviation, the computer systems have been used to help support military decisions. He remarked that the computer system was used to assist in making quick decisions and to help get information quickly. Hafid et al (1992) already suggested that computer systems were so widespread in public and private sectors in Saudi Arabia that it was impossible to work without them.

Almleg (1991) at about the same time in Saudi Arabia, suggested that it was still necessary to automate management procedures, to support decision-making tasks, and to improve and develop networking, so that information could be sent and received quickly and easy. He added that it would be necessary to develop the systems, including networking, to keep up with IT development and to assist further the management and the organisations in Saudi Arabia. Salamh (1989), also in Saudi Arabia had earlier remarked that computer systems would help in making decisions, and would also support operational, planning, control, and strategic activities. He added that computer systems could encourage different levels of management to use computers, and this had led to the realisation that the computer can lead to good and accurate decisions.
In another study in the Gulf States, computer systems were found to be helpful at work. The situation as regards use of IT in the different Gulf States and the levels of satisfaction achieved were similar, because of the similarity of these countries. Ghorab (1997) found in his study of the automation of decision making in UAE banks, that management perceptions of technological sophistication in banking showed similar concerns regarding the economic and technical considerations that surround the adoption of a technologically sophisticated system. He also found that the managers seemed to have a good understanding of how the system's technical features can affect their job performance, and they knew how much return it should generate in order to offset increases in cost in the short and long term.

The literature available thus covers a number of different countries, and examines various views of the uses of computer systems for management. The results present quite similar pictures, which are generally positive about the value of computer systems when used by management for their own professional purposes.

4.4 User satisfaction

Several definitions of user information satisfaction have been provided in the literature. Bailey et al (1983) defined user information satisfaction
CHAPTER FOUR REVIEW OF PREVIOUS WORK

(UIS) as a multidimensional attitude of the user toward different aspects of an information system. Ives et al (1983) and Iivari (1987) described UIS as the perceived effectiveness of an information system. Ives et al (1983) also defined UIS as the extent to which users believe the information system available to them meets their information requirements. They mentioned that the concept of UIS can be traced back to the work of Cyert and March in 1963, who suggested that an information system which meets the needs of its users will reinforce satisfaction with that system. For example, Mawhinney et al (1990) found that the two items with the strongest and most consistent correlation with reported computer use time were user satisfaction with the computer system's contribution to job performance and level of competence with the system.

Many surveys have reported on manager satisfaction in using computer systems: that they increase productivity, effectiveness, decisions, supporting management, sharing with others, management operations and providing all the facilities expected. Igbaria et al (1996) reported that computer systems were being used for evaluating trends, analysing problems/alternatives, accounting/budgeting, making decisions, auditing, communication, planning/controlling and guiding activities. Schervish (1993) notes that three factors are common to all the studies determining
the value of information. (1) Value is based on the relevance the information holds for the worker. (2) Value is conditioned by the ease with which information can be obtained. (3) Value is reflected in the use of the information once it is received.

It is usually advantageous and important for managers to use computer systems for their work. Computer systems are potentially able to provide all the information needed, and so can help managers with problem solving, and also in controlling work activities. Kraemer et al (1993) found that computer-based information is important for most managers: many reported that they were extremely dependent upon it. However, managers typically found the information more valuable for the control of financial resources, than for the management of operations. Further, it appeared that among the factors that might account for differences in the usefulness of computer-based information to managers, quality and accessibility of the information and the manager’s style of use are particularly important.

It is evident that there are different levels of satisfaction with the use of computer systems. Managers use computer systems for different purposes and for a range of tasks, and they correspondingly value computers to differing extents. For example, managers in banking find
computer systems very important for their work, and they believe that they cannot work without them. Such differing aspects as the amount of use of computers, or the position of the manager, can affect the level of satisfaction. Zeffane (1994), at Australian Telecommunications, found that job satisfaction was positively influenced by the extent of computer usage, the role of computer-related training, and demographic characteristics (such as tenure and job position). Further consideration of differing usage by different sub-groups (based on job status and tenure) revealed that the extent of use in different functional areas (by different sub-groups) tended to affect user satisfaction to different degrees (Zeffane, 1994b).

As mentioned previously, there are different aspects of managers’ use of computer systems and their satisfaction with such use. As an example, Ang et al (1997) found that job satisfaction and user information satisfaction was highly correlated. In other words, the general user perception of information satisfaction and service reflected job attitudes and vice versa. It follows that, in attempting to improve the job satisfaction of end-user employees, an additional focus should be on improving the level of user information satisfaction (i.e. factors such as user knowledge of information systems, the quality of service provided by the IT department, and the quality of the output delivered by the
information systems). Similarly, organisations wanting to increase their overall user information satisfaction level should not overlook the importance of job satisfaction factors, such as pay, working conditions, and feelings of accomplishment.

4.5 Information technology impacts

Computers have become an important part of many organisations’ daily work and their importance is growing. In the 1960s and 1970s, computers were used mainly to reduce costs in administrative and accounting areas. Today, they offer organisations more impressive help in addition. Many successful attempts have been made to gain a competitive edge by using computers. They can be used as tools to support work and to provide better information to managers; and the intra-organisational integration of computer applications and their users can lead to a restructuring of an organisation’s activities. Thus, Igbaria et al (1995) found that Finnish professionals and managers used computer technology mainly because they perceived them as useful tools for improving their job performance and productivity.

A number of organisations use technologies to gain a competitive advantage, not least by designing creative applications that allow them to compete more effectively. Some firms use technology to generate
revenue, for example, by making information products available through computer systems. There is an abundance of financial databases and services to which one can subscribe. It is possible to obtain various types of information about companies and their financial conditions. Bray Paul in the Sunday Times (1996) said that 'the company has come to rely much more heavily on IT in recent years, now that virtually everyone has a PC'. IT can be used in all organisational tasks, and can help all levels of managers. Ryker et al (1995) noted, however, that computer systems affect jobs differently, depending on the level of the job in the management hierarchy, and on the type of user. Barua et al (1995) found significant positive impact of IT at the intermediate level of management.

Information can be used to reduce uncertainty and to co-ordinate different individuals and groups. Information helps people function with interdependence. It can also be used to create more flexibility in the organisation and design new organisational forms through IT-enabled design variables. Palmquist (1992) stated that, though the introduction of computing technologies has improved productivity, it has also caused loss of job satisfaction. He also added that computers have made work cleaner and less physically demanding, but they can also intensify the pace of work, render the human contribution more mechanical, and
provide supervisors with feedback that deprives the worker of a sense of autonomy. He concludes that information technology has had a profound impact on individual privacy.

Flexibility is the ability to adapt when confronted with new circumstances. A flexible organisation defends itself quickly against threats, and moves rapidly to take advantage of opportunities. Mutschler et al (1990) found that practitioners who are given discretion in the carrying out of their work, and individuals who are active in their professional organisations, are more likely to use new technology in their day-to-day work. Flexibility provides an organisation with the ability to adapt to change and respond quickly to market forces and uncertainty in its environment.

IT changes the pace of work. For example, it has speeded up order routing and processing on the stock exchange. IT has made it possible to search for information much more rapidly, to communicate with someone at a remote location, and to perform a number of tasks simultaneously. IT can also be used to shorten product development cycles. In general, IT speeds up the pace of work and increases the capacity of the organisation to process information. Dopson et al (1993) found that the impact of information technology can affect the numbers
and roles of managers, and that, as a result, changes are taking place in organisations. Smith et al (1992) stated that the roles and responsibilities assigned to information technology in an organisation change over time and as people adapt to new ways of working. Consequently, the particular causes of concern that management users have concerning IT will change with time.

IT also alters the space and time boundaries of work. When using electronic mail and computer conferencing, colleagues working on a project do not have to be in the same physical location. Even people who work together in the same office can communicate easily when travelling. With a portable computer and a modem, some kinds of business can be conducted from virtually any location at any time of the day or night. Managers can receive information via new channels. They are also able to use the computer systems to obtain different information which is applicable to the jobs. Katzer et al (1992) suggested that managers receive more information from more sources through more channels than almost anyone else in an organisation, whether one describes a manager's job in terms of functional responsibilities (e.g., planning, staffing, budgeting), or cognitive activities (e.g., decision making, problem solving, path finding). Managers will use any form of communication that enables them to provide and use different
information for their decision-making. Wilson et al (1994) remarked that
the use of computer systems within the managerial decision-making
process provides access to complex communication and modelling
capabilities.

Thus, it can be seen that IT has the ability to change the pace of work and
so alter time and space boundaries for work. This impact of IT can be
viewed as increasing organisational flexibility. With properly designed
systems, the organisation can increase its ability to respond to customers,
suggested that the importance of IT in the process of organisational
change is that it increases organisational flexibility, plays a critical role
in organisational change in the public sector, and changes the pace of
work. IT helps individuals and organisations carry out the work in a
business organisation, and increases the productivity of the working in
that organisation.

The most important task of managers is making decisions. IT can change
the way the manager makes decisions and, consequently, can change the
managers' job. Todd et al (1992) found that the use of information has
helped decision making where computer-based information systems have
supported this decision making. The information received proved more
useful of better quality, and was acquired more rapidly. Turban et al (1996, p.747) state that ‘the impacts of IT on decision making can be many; the most probable areas are listed here:

- Automation of routine decisions.
- Less expertise required for many decisions.
- Less reliance on experts to provide support to top executives.
- Power redistribution among managers.
- Support for complex decisions, making them faster and with better quality results.’

IT affects individuals in various ways at the same time that it also affects the organisation. A study carried out by Moss-Jones (1991) consisted of interviewing managers in UK companies to determine the impact of IT on their jobs. He found that IT increases the pressure on managers to respond quickly; thus their pace of work increases and they have less time for reflection. Another significant conclusion is that intensive use of IT seems to blur distinctions between management and non-management roles and to increase management-type behaviour, such as initiative-taking, flexibility and professionalism. The information management component of managers’ work is increasing: managers are spending less time on the ‘social’ components of their jobs and are responsible for more technological hardware. Managers are more involved in planning,
CHAPTER FOUR REVIEW OF PREVIOUS WORK

and this is for a longer time-frame. Kimble et al (1992) looked, in their case studies of managers in the North East of England, at the impact that the use of integrated, computer-based information systems has on managerial skills and responsibilities. They found that information systems do lead to the development of new skills, including the development of more advanced information management skills. They give managers more control over their work and allow them to become more proactive; at worst, they do not have negative effects.

As mentioned before, the quality of the information and the quality of the systems can both affect the use of computer systems by managers. Managers search for different information to make sure that the best information is used. Schervish (1993) noted that the type and quality of information available and uses affects: the planning and quality of services provided to clients; the effectiveness and efficiency of programme administration; the organisational development, mission attainment and accountability. An increased quality of information can help improve efficiency, and may allow the information to be put to various different uses. As an example, Chatwin et al (1992) have pointed out that the impact of information technology can change the business operations of a company and influence the evolution of its product range.
CHAPTER FOUR  REVIEW OF PREVIOUS WORK

Companies are advanced by using different information, as this leads to speedier responses and better decisions.

The impact of information technology on managers or their staff similarly has an impact on the organisation. Supporting individuals supports the organisation, and thus they share the same benefits. Jurison (1996) reported that impacts on the individual precede those on the organisation. He added that IT by itself does not create organisational change, but that the method of its implementation and use determine the changes that will occur.

Computer-based information systems have a range of applications (see chapter 1) which can help managers or staff. Eastwood (1991) noted that an EIS (executive information system) can give financial data, sales figures and world news at the touch of an on-screen button, or the click of a mouse; in addition, when information is updated, the system enables a user to respond quickly to events and to communicate faster with other staff members. Nord et al (1995) have pointed out that executive information systems can directly aid and support some business decisions and strategic planning capabilities. The other CBIS application which can help managers is DSS. For example, Augustine et al (1993) found that the use of decision support technology has the potential to
CHAPTER FOUR REVIEW OF PREVIOUS WORK

change significantly the way organisations are structured and the way managers make decisions.

4.6 Business communication

As the scale of business operations has grown, it has become necessary to gather data and information, and disseminate decisions over a geographically dispersed area. Communications technology makes it possible to share data within the company and with external organisations. It facilitates co-ordination and helps management define new organisational structures as it removes constraints on work time and space, and makes possible the creation of new structures that cut across traditional lines on the organisation chart.

The future of IT, especially in the new century, will be reflect rapid further development, and the changes will very powerful. Many countries and companies are already trying to get ready for the year 2000 in the area of IT. Throughout the 1990s, predictions have tried to look forward to the millennium, especially in the area of networking and communications. For example, Benjamin et al (1990) predicted that by the year 2000 there will have been great advances in terms of technology and computerisation, especially in the area of business communication. They predicted that business operations systems, information repository
systems, and personal support systems would be more advanced, yet more computer, and networking will be easy to use and very advanced. A summary of their predictions for the year 2000 is as follows:

1. Technology
   - The cost performance of everything related to IT (e.g., memories, microprocessors, etc.) will improve by two orders of magnitude
   - The billion-bit backbone network will be completed; it will be the international highway of business communication.

2. Architecture and standards
   - Client/server will be the predominant technology architecture, and it will evolve into important application architecture.

3. Services
   - Electronic mail will become ubiquitous, integrating graphics, voice, and text, and it will provide extensive collaborative support architecture.

4. Economics
   - Major investments will be made to complete and maintain the infrastructure.
   - Because technology is increasingly cheaper for all, the advantage will go to those who (a) apply it well and (b) effectively purchase value added services for implementing it.

5. Applications
Applications will be designed and built using high-level business models. Emphasis will be on the design of robust applications that adapt to both short-term operational difficulties and evolutionary change.

The implementation process within and between large business is generating larger and more complex applications. Because the design issues are so complex, it is reasonable to expect one or two application Chernobyl’s.

6. Change management

The executives in charge of IT organisations will have to learn change management skills and make sure that these skills are built into the IT organisation.

Some of these predictions have happened, for example, voice mail, but others may take a little longer to become widespread. It will be noted that general points, such as change management, represent an ongoing expectation, rather than a specific prediction.

Burrows (1994) has commented that it is certain that the businesses which will dominate the economy in the future will be knowledge-based organisations. A new profession could arise, that of the information resource director. The structure of organisation will change. They will
become more flexible and more responsive to change, with fewer levels of management. The information networks will integrate internal and external information based on an open systems type of organisation. Many of the international companies will move forward on the basis of a world-wide information system, forecasting and studies of future trends. There will be many more small companies, and a rapid rise of in-groups of people networking for specific projects.

Michael et al (1991) added that IT planning can reveal what is possible, make clear what it will take to achieve benefits, and help in orchestrating the efforts that follow. They also suggested that the keys to successful IT strategic planning lie in the following six simple rules:

- Focus first on the business
- Choose IT investment opportunities wisely
- Understand the risk (and be prepared to manage it)
- Avoid unnecessary technological change
- Plan ahead
- Secure total commitment.

In the past, as the larger firms successfully implemented their data processing applications, new challenges were sought. The computer was recognised as a tool that could produce information for management
decision making. First there was the concept of a management information system (MIS). Then a refinement known as the decision support system (DSS) appeared. MIS and DSS (see chapter 1 for more details) have received much attention from managers and information specialists during the past twenty years. As a result of this, the executive information system (EIS) (see chapter 1 for more details) has also appeared to support the managers and provide updated information.

Executive support systems (ESS) are computer-based information systems that provide top managers with the capability to obtain easy access to internal and external information which is relevant to strategic decision making and other executive responsibilities. The term ‘executive support systems (ESS)’ and ‘executive information system (EIS)’ are often used interchangeably, although ‘executive support systems’ typically refers to a system with a broader set of capabilities (Nord et al, 1995). Eastwood (1991) explained that EIS software can reside on a host system connected to networked PCs or terminals, and the information can be displayed on large screen projectors, or called up on a laptop computer. The major characteristics of an EIS include a separate executive database, which incorporates key information from regular management information systems, as well as from external systems. Other characteristics include modelling capabilities, business graphics,
automated links to other databases, status reporting, corporate electronic mail, and probably the most important factor of all-ease of use. Eastwood (1991) also suggested that vendors would increasingly incorporate user interface standards such as Windows, IBM's common user interface, and Motif from the open software foundation.

Managers get support from computer systems within their decision-making by using various information services in a number of different ways. Wilson et al (1994) have warned that decision structures may be imposed through the computer system. This may result in an organisational culture wherein absolute conformity is demanded and cultivated, if the justification of norms is precluded and individual identities are disregarded. They also remarked that it was not proposed that an organisation utilising computer systems would exhibit all of the structural outcomes previously identified, nor that information and communication technology, in itself, would determine organisational development in a restrictive manner.

Firms take advantage of the opportunities provided by telecommunications and networks in a number of ways. Two important contributions of this technology are electronic mail (e-mail) and electronic data interchange (EDI). Managers can gain benefits from all
CHAPTER FOUR

REVIEW OF PREVIOUS WORK

the computer systems facilities which help them with their work. Donnelly et al (1994) noted that the emergence of electronic systems to collect, store, retrieve and manipulate data has provided industry, commerce and public sector with strategic enabling technology, and this has presented society with a potential agent of change in the radical restructuring of society itself. They added that the evolution of systems that deliver very accessible, accurate information based on coherent data in time frames of seconds rather than minutes, days or weeks has impacted fundamentally on the conduct of operations in all sectors.

4.7 Relevant research model

The rapid implementation and widespread use of computerised systems in large organisations has grown, particularly in the area of management information and decision support systems. Many models and frameworks have been proposed to facilitate research into such information systems. An attempt will be made below to summarise some of the theories and research models that are particularly relevant to the present study.

Gorry and Scott-Morton's model (1971) considers an information system from the perspective of the information that it provides to management. They hypothesise that the dependent variables are the attributes of information. These include, for example, accuracy, currency, and
frequency of use, which vary, according to Anthony's (1965) level of
managerial activity and Simon's (1960) relative degree of structure, with
the decision being made. The model variables are:

1. Operational control
2. Management control
3. Strategic planning
4. Structured
5. Unstructured
6. Structured decision systems (programmed)
7. Decision support systems (non-programmed)

Chervany, Dickson and Kozar (1972) attempted to isolate the major
elements that determine the effectiveness of information systems. They
proposed four categories of variable in their framework, with 'decision
effectiveness' as their dependent variable and the others as independent
variables. Their framework included the following types of variable:

1. Decision effectiveness
2. Characteristics of the information systems
3. The decision environment
4. The decision maker
CHAPTER FOUR

REVIEW OF PREVIOUS WORK

Mason and Mitroff's (1973) model defined an information system as consisting of: a person of a certain psychological type who faces a problem within some organisational context for which he/she needs evidence to arrive at a solution, where the evidence is made available through some mode of presentation. This view of an MIS defines five key types that Mason and Mitroff considered as important for MIS design. These variables include:

1. Psychological type
2. Problem type
3. Type of evidence generators and guarantees
4. Organisational context
5. Mode of presentation

Mock's (1973) model focuses attention on the behavioural constraints imposed on system design. In particular, he argues that the information systems user or decision-maker will be operating in a fixed social, personal and structured environment. The model variables, in this case, include individual/psychological, organisational, interpersonal, sociological and environmental, information structure, and decision-maker's performance.
Lucas (1973, 1975) proposed a model for predicting MIS utilisation and job performance; it used seven groups of variables including:

1. Quality of system
2. Attitude and perceptions
3. Situational and personal factors
4. Decision style
5. Use of information system
6. Action analysis
7. Performance

The model describes how user performance affects usage of the information system, and how system usage in turn influences user attitudes.

Ives, Hamilton and Davis's (1980) model proposed a framework that subsumes the models previously described. They used three major variable groups in their framework:

1. Process variables
2. Environmental characteristics
3. Information system characteristics
Mawhinney et al (1990) proposed a model adapted to the context of PC utilisation. This model described groups of variables which were expected to affect such utilisation, namely:

1. Organisational
2. Personal
3. Computer system
4. Process

The utilisation of the system served as the dependent variable and the remaining variables were regarded as independent variables.

Davis (1993) described a technology acceptance model (TAM), which was adapted from the theory of reasoned actions (TRA) from social psychology. This model (1) specifies how to measure the behaviour-relevant components of attitudes, (2) distinguishes between beliefs and attitudes, and (3) specifies how external stimuli, such as the objective features of an attitude object, are causally linked to beliefs, attitudes and behaviour. The technology acceptance model includes system design features, perceived usefulness, perceived ease of use, attitude toward using, and actual system use.

The Delone and Mclean (1992) model included six types of variables, under the headings of system quality, information quality, information use,
user satisfaction, individual impact, and organisational impact. They reviewed previous discussions of modelling, and commented on all those empirical studies that had appeared in one of the seven leading publications in the IS field. In addition, a number of other articles were included, some dating back to 1949, that made a theoretical or conceptual contribution, even though they may not have contained any empirical data. Taken together, these 180 references provided a representative review of the work that had been done and provided the basis for formulating a more comprehensive model of IS success than had been attempted previously. Several of the models described before were considered in their review, and several variables from these models were used by Delone and Mclean to discuss the context of information systems’ success.

Most of their reviews and samples of studies involved managers. Their model was developed for the purpose of assessing information systems’ (I/S) success, and to elucidate what were the dependent variables. However, the dependent variable in the reviewed studies of I/S success proved to be an elusive one to define. Different researchers have addressed different aspects of success, thus making comparisons difficult, and the prospect of building a cumulative tradition for I/S research seems correspondingly elusive. To organise this diverse research, as well as to present a more integrated view of the concept of I/S success, a
comprehensive taxonomy was introduced. This taxonomy posits six major dimensions or categories of I/S success. These many aspects of I/S success are drawn together into a descriptive model, and its implications for future I/S research spelt out. Their model as follows.

The above diagram represents the information system success model which was developed by Delone and Mclean. It was decided to use this as the basis for discussion in the present thesis. However, it was developed further to serve the purposes of this thesis.

The process and environments concepts from the organisational effectiveness literature provided a theoretical base for developing this rich model of I/S success measurement. The model recognises success as a process construct, which must include both temporal and causal influences in determining the I/S process. The authors added that this model of success clearly needs further development and validation before it can serve as a basis for the selection of appropriate I/S measures.
CHAPTER FOUR  

REVIEW OF PREVIOUS WORK

Researchers attempting to measure, say, the effects of user participation on the subsequent success of different information systems, may utilise user satisfaction as their primary measure, without recognising that system and information quality may be highly variable among the systems being studied. In other words, the variability of the satisfaction measures may be caused, not by the variability of the extent or quality of participation, but by the differing quality of the systems themselves, i.e., users are unhappy with 'bad' systems, even when they have played a role in their creation.

As an examination of the literature on computer systems success makes clear, there is not one measure of success, but many. However, on more careful examination, these measures fall into the major categories mentioned previously. By studying interactions among these components of the model, as well as the components themselves, a clearer picture emerges as to what constitutes computer systems' success.

The Delone and Mclean (1992) model has been chosen as the basis for this dissertation, because it serves the aims and objectives of this study (see chapter 5 for more details), although some minor adaptations have been made (see chapter 5 for more details) to reflect these aims and objectives.
4.8 Summary

This review of the literature has indicated some points, which are highly relevant to the present study. However, most of the discussion has related to studies in developed countries: their relevance to a country such as Saudi Arabia has to be tested. The following summarises the main points in the literature review which seem relevant to the present study:

Organisational support

- The organisation plays a fundamental role in supporting managers in their use of computer systems.
- Managers need to be involved in examining the solutions of IT, not just the problems.
- The benefits of automated information support for the manager include increased motivation, better use, and timely availability of information, the ability to analyse business problems more thoroughly, and increased productivity of managers.
- Managers' support involves activities that serve to enhance the development and improvement of managers within the organisation.
- Managers should be increasingly computer literate.
- Information centres offer a co-ordinated, formalised system for supporting computer users, including managers.
CHAPTER FOUR REVIEW OF PREVIOUS WORK

- Information centres should be organised and dedicated to supporting managers, standardising hardware and software, and providing training, technical support, consulting support, assistance, and satisfying the demands of managers, to make use of the power of computer systems in a relatively easy and timely fashion.

- Information centres need to offer a range of support for managers, such as systems documentation, and substantial education programmes, to encourage them to use the computer systems properly.

- Managers need support to apply computer systems to a wider variety of business tasks, and need to be encouraged to make full use of computer systems in all possible areas of their work.

- Managers would make more and better use of computer systems if they were well trained.

- Computer literacy is a key factor for the effective introduction of such systems, and the introduction of new technology must be preceded by appropriate training programmes.

- Frequent retraining can help managers to keep up with systems developments.

- If organisations want to introduce computer systems, they must provide sufficient training for managers, involve managers in the development of the computer system, provide easy access to the technology, and
CHAPTER FOUR  
REVIEW OF PREVIOUS WORK

attend to the structural factors of the organisation that can facilitate or impede the adoption of a new technology.

- Support by specially designated staff is always preferable, because they understand precisely what the manager needs.

- It is advantageous if the manager is familiar with the systems development work.

- Computer experience, as it increases, assists managers in making full and appropriate use of computer systems.

- Maximum system quality and information quality encourages managers to use the computer systems, and is important for optimum organisational performance.

- Increased ease of use of the systems, and more information which matches the managers' requirements, encourages managers to use computer systems.

**Information technology and the manager**

- A use of computer systems is seen as being increasingly important by managers around the world.

- In most countries, managers feel that the computer system has an important role in helping individuals and organisations with their work.

- Computer systems are used in different companies for different tasks.

- Computer systems are typically used to support decision-making.
Computer systems have proved valuable in supporting managerial work.

Computer systems can support all types of managerial work.

Managers now need to use computer systems to carry out their work.

Managers use different computer applications, but the most popular ones are databases, office systems and financial.

User satisfaction

Managers were satisfied when using computer systems if these increased productivity, effectiveness, speed of decision making, information provided to support management, information sharing with others, and the speed of management operations.

Computer systems are typically used for evaluating trends, analysing problems, accounting, decision-making, auditing, communication, planning, and guiding activities.

Job satisfaction and user information satisfaction are highly correlated.

Companies now rely very heavily on computer systems.

Information technology impacts

Organisations and managers find that computer systems are having a significant positive impact on their activities.
CHAPTER FOUR  REVIEW OF PREVIOUS WORK

- All categories of managers mainly use computer systems as tools to improve their job performance and productivity.

- Computer systems support for managers work activities and productivity has increased the speed of work and the capacity of the organisation to process information. As a result, it is affecting the numbers and roles of managers.

- Managers can receive and use different information from more sources through more channels via the application of computer systems.

- Computer systems change the pace of work, and increase organisational flexibility.

- Computer systems support decision making in many areas, such as: the automation of routine decisions; less expertise is required for many decisions; there is less reliance on experts to provide support to top managers; there is power redistribution among managers. The systems support consideration of complex decisions, making them faster and with better quality results.

- Computer systems are now able to support managers, helping them to respond quickly, and to gain control over their work.

- The higher quality of information can help improve the efficiency and quality of different tasks.
CHAPTER FOUR  
REVIEW OF PREVIOUS WORK

- Business communication facilities improve co-ordination, and help management to define new organisational structures. They also help organisations to share information with internal and external bodies.

- The information network integrates internal and external information in a way which is useful for managers and organisations.

- Managers get their support from computer systems, in terms of decision-making, by using various information sources in a number of different ways.

- Firms can take advantage of telecommunications and networks in a number of different ways.

- E-mail is very useful for managers.

- There are a number of relevant models to study systems aids to managers, but the Delone and Mclean model seems most appropriate for the present thesis.

Developing countries

- In the early days of office automation managers in Saudi Arabia used computer systems for different tasks and found them beneficial and useful for their work. However, there are few more recent studies, and little is known about the impact of networking on Saudi firms.

- Critical factors leading to the lack of success of CBIS are poor infrastructures, lack of foreign exchange to buy spare parts, poor
supplier services, scarce education and training facilities (and therefore lack of skilled personnel), and lack of management commitment and co-operation.
5.1 Introduction

In order to fulfil the aims and objectives of this study, the following approach has been used. Firstly, a research model is presented, which describes the characteristics of the approach developed for the study and the variables considered. The second item concerns the actual research methods which might be employed, and the advantages and disadvantages of each of these methods. This leads to the decision that both qualitative and quantitative methods will be used for data collection in this study. This is followed by a discussion of questionnaire and interview contents,
and their administration in Saudi Arabia and the UK. Thirdly, the construction and application of a pilot study is described. Finally, the approach to data analysis is presented.

5.2 Research model

The purpose of the study is to examine managers' use of computer-based information systems in their day-to-day working activities, to examine also the role of computer systems in business organisation, and to consider the best way of supporting managers in their use of computer-based information systems. The model that serves as a basis for this dissertation was formulated by Delone and Mclean (1992). They analysed nearly one hundred empirical studies on information system success conducted between 1981 and 1987 and provided a comprehensive review of the relevant literature. From this review, they proposed a model of information system success, which consists of six types of variables, under the headings of: system quality, information quality, information use, user satisfaction, individual impact, and organisational impact. The reason for choosing this model as indicated in the previous chapter is that it deals with the groups and systems which satisfy the requirements for the aims and objectives of this thesis.
The actual model presented in this dissertation was developed on this basis to serve the purposes of the aims and objectives of the research (see figure 5.2). The difference (see chapter 4 for more details) of this model from the original model was that two more variables were added. These were the individual characteristics and the support characteristics. In addition, some of the variable names have been changed to serve the purpose of the study. The model groups them into eight categories: individual characteristics, support characteristics, system quality, information quality, CBIS use, managers' satisfaction, individual impact, organisational impact. The variables listed in each category for use in this study can be supported by reference to the literature review. Some of the variables listed were included as indirect measures of items relevant to the aims and objectives of the study.

The purposes and the measurements of these variables can be described in more detail as follows:

- Individual Characteristics: This category describes the manager's background. This includes the manager's position, education, age, department and computer experience. These variables have been used in this study to measure the individual characteristics.

- Support Characteristics: This category describes the organisational support for managers, including the infrastructure and support facilities.
The variables included the upgrade of the systems, training, assistance and support from both the management and the organisation for managerial staff. The computer centre/information centre in the organisation provides these kinds of support in order to assist managerial skills and help managers in the use of the available CBIS.

- **System Quality**: This category describes the quality of the CBIS, and is a measure of the information processing system itself. The variables cover accuracy, response time, quality of the system, nearest computer system, kind of computer use, handling of the computer system, the ease of use, ease of learning, value of the system, the available information, and the system flexibility.

- **Information Quality**: This category describes the computer systems' output. Since the information output is very important for managers, the quality of that output is of concern for their work and for the success of the job. The variables here measure the information quality in terms of information value, output quality, output formatting, accuracy, ease of use, and the different applications used by managers.

- **Computer-based Information System Use**: This category describes the CBIS itself. The CBIS produces the information for the managers; this, together with the systems, can increase the manager's satisfaction with the use of the systems in their work. In this study, the variables used to measure the computer-based information system were, whether the
computer systems are essential to the manager’s work, whether they provide all the facilities expected, their speed of response, and whether the information provided is up to date.

- Manager’s Satisfaction: This category describes the manager’s satisfaction with the use of the CBIS and the support it provides. This study uses a number of measures for managers’ satisfaction; these are the availability of information, the value of information for the tasks, applications used in their work, how helpful the information is in looking for trends, making decisions, analysis of problems, accounting, auditing, communication, planning, controlling and guiding activities.

- Individual Impact: This category describes the effect of the CBIS on individual performance. Impact is the most difficult parameter to define in a non-ambiguous fashion. It is closely related to performance, and so ‘improving my or my function’s performance’ is certainly evidence that the CBIS has had a positive impact. Moreover, ‘impact’ could also mean that the CBIS has given the user a better understanding of the decision context, has improved his or her decision-making productivity, has produced a change in user activity, or has changed the decision maker’s perception of the importance or usefulness of the CBIS. The same variables have been used to examine both meanings. The variables used to measure individual impact are the improvement in the speed of working, improvement in the quality of work, whether
CBIS makes the work easier to perform, improves effectiveness, and enhances the ability to take decisions, and the apparent value of computer systems.

- Organisational Impact: This category describes the effect of the CBIS on organisational performance. In this study, the following variables have been used to measure the organisational impact. These are improvement of the quality of managerial decisions, helping the organisation to provide new services for staff, enhancement of communication between the organisation and external bodies/services, improvement in organisational productivity, and beneficial use of computer systems within the organisation.

This model proposes that INDIVIDUAL CHARACTERISTICS, SUPPORT CHARACTERISTICS, SYSTEM QUALITY, and INFORMATION QUALITY, individually and jointly affect both COMPUTER-BASED INFORMATION SYSTEM (CBIS) USE and MANAGERS' SATISFACTION. Additionally, the amount of CBIS USE can affect the degree of MANAGERS' SATISFACTION—positively or negatively. CBIS and MANAGERS' SATISFACTION are direct antecedents of INDIVIDUAL IMPACT; and, lastly, this IMPACT on individual performance should eventually have some Organisational IMPACT.
5.3 Research method

Methods are, to some extent, related to methodology. In other words, particular methods are often associated with particular approaches to the way research is done. Compare, for example, the two major approaches classified as 'quantitative' and 'qualitative'. The difference is not simply that one deals with numerical data, while the other does not. A qualitative approach typically sees the researcher as internal to the organisation being studied, both influencing and being influenced by the activities under examination. Such studies are likely to give more emphasis to personal and informal aspects. Quantitative studies, on the contrary, see the researcher as external to the organisation—not influencing, or being influenced by the organisational activities that are being examined. This kind of investigation takes a more formal, third-person perspective.

An example of a method that clearly relates to methodology is 'participant observation'. This concentrates on observing people in their work environment with the researcher acting, in effect, as a temporary colleague. This approach obviously fits well with qualitative methodology. Such an approach has several advantages, for example (Creswell, 1994, p.151):
The researcher gains first-hand experience of the informants' work.

The researcher can record information in real-time.

Unusual/atypical activities can be noted.

Activities that the informant may not consider important can be recorded.

In the present instance, the methodology adopted was quantitative. The reason was that, since this was the first time such an investigation had been carried out, it seems desirable to obtain a statistically viable set of responses. This also meant that the type of questions being asked had to be standardised, so a formal approach was essential. The strong belief in secrecy that exists in Saudi firms made any type of observational approach impossible. Questionnaires are almost always the best way of carrying out a large-scale quantitative survey, so they were used here. However, it seemed desirable to ask some questions of a more qualitative nature. Since techniques relying on observation or participation were ruled out, the method used for this element was interviews. These have the advantage of being well-documented, and therefore relatively straightforward to apply and analyse.

Dillman (1978) considered three different approaches: face-to-face interviews, telephone, or mail. On the basis of many years' experience...
with large surveys, he provided a comprehensive comparison of these three approaches, with twenty-four factors being seen as important when evaluating the merits of the three methods. As with all research strategies, no one approach scores highly for all situations. Dillman concluded that each method has merits as well as shortcomings, and the choice is very much dependent on the research aims and objectives.

The major strengths and weaknesses of the three methods are summarised below in table 5.3.

**Table 5.3 The major strengths and weaknesses of the three methods**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Mail survey</th>
<th>By telephone</th>
<th>Face-to-face interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed cost</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Marginal cost</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Explanation</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Response rate</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Completion time</td>
<td>Short/Long</td>
<td>Short</td>
<td>Very Long</td>
</tr>
<tr>
<td>Inherent bias</td>
<td>Free</td>
<td>Bias</td>
<td>Bias</td>
</tr>
<tr>
<td>Anonymity</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
The advantages and disadvantages of these methods are discussed in more details in the following.

5.3.1 Use of interviews

Interviews can be conducted either face-to-face, or over the telephone. Although most unstructured interviews in organisational research are conducted face-to-face, structured interviews can be either face-to-face, or through the medium of the telephone, depending on the level of complexity of the issues involved, the time that the interviews would take, the convenience of both parties, and the geographical area covered by the survey. Telephone interviews are best suited to studies where many respondents are to be reached over a wide geographic area and the time that each interview takes is short, less than twenty minutes. Many market surveys, for instance, are conducted through structured telephone interviews (Uma Sekran, 1992, p.196).

The telephone interview has mostly been used to obtain data quickly, and is cheaper to use in some cases, especially if it is used locally. On the other hand, the telephone interview method depends entirely on efficient oral communication (Dillman, 1978). This latter point helped make the method inappropriate for use in the UK, since the problem of an
interviewer speaking in a foreign language would make it difficult for both interviewer and respondent to understand each other easily. For Saudi Arabia it would be very costly to use overseas calls, and, even the overseas mail would be very costly, and it would take a lot of time.

The main advantage of telephone interviewing, from the researcher's point of view, is that a number of different people can be reached if need be, across the country or even internationally in a relatively short period of time. From the respondents' standpoint it would eliminate any discomfort that some respondents might feel in facing the interviewer. It is also possible that most respondents would feel less uncomfortable disclosing personal information over the phone than face-to-face.

One of the main disadvantages of telephone interviewing is that the respondent can unilaterally terminate the interview without warning or explanation by hanging up the phone. To minimise this problem it is advisable to call the interviewee ahead of time to request participation in the survey, giving an approximate idea of how long the interview will last, and setting up a mutually convenient time. Interviewees tend usually to appreciate this courtesy, and are then more likely to co-operate. Another disadvantage of telephone interviews is that the researcher will not be able to see the respondent and react to non-verbal communication.
The face-to-face interview allows greater flexibility in the questioning process. It allows the interviewer to determine the exact wording of the questions and probe for additional information and detail. In addition, answers can be obtained from respondents who would not reply to a mail questionnaire, often due to unwillingness to take the time. The main advantage of face-to-face or direct interviewing is that the researcher can adapt the questions as necessary to clarify doubts, and ensure that the responses are properly understood by repeating, or rephrasing, the questions. The researcher can also pick up non-verbal cues from the respondents. Any discomfort, stress, or problems that the respondents' experience can be detected through frowns, nervous tapping, and other body language unconsciously exhibited by the respondent. This would obviously be impossible to detect in a telephone interview.

The main disadvantages of face-to-face interviews are the geographical limitations they may impose on the surveys, and the vast resources needed if such surveys need to be done nationally or internationally. The costs of training interviewers to minimise interviewer biases (e.g., differences in questioning methods, interpretation of responses) are also high. Another drawback is that respondents might feel uneasy about the anonymity of their responses when they are interacting face-to-face with an interviewer.
The main advantage of using the interview method, in general, is that it facilitates communication between the interviewer and the respondent, allowing the interviewer to explain and clarify his questions to elicit significantly more complete answers. The interview method can also provide detailed in-depth information. The main disadvantage of the method is that the interviewer may influence the respondents' answers. It may also be time-consuming, and costly, and requires skilled and experienced interviewers. Another significant disadvantage is the time taken, which is of particular importance in this study as it deals with managers, who are always busy.

5.3.2 Use of questionnaires

A questionnaire is a preformatted, written set of questions to which respondents record their answers, usually within rather closely defined alternatives. The questionnaire method is regarded as an impersonal research method. A questionnaire is an efficient data collection mechanism when the researcher knows exactly what is required and how to measure the variables of interest. Questionnaires can be administered personally, or mailed to the respondents. Their main advantages are that larger samples can be used than for interviews and statistically valid measurement can be developed. In addition, there is a reduction in biasing
error, the cost is lower, and there is greater anonymity. The major disadvantages are lack of control over who fills in the questionnaire, no opportunity for probing, and the generally low response rate (Nachmias & Nachmias, 1989). Various techniques can be used to try and overcome the problem of low response rate, for example, over-sampling, follow up, length of questionnaire, and so on.

When the survey is confined to a local area, and the organisation is willing to help to distribute and collect the questionnaires, or let the researcher to distribute it at the workplace, personally administering the questionnaires is the best way to collect data. The researcher also has the opportunity to introduce the research topic and motivate the respondents to give their honest answers. In addition, an explanation can be provided if the respondent is confused about the questions. As the research administrator is present he/she can clarify matters, thereby obtaining more relevant responses.

Another important advantage is that the researcher, or a member of the research team, can collect all the completed responses within a short period of time. Any doubts that the respondents might have regarding any question can be clarified on the spot.
CHAPTER FIVE

In addition, it requires fewer skills to administer a questionnaire than to conduct interviews. It is also often conceptually easier to analyse questionnaire returns than those from interviews. Wherever possible, it is advantageous to administer questionnaires personally to groups of people because of these advantages. However, organisations often are not able or willing to allow company time for data collection, and other ways of getting the questionnaires completed and returned may have to be found. In such cases, employees may be given blank questionnaires that will be collected from them later personally, or they can be provided with self-addressed, stamped envelopes and asked to have them completed and mailed to the researcher by a certain date.

The main advantage of a mail questionnaire is that a wide geographical area can be covered in the survey. The questionnaires are mailed to the respondents, who can complete them at their own convenience, perhaps outside the workplace, and at their own pace. However, the return rates of mail questionnaires are typically not as high as might be desired; indeed, sometimes, they are very low. Another disadvantage to the mail questionnaire is that any doubts the respondents might have cannot be clarified. With very low return rates it is difficult to establish the representativeness of the sample, because those who responded to the survey may be totally different from the population they were intended to
represent. However, some effective techniques exist for improving the rates of response to mail questionnaires. Sending follow up-letters, enclosing some small monetary incentives with the questionnaire, providing the respondents with self-addressed, stamped, return envelopes, and keeping the questionnaire as short as possible, will all help to increase return rates of mail questionnaires (Uma Sekran, 1992, p.201).

5.3.3 The present study

It was expected that there would be some difficulties in obtaining information from Saudi Arabian firms. The problem is that most Saudi firms are not yet accustomed to the idea of externally conducted surveys. Many Saudi firms fear that any release of information about their activities will benefit their competitors. Some Saudi firms keep their information secret because of the Saudi tradition of not sharing information with others. For example, they will not give researchers the opportunity to explain their research, but will refuse cooperation as a matter of principle. In comparison UK firms give the researcher the opportunity to explain his research, and then decide whether to participate. They are willing to consider whether they might get benefit from the research. Indeed, as a part of a developed country, they support research and often welcome
researchers into their company. Consequently, attempts to investigate Saudi firms have always encountered difficulties: no survey of the type proposed here has hitherto been carried out in Saudi Arabia.

As mentioned previously, it was decided to use two data-gathering methods for data collection in both Saudi Arabia and the UK. The first method of data collection was separated into two stages. The first stage involved a series of interviews with selected managers to obtain qualitative feedback. The second stage involved a series of interviews with computer centre/information centre staff to obtain additional qualitative feedback. Further, the interviews employed two different methods, face-to-face interviews and telephone interviews. The reasons for using both methods of interviews was that it enabled managers outside of Riyadh, where the main industrial and financial firms are located, to be interviewed. The decision to use the interview method was made on the basis, as indicated before, that it was the best way of collecting detailed information from the managers and computer centre managers in all of the business organisations.

The second method of data collection was also separated into two stages. For the first stage, the mail questionnaire method was chosen as the most appropriate data collection method to obtain quantitative feedback. At the
second stage, the personal distribution method was used and questionnaires were distributed directly to a sample of staff to obtain further quantitative feedback. The reason for using both questionnaire methods was that it allowed a wider range of geographical locations to be included. Furthermore, this method seemed most likely to provide an acceptable sample of firms in Saudi Arabia. Personal distribution was also used to increase the response rate.

5.4 Interview method

The interviews were used as a follow up to the questionnaire in both Saudi Arabia and the UK in order to get the richest possible picture of the current situation on the computer-based information system. To ensure the suitability and completion of the interviews, several steps were taken. The first step was developing the interview schedule for the managers. A prototype schedule for internal discussion with my supervisor was initially constructed. In the light of this discussion, revisions were made to the interview schedule. The second step was developing another interview schedule for the computer centre/information centre staff. Again, a prototype for internal discussion with my supervisor was constructed, and in the light of this discussion, revisions were made to the interview schedule to arrive at the final draft
CHAPTER FIVE RESEARCH METHODOLOGY version. The third step in the interview development then involved submitting the revised drafts to some experts (see pilot study later in this chapter for details). These experts were asked to read the interview schedules critically, to give their reactions and suggestions, to make notes, and when necessary to eliminate, add, or rewrite some questions. The fourth step consisted of a pilot test of the interviews (see pilot study for details) to make sure of the time taken and to gain experience in conducting the interviews. The final step was translating the English version into Arabic.

Once all the above processes were completed, both Arabic and English versions of the interview schedules were retyped. The interviews with the former version were carried out in Saudi Arabia and with the latter version in the UK.

5.4.1 Interview content

The interviews were planned to be carried out in fifteen minutes, because they were to be used with managers who are very busy. Two different interview schedules were developed, the first schedule was to be administered to managers, in order to investigate further the impact of computer-based information systems and the way computer-based
information systems are being used for management purposes. This interview, therefore, concentrated on four elements in order to satisfy the aims and objectives of the study, as follows:

- Managers' background: managerial position, department, sex, education, and age.

- Computer-based information systems: computer systems experience, the importance of the computer-based information systems for the managers, how helpful the computer-based information systems were for decision making, and the extent of use of the computer-based information systems in the manager's work.

- Computer-based information systems policy, planning and funding: satisfaction with the existing computer systems, how the computer systems policy/planning is decided, and the sort of plans being made for computer systems development.

- Help, support and training.

The second set of interviews were with the computer centre managers, to investigate how the computer centre supports managerial uses of the computer systems, from the computer centre managers' point of view. In order to satisfy the requirements of the aims and objectives of the project, the questions in these interviews were concentrated on four elements, as follows:
CHAPTER FIVE RESEARCH METHODOLOGY

- Managers’ background: managerial position, sex, education, and the age of the respondents.

- Current status of computer-based information: the computer systems configuration used in the organisation, the number of staff working in the department, and the activities of the department concerning software development.

- Computer-based information systems policy, planning and funding: satisfaction with the existing computer systems, how the computer systems policy/planning is decided, and the sort of plans being made for computer systems development.

- Training support and help: the training, support and help that the computer centre provides for the managers in their use of the computer systems.

(See appendix for details of these interview schedules.)

5.5 Questionnaire method

The main objective of the questionnaire was to seek the manager’s point of view as regards of the computer-based information systems (whether they play a major role in their day-to-day activities, or not) and to carry out an investigation into the way computer-based information systems
are being used for management purposes. The intention was also to assess how to develop computer systems in business organisations and to explore the best way of supporting managers via the use of computer systems. In order to collect this information, questionnaires were distributed in both Saudi Arabia and the UK. To ensure the suitability and ease of completion of the questionnaires, several steps were taken. The first step in developing the questionnaire was to construct a prototype for internal discussion with my supervisor. In the light of this discussion, revisions were made to the questionnaire. The second step in the questionnaire development then involved submitting the revised draft to some experts (see pilot study). These experts were asked to read the questionnaire critically, to give their reactions and suggestions, to make notes, and when necessary to eliminate, add, or rewrite the questionnaire questions. The third step consisted of a pilot test of the questionnaire (see pilot study for details). The final step was translating the English version into Arabic.

Once all the above processes were completed, both Arabic and English versions of the questionnaire were retyped and distributed in Saudi Arabia and in the UK. According to Dillman (1978), three steps must be taken to maximise the survey response:

- Minimise the cost of responding
• Maximise the rewards for doing so

• Establish trust that rewards will be delivered

Dillman also offers advice on matters such as envelopes, the covering letter, mailing dates, and so on. Dillman suggests that both the envelope and covering letter should contain the name and address of the intended recipient. Dillman also advises the use of three reminders or more, where the third reminder should be sent by registered mail to all non-respondents (the use of registered mail being to emphasise the importance of both the survey and the recipient).

The study adopted Uma Sekran’s (1992) ideas and Dillman’s Total Design Method (TDM) for the development and use of a mail questionnaire (Dillman, 1978). The following methods were applied in this study to increase the response rate:

• An official letter from the Saudi Arabian sponsors was sent with the questionnaire asking for help with this research.

• Personal contact was made with the public relations departments of the organisations to request that the distribution was carried out by them.

• An individual, one page, dated covering letter printed on headed paper with a signature was sent along with the questionnaire.
• Stamped, self-addressed envelopes, giving a local address, were provided.

• The problems, aims and purposes of the study, and its expected usefulness were explained in the covering letter.

• The degree of confidentiality of responses was prescribed.

• Respondents were thanked for their co-operation.

• Follow-up letters were sent to all non-respondents.

• Follow-up calls were made to non-respondents’ companies.

• In terms of reducing the effort for respondents, the questionnaire was kept as clear, short and simple as possible.

5.5.1 Questionnaire content

In deriving a final version of the questionnaire, strenuous efforts were made to keep the questionnaire short, unambiguous, easy for the respondent to complete and easy to analyse (question wording, length of questions, order of questions and questionnaire format were considered seriously).

The questionnaire sent out in both Saudi Arabia and the UK was divided into five main content areas to satisfy the aims and objectives of the study, as follows:

• Background variables: position, department, experience, highest degree, gender, and age.
CHAPTER FIVE RESEARCH METHODOLOGY

- Assessment of computer-based information systems: nearest terminal, kind of computer, and handling of the computer systems.
- Questions about users and system: easy to learn, easy to use, easy to read, easy to use applications, support of the system at work.
- Usage of computer systems: frequency of usage of selected computer applications, frequency of use of computer system on selected tasks, impacts on individual and organisation.
- Infrastructure and support facilities: significance of change, differences in the changes, and extent of assistance obtained by users from selected different supports (e.g. manuals, staff, training, friends, etc).

(See appendix for details of the questionnaire.)

5.6 Pilot study

Once questionnaire construction had been completed, it was important to test the techniques and questions, and to gather experience of how the questions might be understood by respondents (Stone et al, 1984, p.15). Moser et al. (1986) argue that a pre-test before the main survey provides an indication of the suitability of questions and helps identify hidden problems before carrying out the main survey. The main point of the
CHAPTER FIVE

pilot study was to make sure that the questionnaire and interview
techniques worked.

As suggested by Dillman (1978), the questionnaire and interviews were
pre-tested by three different groups: colleagues, Loughborough
University administrative staff, and staff at the Shell Company in
Chester. The first pilot test, with Loughborough colleagues, involved six
questionnaires and two interviews. The second pilot-test was conducted
with administrative staff of the Finance Department and Academic
Registry of Loughborough University. Thirteen questionnaires were
distributed and two interviews were held, one with the Senior Assistant
Registrar and the second with the Bursar. The final pre-test was carried
out at Shell Research at Thornton Research Centre, Chester. This final
pilot study went through three steps: forty questionnaires were
distributed, interviews were held with six managers (including one in the
information centre), and included two interviews with managers by
telephone.

The response rate for the piloting of the questionnaires distributed was
91%. The main point of the pilot studies was to achieve more
clarification regarding the wording of both the questionnaire instructions
and questions. Improving these aspects should lead to better feedback,
lack of which is considered to be one of the major weaknesses of questionnaire surveys. The pilot helped to determine the questionnaires’ suitability and clarify any confusion that might occur. In addition, the pilot interviews tried to evaluate what would happen when the interviewee tried to understand the questions asked, and to see if the questions covered the purpose of the interviews or not. Furthermore, an estimate of the timetable for the interviews had to be established, since the interviews was to be carried out with busy managers.

As a result of the initial pilot study, some changes were made in the first and second pilot studies in terms of individual words, problems of understanding questions, the way questions were asked, and order of questions. However, the final pilot study at Shell Research proved to be very successful.

5.7 Selection of sample

The names, addresses, and telephone numbers of the Saudi Arabian business organisations were drawn from the following sources. The first was a listing on the Internet of business organisations in Saudi Arabia (the top 100 companies in Saudi Arabia, 1996). The second was the list of licensed factories in production, which is published by the Ministry of
Industry and Electricity in Saudi Arabia, and covers all the manufacturing firms. The third was the Eastern Province Industrial directory (1996), which is published by the Chamber of Commerce and Industry. The fourth was the Saudi Basic Industrial Corporation (SABIC) directory, which covers all SABIC branches in the country. Finally, the list of some representative offices of Saudi Arabian organisations in UK, which was made available by the Royal Embassy of Saudi Arabia, Office of the Commercial Attaché, in London proved useful.

The sample of firms was chosen so as to concentrate particular attention on the oil companies and banks. The reason for this choice is that Saudi Arabia depends on the oils and banks for much of its economic activity (see chapters 2, and 3). However, a smaller number of questionnaires was distributed to other companies, such as the Electricity Company, for comparison.

The distribution of the questionnaire covered oil companies in the Eastern Province, the Western Province, and Riyadh in the Central Province. This is where the oil companies are located. Concerning the banks, only Riyadh was covered, because the headquarters of all the banks are located in Riyadh.
CHAPTER FIVE RESEARCH METHODOLOGY

5.8 Saudi Arabia survey

The survey took place between September 1996 and January 1997. Altogether, twenty-seven people were interviewed from the oil companies and banks. The arrangements for the interviews were usually made by telephone, but some were made in person. The calls were made to the managers themselves directly, and some of them made an appointment for an interview, whilst others asked to do it by phone immediately. When companies were visited to distribute questionnaires and to arrange interviews, some managers agreed to be seen right away, because the interview would take only fifteen minutes. Telephone calls were made to the public relation departments of the oil companies to check the procedure for distribution of the questionnaires. The reason for contacting the public relations was that it is the fastest way to get permission to distribute the questionnaires, it helps obtain quicker responses, and it helps to increase the response rate.

Altogether, nineteen managers from different departments and different levels of management in oil companies and banks were interviewed.

In analysing the interviews, responses were grouped according in relation to the sample type, and these are summarised below:
The sample interviewed included eight managers from banks, and eleven from oil companies. In the interviews with the computer centre managers, eight managers were interviewed from banks and oil companies.

For the questionnaire, 1000 questionnaires were distributed through the public relation departments personally, or by mail. Initially, questionnaires with covering letters, stamped return envelopes and an official letter from the sponsors were sent in one envelope to the public relations department for them to distribute. Follow-up calls were made to the public relations department to make sure that they had received the package. Three weeks later, another phone call was made to find out how the distribution was progressing, and to encourage them to speed up the process. Some companies were visited; the managers of the public relations department were met, a copy of the questionnaire was shown to them, and the topic explained. Most of them readily agreed to distribute the questionnaire and a date was made for the questionnaires to be collected from their
departments. The responses were analysed in relation to the sample type, and these are summarised below:

<table>
<thead>
<tr>
<th>Group Type</th>
<th>Number</th>
<th>Returned</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Distribution</td>
<td>700</td>
<td>544</td>
<td>77.7</td>
</tr>
<tr>
<td>Mail</td>
<td>300</td>
<td>177</td>
<td>59.0</td>
</tr>
<tr>
<td>Total</td>
<td>1000</td>
<td>721</td>
<td>72.1</td>
</tr>
</tbody>
</table>

Table 5.8B Saudi Arabia questionnaire sample

When conducting the questionnaire, the following methods were used:

- Questionnaire envelopes and the stamped return envelopes were numbered, and a record of numbers and corresponding names or addresses were kept, so that reminders could be sent out.
- All questionnaires were posted at the same time.
- Stamped addressed envelopes were enclosed.
- Follow-up letters were sent.
- Follow-up telephone calls were made.

Figure 5.8 below indicates the number of responses received, in terms of the business sector, and the percentage of the response rate, for the questionnaires distributed in Saudi Arabia.
A number of problems appeared during the data collection. One major problem noted during the interview process was the unwillingness of some interviewees to provide detailed information. This is one of the reflections of the secretiveness noted as particularly common in Saudi Arabia businesses. It is clear that companies try to keep as much information as possible about their activities secret because of fear of competitors. Some individuals were unwilling to take part in an interview. Many were not available, and some of them do not like to involved in order not to divulge confidential information. Some managers preferred to do the interview by phone, especially the computer centre managers, possibly because they prefer to keep outsiders away from their hardware/software. In addition, one of the most difficult and time-consuming problems was associated with getting official permission to distribute the questionnaires. Permission is needed from each company administration in order to

**Figure 5.8 Questionnaire Distributed in Saudi Arabia**

<table>
<thead>
<tr>
<th>Organisation</th>
<th>No. of returns</th>
<th>% of group</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIL</td>
<td>522</td>
<td>72.4</td>
</tr>
<tr>
<td>BANK</td>
<td>140</td>
<td>19.4</td>
</tr>
<tr>
<td>OTHERS</td>
<td>59</td>
<td>8.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>
distribute questionnaires. To obtain such permission for firms throughout the whole of Saudi Arabia would have been very time-consuming. Ten companies did not permit questionnaires to be distributed, because of issues of confidentiality. It was clear from the follow-up that many Saudi firms would never be prepared to return a questionnaire. Another problem was with the Post Office, because five of the envelopes, which contained altogether one hundred questionnaires, were never received. Twenty returned questionnaires were incomplete.

5.9 UK survey

This comparative study involved three business companies in the UK. The first company was Shell, because it is an oil company, and so it is possible to make comparisons with the Saudi Arabian oil companies. The other two companies were Astra and Andaris. These are similar high-technology companies, with a commitment to automation, which can be used to indicate current good practice.

The survey took place between May 1996 and July 1996, and then April 1997 and June 1997 in the different companies in the UK. Shell at Chester, Andaris at Nottingham, and Astra at Loughborough were visited for interviews and questionnaire distribution. The arrangements were
made through e-mail and information about the questionnaire distribution was obtained via contacts with appropriate individuals in each company.

Altogether eleven managers were interviewed, and these were selected from different departments and different levels of management in the organisations. For the interviews with the computer centre managers, three were selected interviewed—one from each of the different organisations. Altogether 140 questionnaires were distributed to the British firms, with a return rate of 74%.

Figure 5.9 below indicates the number of responses received, in terms of the organisation, and the percentage of the response rate, for the questionnaires distributed in the UK organisations.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>No. of returns</th>
<th>% of group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell</td>
<td>36</td>
<td>90.0</td>
</tr>
<tr>
<td>Others</td>
<td>67</td>
<td>67.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>103</td>
<td>74</td>
</tr>
</tbody>
</table>

Figure 5.9 Questionnaire distributed in the UK
The only problems that appeared during the data collection were the difficulty in getting permission to administer the questionnaire because of issues of confidentiality. In order to overcome this difficulty meetings took place with the representatives of each company to explain the purpose of the research. Following this, permission to distribute the questionnaire was given. The whole process was, however quite time-consuming.

5.10 Data analysis

Data collected from the mail questionnaire were tabulated and coded for analysis on a personal computer using SPSS. After the use of the 'Frequencies' command, which enables the determination of the extent of cleaning necessary before the generation of statistical information, chi-square tests were processed in order to get the appropriate statistical results required to look for a possible significance differences. For example, it was used to see if there are any significant differences between Saudi firms and UK firms. The chi-square test was used at the 0.01 and 0.05 levels in looking for statistical significance. Excel was used for some of the data analysis, such as graphs. Excel was also used to compare some results from Saudi Arabia with those from the UK, using
the chi-square formula. This was difficult to do by the SPSS because the number of questionnaire returns from different sources was not equal.

The interviews were more difficult to analyse. The interviews were recorded on a cassette, then transcribed manually. However, some of the Saudi interviews had to be translated from Arabic to English. The data collected from the interviews were described, summarised and listed to create graphs and tables. Three tabular forms were designed for the interviews with the managers and the computer centre managers, and for the comparison of results between Saudi Arabia and the UK. These forms were designed and created for these interviews to simplify and help categories the answers the questions asked at the interviews. Each interview was therefore input into one of the forms, and then it was coded for analysis (see copies of these forms in the appendix). Application of these forms made the analysis easier to carry out.
Chapter Six

Data Analysis: Saudi Arabian Questionnaire

6.1 Introduction

The purpose of this chapter is to analyse the results of data collected from the questionnaire survey conducted in Saudi Arabia, so as to discover, as March (1988) put it, what the data says. The findings are grouped into three main sections. The first section deals with background variables, the assessment of computer systems' availability, and the significance level of the results. The second section deals with the usage of the computer systems, and the significant differences. The final section deals with infrastructure and support facilities, and, again, the significant differences.
Sample

As mentioned in chapter 5, the sample was chosen so as to concentrate primarily on the oil companies and banks. However, a small number of questionnaires was collected from other companies, such as the Electricity Company, for comparison. In total, 1000 questionnaires were distributed, and 721 questionnaires were returned. This gives a satisfactory overall response rate of 72.1%. The table below indicates the number of responses received, in terms of the business sector concerned, and the percentage of the response rate, for the questionnaires distributed in Saudi Arabia.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>No. of returns</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIL</td>
<td>522</td>
<td>72.4</td>
</tr>
<tr>
<td>BANK</td>
<td>140</td>
<td>19.4</td>
</tr>
<tr>
<td>OTHERS</td>
<td>59</td>
<td>8.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.1 Questionnaire distributed in Saudi Arabia

6.2 Background variables

Position of respondent

The respondents’ were asked about their position in the organisation. The results showed that nearly three-quarters were junior managers. However,
a small number of respondents were secretary. The table below indicates the responses of managers by position.

<table>
<thead>
<tr>
<th>Position</th>
<th>No. of returns</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior manager</td>
<td>130</td>
<td>18.0</td>
</tr>
<tr>
<td>Junior manager</td>
<td>532</td>
<td>73.8</td>
</tr>
<tr>
<td>Secretary</td>
<td>59</td>
<td>8.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.2A Position of respondents

It may seem surprising to include secretaries here, since they are not usually regarded as managerial staff. However, in Saudi Arabia, secretaries are typically considered as integral members of management team, carrying out information activities in parallel with members who are managers. In fact, their duties are often those of a personal assistant, rather than a traditional secretary. A similar trend also seems to be occurring for IT-intensive secretarial posts in the UK. [As will become apparent later in the thesis, this assimilation of activities can be justified retrospectively by the similarity in terms of activities and reactions of secretarial and managerial staff.]
Departmental distribution

The table below shows the distribution of managers by departments.

<table>
<thead>
<tr>
<th>Departments</th>
<th>No. of returns</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td>123</td>
<td>17.1</td>
</tr>
<tr>
<td>Maintenance</td>
<td>106</td>
<td>14.7</td>
</tr>
<tr>
<td>Management</td>
<td>99</td>
<td>13.7</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>96</td>
<td>13.3</td>
</tr>
<tr>
<td>Computer centre</td>
<td>91</td>
<td>12.6</td>
</tr>
<tr>
<td>Marketing</td>
<td>90</td>
<td>12.5</td>
</tr>
<tr>
<td>Personnel</td>
<td>63</td>
<td>8.7</td>
</tr>
<tr>
<td>Production</td>
<td>53</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>721</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 6.2B Departmental distribution

There is an overall similarity in the departmental distribution of the returns: all these different departments used computer systems. The response rate from each department seems to be in proportion to the number of staff. The low percentage of computer centre respondents was due to the fact that a limited number of questionnaires were distributed to computer centres, as the staff were computer specialists rather than managers.
Managers’ computer experience

The respondents were asked about their computer experience. About three-quarters of the respondents (75.5%) had less than 10 years experience of computer systems. The quarter of the respondents (24.5%) who had more than 10 years of experience, worked mainly in the banks. The following table shows the actual distribution of managers by computer systems’ experience.

<table>
<thead>
<tr>
<th>Experience</th>
<th>No. of returns</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 year</td>
<td>67</td>
<td>9.3</td>
</tr>
<tr>
<td>2-5 year</td>
<td>258</td>
<td>35.8</td>
</tr>
<tr>
<td>6-10</td>
<td>219</td>
<td>30.4</td>
</tr>
<tr>
<td>Over 10 year</td>
<td>177</td>
<td>24.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.2C Managers’ computer experience
Managers’ qualifications

Respondents were asked about their qualifications. Over half of the managers’ held degree qualifications. The following table shows the managers’ distribution by qualification.

<table>
<thead>
<tr>
<th>Qualification</th>
<th>No. of returns</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D.</td>
<td>9</td>
<td>1.2</td>
</tr>
<tr>
<td>Master/MBA</td>
<td>64</td>
<td>8.9</td>
</tr>
<tr>
<td>BSc/BA</td>
<td>321</td>
<td>44.5</td>
</tr>
<tr>
<td>Diploma</td>
<td>162</td>
<td>22.5</td>
</tr>
<tr>
<td>Other</td>
<td>165</td>
<td>22.9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.2 D Managers’ qualifications

Managers’ gender

The following table shows the distribution of managers by gender.

<table>
<thead>
<tr>
<th>Gender</th>
<th>No. of returns</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>711</td>
<td>98.6</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>1.4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.2E Managers’ gender
CHAPTER SIX  SAUDI ARABIA QUESTIONNAIRE ANALYSIS

The majority of respondents in the organisations were male with females representing only 1.4% a tiny minority. The reason for this is that the majority of staff working in business organisations in Saudi Arabia are male.

Managers’ age

The majority of managers were young, similar to the age distribution of the Saudi population in general. The data show that about 90% were under 46 years old. The following table shows the managers’ distribution by age.

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of returns</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25</td>
<td>59</td>
<td>8.2</td>
</tr>
<tr>
<td>25-35</td>
<td>338</td>
<td>46.9</td>
</tr>
<tr>
<td>36-45</td>
<td>250</td>
<td>34.7</td>
</tr>
<tr>
<td>46-55</td>
<td>65</td>
<td>9.0</td>
</tr>
<tr>
<td>Over 55</td>
<td>9</td>
<td>1.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.2F Managers’ age
Correlation between background variables

In terms of cross-correlations between these background variables, the ones discussed below all correspond to differences with $P<0.01$. The analysis of the foregoing results implies the following:

- 'Organisation' versus 'Departments': The results show that there are departmental differences between the oil organisations and the banks (chi-square value of 17.7, DF=2).
- 'Organisation' versus 'Experience': The results show that there is a significant difference between the organisations in terms of experience, with the oil industry having a higher proportion of experienced computer users than banks (chi-square value of 17.9, DF=1).
- 'Organisation' versus 'Qualification': The survey indicates that banks have a lower proportion of graduate staff (chi-square value of 13.7 with 2 DF).
- 'Position' versus 'Departments': The results indicate that there are slightly differing proportions of senior and junior staff in different departments (chi-square value of 31.2 with 14 DF).
- 'Position' versus 'Qualification': The survey indicates that the more senior staff are better qualified (chi-square value of 16.27 with 4 DF).
- 'Position' versus 'Age': The results show that the older people tend to have higher positions (chi-square value of 9.8 with 2 DF).
CHAPTER SIX SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'Department' versus 'Age': The result indicates that there is a high percentage of staff who under 46 years old (89.7%); however, the result also shows there are different age distributions in different departments (chi-square value of 13.02 with 2 DF).

- 'Experience' versus 'Qualification': The survey shows that the more educated the respondents are, the more years computer experience they have (chi-square value of 20.96 with 1 DF).

- 'Experience' versus 'Age': The survey shows that the older the respondents are, the more years computer experience they have (chi-square value of 16.96 with 1 DF).

- 'Qualification' versus 'Age': Conversely, the younger respondents are, the lower the qualifications they hold (chi-square value of 13.2 with 1 DF).

6.3 Assessment of the computer systems

Nearest computer system

Two-thirds of the managers have computer systems on their desks. About 90% of the respondents had access to computing facilities within their offices, whether on their desk, or sharing with others in their office. The remainder all have access to computer facilities outside their office, whether in their departments, or in the computer centre of the
organisations. The following table shows the distribution of the managers in terms of their proximity to a computer system.

<table>
<thead>
<tr>
<th>Nearest computer</th>
<th>No. of returns</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>On desk</td>
<td>460</td>
<td>63.8</td>
</tr>
<tr>
<td>In office</td>
<td>181</td>
<td>25.1</td>
</tr>
<tr>
<td>In department</td>
<td>67</td>
<td>9.3</td>
</tr>
<tr>
<td>In computer centre</td>
<td>13</td>
<td>1.8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.3A Nearest computer systems

**Kind of computer system**

More than three-quarters of managers have networking access to their computer systems. The following table shows the distribution of managers by kind of computer system access.

<table>
<thead>
<tr>
<th>Kind of systems</th>
<th>No. of returns</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networked</td>
<td>299</td>
<td>41.5</td>
</tr>
<tr>
<td>Stand-alone</td>
<td>144</td>
<td>20.0</td>
</tr>
<tr>
<td>Both</td>
<td>276</td>
<td>38.3</td>
</tr>
<tr>
<td>Neither</td>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.3B Kind of computer system
Handling of computer systems

More than three-quarters of managers handle their computer systems by themselves, while a small number of managers have someone else (such as secretary) to do the work on the computer systems for them. The following table shows the managers’ methods of handling computer systems.

<table>
<thead>
<tr>
<th>Handle computer</th>
<th>No. of returns</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>By self</td>
<td>642</td>
<td>89</td>
</tr>
<tr>
<td>Via someone else</td>
<td>79</td>
<td>11</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.3C Handling of computer systems
6.4 Managers and their systems

Managers

The results show that the majority of the managers believe computer systems are easy to learn and easy to use. The following table shows the managers’ assessment of their computer systems.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>generally true</th>
<th>partly true</th>
<th>not true</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy to learn how to use computer system</td>
<td>66.0</td>
<td>31.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Easy to use a computer keyboard</td>
<td>81.1</td>
<td>17.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Easy to read from computer screen</td>
<td>76.0</td>
<td>20.7</td>
<td>3.3</td>
</tr>
<tr>
<td>Easy to login and out from a computer</td>
<td>79.8</td>
<td>16.8</td>
<td>3.5</td>
</tr>
<tr>
<td>Easy to use computer applications</td>
<td>57.4</td>
<td>36.1</td>
<td>6.5</td>
</tr>
<tr>
<td>Easier to use printouts than on screen</td>
<td>49.4</td>
<td>34.7</td>
<td>16.0</td>
</tr>
<tr>
<td>Use computer systems outside workplace</td>
<td>34.8</td>
<td>21.6</td>
<td>43.6</td>
</tr>
<tr>
<td>Average</td>
<td>63.4%</td>
<td>25.5%</td>
<td>11.1%</td>
</tr>
</tbody>
</table>

Table 6.4A Managers’ assessment of their computer system

Systems

The results show that the majority of the managers believe computer systems are helpful for their job. The following table shows the managers’ assessment of their systems and of the value of computer systems.
Correlations between managers' views of systems

In terms of cross-correlation between managers' views of systems, those listed below refer to differences with P<0.01. The analysis of the foregoing results implies the following:

- 'Easy to learn computer systems' versus 'Computer essential to my work': The results indicated that the users who said the computer systems were essential to their work, also said they were easy to learn (chi-square value of 48.2 with 4 DF).

- 'Easy to learn computer systems' versus 'Information is up-to-date': The results imply that users who said the information is up-to-date also said the computer systems are easy to learn (chi-square value of 21.7 with 4 DF).

- 'Easy to learn computer systems' versus 'Computer output is presented in useful way': The results indicate that the users who said...
that the output was presented in useful way, also said that computers are easy to learn (chi-square value of 23.7 with 4 DF).

- ‘Easy to use computer keyboard’ versus ‘Computer essential to my work’: The results show that users who said it is easy to use the computer keyboard, also said that the computer was essential to their work (chi-square value of 36.9 with 4 DF).

- ‘Easy to use computer keyboard’ versus ‘Output is presented in useful way’: The results indicate that those who found it easy to use the computer keyboard, also thought that the output is presented in a useful way (chi-square value of 44.4 with 4 DF).

- ‘Easy to read from computer screen’ versus ‘computer essential to my work’: The results indicate that users who said it is easy to read from screens, also said that the computer is essential to their work (chi-square value of 16.6 with 4 DF).

- ‘Easy to read from computer screen’ versus ‘Systems provides all the facilities’: The results show that respondents who said it is easy to read from screens, also said that the systems provided all the facilities they needed (chi-square value of 32.5 with 4 DF).

- ‘Easy to read from computer screen’ versus ‘Information is up-to-date’: The results indicate that the users who said the information was up-to-date, also said it is easy to read from screens (chi-square value of 38.5 with 4 DF).
• 'Easy to read from computer screen' versus 'Output is presented in useful way': The results show that those who said it is easy to read from screens, also thought the output was presented in a useful way (chi-square value of 36.0 with 4 DF).

• 'Easy to log in and out' versus 'the system provides all the facilities': The results indicate that those who said it is easy to log in and out from computer systems, also thought that the systems provided all the facilities they needed (chi-square value of 35.1 with 4 DF).

• 'Easy to log in and out' versus 'Information is up-to-date': The results show that the users who said it is easy to log in and out, also said that the information is up-to-date (chi-square value of 40.4 with 4 DF).

• 'Easy to use computer applications' versus 'Essential to my work': The results show that those users who said it is easy to use applications, also said that the computer is essential to their work (chi-square value of 41.0 with 4 DF).

• 'Easy to use computer applications' versus 'The system provides all the facilities': The results indicate that respondents who said it is easy to use applications, also said that the systems provide all the facilities needed (chi-square value of 33.4 with 4 DF).

• 'Easy to use computer applications' versus 'Information is up-to-date': The results show that the users who said information is up-to-date, also said it is easy to use applications (chi-square value of 25.3 with 4 DF).
CHAPTER SIX  SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'Easy to use computer applications' versus 'computer output is presented in useful way': The results show that users who said the output is presented in a useful way also said that computer applications are easy to use (chi-square value of 31.2 with 4 DF).

- 'Easier to use printouts than on screen' versus 'Computer essential to work': The results show that those who said the computer is essential to their work, also said it is easier to use prints-outs than to read from the screen (chi-square value of 16.3 with 4 DF).

- 'Easier to use printouts than on screen' versus 'Computer output is presented in useful way': The results show that respondents who said it is easier to use print-outs than to read from the screen, also said that output was presented in a useful way (chi-square value of 21.8 with 4 DF). We have worked previously that respondents also said that it is easy to read from screens. In fact, the respondents agreed that both print-outs and screen were useful, but print-out was preferred because it could be used in different places.

Conclusions: In addition to the above, some differences were found to be significant at P<0.05. These were 'Easy to use computer keyboard' versus 'The information is up-to-date' (chi-square value of 12.2, DF=4), 'Easy to log in and out' versus 'I am satisfied with the speed' (chi-square value of 11.7, DF=4), 'Easy to log in and out' versus 'Computer output is presented in useful way' (chi-square value of 12.4, DF=4), and 'I use
CHAPTER SIX  

SAUDI ARABIA QUESTIONNAIRE ANALYSIS

computer outside workplace’ versus ‘Computer output is presented in useful way’ (chi-square value of 11.7, DF=4). Thus, these correlations also support the conclusion that staff who found it easy to use computer systems were also satisfied with those systems.

6.5 Usage of computer systems

6.5.1 Applications

A variety of computer systems applications were found to be used on the job by managers. Selected applications were assessed in terms of their frequency of usage by managers. These systems applications were measured in terms of five indicators in order to present on overall picture of the frequency of usage. These usage indicators are as follows:

- Not at all
- Less than once a month
- Once a week to once a month
- Several times a week
- Several times each day
CHAPTER SIX        SAUDI ARABIA QUESTIONNAIRE ANALYSIS

Word-processing

More than three-quarters of respondents used word-processing (78.2%).
Over a third (34.8%) reported using word processing several times each
day; 21.1% used it several times a week; 14.7% used it once a week to
once a month; 7.6% used it less than once a month; and 21.8% did not
use it at all. The detailed frequency of word-processing usage by
respondents is given below.

% of respondents for Word-processing

Not at all
Less than once a month
Once a week to once a month
Several times a week
Several times each day

% of respondents
CHAPTER SIX  SAUDI ARABIA QUESTIONNAIRE ANALYSIS

Spreadsheets/financial report

Three-quarters of staff used spreadsheets to some extent, and only a quarter did not. A fifth (21.5%) of the respondents reported using spreadsheets several times each day; 20.8% used it several times a week; 22.5% used it once a week to once a month; 10% used it less than once a month; and 25.3% did not use it at all. The detailed frequency of spreadsheet usage by respondents is given below.
Internal database

About three-quarters of staff used internal databases somewhat less than a third (30.1%) of the respondents reported using an internal database several times each day; 15.5% used it several times a week; 17.8% used it once a week to once a month; 12.1% used it less than once a month; and 24.5% did not use it at all. The detailed frequency of internal database usage by respondents is given below.
External database

About half of the staff used external databases (54.5%). In terms of frequency of use, the first group spread rather evenly. Altogether, 12.8% of the respondents reported using an external database several times each day; 12.8% used it several times a week; 15.8% used it once a week to once a month; 13.2% used it less than once a month; and 45.5% did not use it at all. The detailed frequency of external database usage by respondents is given below.

![Graph showing frequency of external database usage by respondents](image-url)
CHAPTER SIX
SAUDI ARABIA QUESTIONNAIRE ANALYSIS

Graphics applications

More than half of the respondents used graphics applications (59.8%). A minority (6.8%) of the respondents reported using graphics applications several times each day; 13.2% used them several times a week; 19.8% used them once a week to once a month; (20%) used them less than once a month; and (40.2%) did not use them at all. The detailed frequency of graphics application usage by respondents is given below.

<table>
<thead>
<tr>
<th>% of respondents for Graphic application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
</tr>
<tr>
<td>Less than once a month</td>
</tr>
<tr>
<td>Once a week to once a month</td>
</tr>
<tr>
<td>Several times a week</td>
</tr>
<tr>
<td>Several times each day</td>
</tr>
</tbody>
</table>

% of respondents

10 15 20 25 30 35 40 45

0 5 10 15 20 25 30 35 40 45
Electronic mail/communication

Half of the respondents used E-mail/communication (50.8%). Of these, 22.7% of the respondents reported using it several times each day; 11.4% used it several times a week; 10.4% used it once a week to once a month; 6.2% used it less than once a month; and 49.2% did not use it at all. The detailed frequency of electronic mail usage by respondents is given below.

![Bar chart showing the percentage of respondents for electronic mail usage frequency. The categories are: Not at all, Less than once a month, Once a week to once a month, Several times a week, and Several times each day. The chart indicates that 50% of respondents did not use email at all, 20% used it several times each day, and the rest used it less frequently.]
Statistical packages

Half of the respondents used statistical packages (51%). Only 9.3% of the respondents reported using them several times each day, 7.6% used them several times a week; 15.5% used them once a week to once a month; (18.6%) used them less than once a month; and (49%) did not use them at all. The detailed frequency of statistical package usage by respondents is given below.
CHAPTER SIX  SAUDI ARABIA QUESTIONNAIRE ANALYSIS

Other computer systems applications usage

<table>
<thead>
<tr>
<th>Application</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation application</td>
<td>10.5</td>
</tr>
<tr>
<td>Programming language</td>
<td>5.7</td>
</tr>
<tr>
<td>Microsoft office</td>
<td>1.7</td>
</tr>
<tr>
<td>Scheduling management maintenance</td>
<td>1.2</td>
</tr>
<tr>
<td>Design</td>
<td>0.7</td>
</tr>
<tr>
<td>Games</td>
<td>0.4</td>
</tr>
</tbody>
</table>

6.6 Tasks involving computer systems

The respondents were asked about the extent to which computer systems were helpful for their tasks. Selected tasks were assessed in terms of managers' use of computer systems for carrying out those tasks. Five indicators were again employed in order to present a full picture of the frequency of usage. The indicators are as follows:

- Not at all
- Less than once a month
- Once a week to once a month
- Several times a week
- Several times each day
CHAPTER SIX  SAUDI ARABIA QUESTIONNAIRE ANALYSIS

Looking for trends

The responses indicate that the respondents did not use computer systems frequently for looking for trends. A small number, 9% of the respondents, reported using it several times each day; 14% used it several times a week; 21.5% used it once a week to once a month; 15.7% used it less than once a month; and 39.8% did not use it at all. The detailed frequency of looking for trend usage by respondents is given below.

![Graph showing the percentage of respondents looking for trends](image-url)
Analysing problems/alternatives

More than three-quarters of the respondents used computer systems for analysing problems (64.8%). Again, a small number, 10.7% of the respondents, reported using the computer to analyse problems/alternatives several times each day; 15.1% used it several times a week; 21.5% used it once a week to once a month; 17.5% used it less than once a month; and 35.2% did not use it at all. The detailed frequency of analysing problems/alternatives usage by respondents is given below.
Accounting/budgeting

More than half of the respondents used computer systems for accounting (57.4 %), and the frequency of use was spread fairly evenly across the range. Altogether, 11% of the respondents reported using several times each day; 13.5% used it several times a week; 14% used it once a week to once a month; 19% used it less than once a month; and 42.6% did not use it at all. The detailed frequency of accounting/budgeting usage by respondents is given below.
Making decisions

More than half of the staff used computer systems for making decisions (60.1 %). Again, the spread was fairly even: 10% of the respondents report using a computer system to make decisions several times each day; 14.3% used it several times a week; 16.8% used it once a week to once a month; 19% used it less than once a month; and 39.9% did not use it at all. The detailed frequency of usage for assisting decisions by respondents is given below.
Auditing

More than half of the respondents used computer systems for auditing (52.3 %), with a fairly even use across the frequency range. Of these, 14.7% of the respondents reported using computer systems for auditing several times each day; 8.6% used it several times a week; 15.1% used it once a week to once a month; 13.9% used it less than once a month; and 47.7% did not use it at all. The detailed frequency of auditing usage by respondents is given below.

[Bar chart showing usage frequency]
CHAPTER SIX  SAUDI ARABIA QUESTIONNAIRE ANALYSIS

Communication

Nearly two-third of the staff used computer systems for communication (65%). Communication tasks was defined as communicating with external bodies, such as public relation tasks. A fifth (26.1%) of the respondents reported using this several times each day; 13.2% used it several times a week; 16.4% used it once a week to once a month; 9.4% used it less than once a month; and 35% did not use it at all. The detailed frequency of communication usage by respondents is given below.

![Chart showing communication frequency by respondents]

- Nearly two-third of the staff used computer systems for communication (65%).
- Communication tasks were defined as communicating with external bodies, such as public relation tasks.
- A fifth (26.1%) of the respondents used this several times each day.
- 13.2% used it several times a week.
- 16.4% used it once a week to once a month.
- 9.4% used it less than once a month.
- 35% did not use it at all.
Planning

Two-thirds of the staff used computer systems for planning (67.7%). Amongst these, 13.9% of the respondents reported using several times each day; 18.6% used it several times a week; 21.1% used it once a week to once a month; 14.1% used it less than once a month; and 32.3% did not use it at all. The detailed frequency of planning usage by respondents is given below.
CHAPTER SIX SAUDI ARABIA QUESTIONNAIRE ANALYSIS

Controlling/guiding activities

Two-thirds of the staff used computer systems for controlling/guiding activities, with a fairly even frequency spread. Altogether, 17.2% of the respondents reported using a computer system for controlling/guiding activities several times each day; 16.1% used it several times a week; 19.7% used it once a week to once a month; 13.7% used it less than once a month; and 33.3% did not use it at all. The detailed frequency of controlling/guiding activity usage by respondents is given below.

% of respondents for Controlling/guiding activities

- Not at all: 35%
- Less than once a month: 30%
- Once a week to once a month: 25%
- Several times a week: 20%
- Several times each day: 15%
- Less than once a month: 10%
- Once a week to once a month: 5%
- Several times a week: 0%
### Other tasks

<table>
<thead>
<tr>
<th>Tasks</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>1.9</td>
</tr>
<tr>
<td>Programming</td>
<td>1.7</td>
</tr>
<tr>
<td>Record</td>
<td>0.8</td>
</tr>
<tr>
<td>Monitoring timekeeping</td>
<td>0.6</td>
</tr>
<tr>
<td>Finding &amp; ordering spare parts</td>
<td>0.4</td>
</tr>
<tr>
<td>Technical</td>
<td>0.2</td>
</tr>
<tr>
<td>Training</td>
<td>0.1</td>
</tr>
<tr>
<td>Evaluate daily work activity</td>
<td>0.1</td>
</tr>
</tbody>
</table>

#### 6.7 Correlations between applications and tasks

In terms of cross-correlations between the applications and usage, correlations with $P<0.01$ are presented below:

- 'Word processing' versus 'Looking for trends': The results showed that users involved in word processing also used the computer system for looking for trends; in neither case was the correlation affected by frequency of use (chi-square value of 98.8 with 16 DF).

- 'Word processing' versus 'Analysing problems': The survey shows that those involved in word processing also made use of the computer system for analysing problems; in neither case was the correlation affected by frequency of use (chi-square value of 70.5 with 16 DF).

- 'Spreadsheet' versus 'Looking for trends': The survey shows that respondents involved in using the spreadsheets also used the computer system to look for trends; in this case, especially when they use them
from once a week to once a month (chi-square value of 72.5 with 16 DF).

- 'Spreadsheet' versus 'Analysing problems': The results show that the users involved in using spreadsheets also used the computer system for analysing problems, but this was only the case when they used this capability from once a week to once a month (chi-square value of 96.5 with 16 DF).

- 'Spreadsheet' versus 'Accounting': The results show that respondents involved in using spreadsheets also used the computer system for accounting; in neither case was the correlation affected by frequency of use (chi-square value of 181.8 with 16 DF).

- 'Spreadsheet' versus 'Making decisions': The results show that respondents involved in using spreadsheets, also used the computer system for making decisions; in neither case was the correlation affected by frequency of use (chi-square value of 97.8 with 16 DF).

- 'Spreadsheet' versus 'Auditing': The survey shows that respondents involved in using spreadsheets, also made use of auditing; in neither case was the correlation affected by frequency of use (chi-square value of 65.4 with 16 DF).

- 'Spreadsheet' versus 'Planning': The results indicate that respondents involved in using spreadsheets also use the system for planning, when frequency of use is from once a week to once a month (chi-square value of 108.3 with 16 DF).
CHAPTER SIX SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'Internal database' versus 'Looking for trends': The results indicate that respondents who made use of internal databases also used the computer system to look for trends; in neither case was the correlation affected by frequency of use (chi-square value of 61.2 with 16 DF).

- 'Internal database' versus 'Analysing problems': The results indicate that respondents who made use of internal databases also used the computer system for analysing problems; in neither case was the correlation affected by frequency of use (chi-square value of 72.8 with 16 DF).

- 'Internal database' versus 'Making decisions': The results indicate that respondents who made use of internal databases also used the computer system for making decisions; in neither case was the correlation affected by frequency of use (chi-square value of 116.4 with 16 DF).

- 'Internal database' versus 'Planning': The survey shows that respondents who used internal databases also used the computer system for planning; in neither case, was the correlation affected by frequency of use (chi-square value of 100.3 with 16 DF).

- 'External database' versus 'Analysing problems': The results indicate that respondents who made use of external databases also used the computer system for analysing problems; especially when they used it from once a week to once a month (chi-square value of 108.3 with 16 DF).
CHAPTER SIX SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'External database' versus 'Making decisions': The results indicate that respondents who made use of external databases also used the computer system for making decisions; especially when they used it once a week to once a month (chi-square value of 106.1 with 16 DF).

- 'External database' versus 'Planning': The survey indicates that respondents who used external databases also used the computer system for planning (chi-square value of 90.6 with 16 DF).

- 'External database' versus 'Controlling/guiding activities': The results indicate that respondents who made use of external databases also used the computer system for controlling activities; in neither case was the correlation affected by frequency of use (chi-square value of 92.8 with 16 DF).

- 'Graphics' Versus 'Analysing problems': The results indicate that respondents who used graphics applications also used the computer system for analysing problems; especially when they used it for once a week to once a month (chi-square value of 175.1 with 16 DF).

- 'Graphics' versus 'Making decisions': The survey indicates that respondents who used graphics applications also used the computer system for making decisions; in neither case was the correlation affected by frequency of use (chi-square value of 137.8 with 16 DF).

- 'Electronic mail' versus 'Communication': The results indicate that respondents who used electronic mail also used the computer system
for communications with others; in neither case was the correlation affected by frequency of use (chi-square value of 487.6 with 16 DF).

- ‘Statistical packages’ versus ‘Accounting’: The survey indicates that respondents who used the statistical packages also used the computer system for accounting; in neither case was the correlation affected by frequency of use (chi-square value of 149.0 with 16 DF).

- Conclusions: Apart from these correlations significant at the (P<0.01) level, there were no correlations significant at P<0.05. It follows from these correlations, that there is a strong link between using computer applications and spread of tasks that a manager faces.

6.8 Correlations between usage and satisfaction

In terms of cross-correlations between usage and satisfaction, the results discussed below refer to correlations significant at P<0.01.

- ‘Easy to learn computer systems’ versus ‘Analysing problems/alternatives’: The result indicates that respondents who used the computer system for analysing problems also found the system easy to learn; in neither case was the correlation affected by frequency of use (chi-square value of 24.2 with 8 DF).

- ‘Easy to learn computer systems’ versus ‘Accounting’: The results show that respondents who used the computer systems for accounting, irrespective of how often they used it, also said it was easy to learn (chi-square value of 21.6 with 8 DF).
CHAPTER SIX SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'Easy to learn computer systems’ versus ‘Auditing’: The results indicate that those who said it is easy to learn computer systems, also for auditing; in neither case was the correlation affected by frequency of use (chi-square value of 30.8 with 8 DF).

- 'Easy to learn computer systems’ versus ‘Planning’: The results show that respondents who found it is easy to learn computer systems also used them for planning; in neither case was the correlation affected by frequency of use (chi-square value of 26.7 with 8 DF).

- 'Easy to learn computer systems’ versus ‘Controlling/guiding activities’: The survey indicates that respondents who said the computer systems were easy to learn also used them for controlling/guiding activities irrespective of frequency of usage (chi-square value of 26.6 with 8 DF).

- 'Easy to log-in-out from computer systems’ versus ‘Looking for trends’: The results indicate that respondents who used computer systems for looking for trends also said it is easy to log-in or out from computer systems; in neither case was the correlation affected by frequency of use (chi-square value of 22.2 with 8 DF).

- 'Easy to log-in-out from computer systems’ versus ‘Communication’: The results showed that respondents who used the communication facilities also said it easy to log-in or out; in neither case was the correlation affected by frequency of use (chi-square value of 22.2 with 8 DF).
"Easy to log-in-out from computer systems" versus "Planning": The respondents who used the computer system for planning also said it is easy to log-in or out; in neither case was the correlation affected by frequency of use (chi-square value of 22.4 with 8 DF).

"Easy to use computer applications" versus "Looking for trends": The survey indicates that respondents who used the computer system for looking for trends also said it is easy to use; in neither case was the correlation affected by frequency of use (chi-square value of 40.1 with 8 DF).

"Easy to use computer applications" versus "Analysing problems": The results show that respondents who used the computer system for analysing problems also thought that computer applications were easy to use; in neither case was the correlation affected by frequency of use (chi-square value of 28.9 with 8 DF).

"Easy to use computer applications" versus "Making decisions": The results show that respondents who used computer system for making decisions also thought that computer applications were easy to use; in neither case was the correlation affected by frequency of use (chi-square value of 25.6 with 8 DF).

"Easy to use computer applications" versus "Communication": The respondents who used the communication facilities, also said that computer applications were easy to use; in neither case was the
correlation affected by frequency of use (chi-square value of 22.3 with 8 DF).

- 'Easy to use computer applications' versus 'Planning': The results show that respondents who used computer systems for planning also said computer applications were easy to use; in neither case was the correlation affected by frequency of use (chi-square value of 33.1 with 8 DF).

- 'Easier to use print-outs than on-screen' versus 'Analysing problems': The results of the survey show that respondents who used computer systems for analysing problems also said that they found it easier to use print-outs than on-screen; in neither case was the correlation affected by frequency of use (chi-square value of 20.2 with 8 DF).

- 'Easier to use print-outs than on-screen' versus 'Accounting': The results show that respondents who used computer systems for accounting also said it was easier to use print-out than on-screen; irrespective of frequency of usage (chi-square value of 23.6 with 8 DF).

- 'Easier to use print-outs than on-screen' versus 'Planning': The survey shows that respondents who used computer systems for planning also said it was easier to use print-outs than on-screen; in neither case was the correlation affected by frequency of use (chi-square value of 25.8 with 8 DF).
• **Conclusions:** All the foregoing were significant at the $P<0.01$ level; there were no correlations significant at the $P<0.05$ level. The results taken together suggest that there is a strong link between using applications and finding the system easy to use. Interestingly, this appears to be the case regardless of how often staff use the computer for that purpose. Again, there is a preference for using print-outs because of their greater ease of use.

### 6.9 Computer systems impacts

#### Individual impact

The majority of respondents agree that computer systems have a major impact on their own work. The following table reflects the degree of impact on different working activities. It is apparent that nearly 90% believe, either slightly or strongly, that computer systems improve their working ability.
CHAPTER SIX  SAUDI ARABIA QUESTIONNAIRE ANALYSIS

<table>
<thead>
<tr>
<th>Opinion</th>
<th>strongly disagree %</th>
<th>slightly disagree %</th>
<th>slightly agree %</th>
<th>strongly agree %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves my speed of working</td>
<td>4.0</td>
<td>3.3</td>
<td>15.4</td>
<td>77.3</td>
</tr>
<tr>
<td>Improves the quality of my work</td>
<td>3.3</td>
<td>3.2</td>
<td>15.4</td>
<td>78.1</td>
</tr>
<tr>
<td>Makes my work easier to perform</td>
<td>3.5</td>
<td>3.7</td>
<td>16.4</td>
<td>76.4</td>
</tr>
<tr>
<td>Improves my effectiveness</td>
<td>4.2</td>
<td>5.0</td>
<td>18.6</td>
<td>72.3</td>
</tr>
<tr>
<td>Enhance my ability to take decisions</td>
<td>9.4</td>
<td>12.9</td>
<td>33.8</td>
<td>43.8</td>
</tr>
<tr>
<td>I would have too little information</td>
<td>9.4</td>
<td>18.7</td>
<td>26.9</td>
<td>44.9</td>
</tr>
<tr>
<td>Average</td>
<td>5.6%</td>
<td>7.8%</td>
<td>21.1%</td>
<td>65.5</td>
</tr>
</tbody>
</table>

Table 6.9A individual impact

Organisational impact

The following table shows evaluations of such impacts by the respondents.

<table>
<thead>
<tr>
<th>Opinion</th>
<th>strongly disagree %</th>
<th>slightly disagree %</th>
<th>slightly agree %</th>
<th>strongly agree %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves the quality of managerial decisions</td>
<td>5.4</td>
<td>10.1</td>
<td>32.7</td>
<td>51.7</td>
</tr>
<tr>
<td>Helps the organisation to provide new services</td>
<td>3.3</td>
<td>7.6</td>
<td>25.5</td>
<td>63.5</td>
</tr>
<tr>
<td>Enhances communication with external bodies</td>
<td>5.8</td>
<td>5.8</td>
<td>24.3</td>
<td>64.1</td>
</tr>
<tr>
<td>Improves organisational productivity</td>
<td>1.9</td>
<td>4.3</td>
<td>24.5</td>
<td>69.2</td>
</tr>
<tr>
<td>Increasing use of computer is beneficial</td>
<td>2.8</td>
<td>4.0</td>
<td>17.3</td>
<td>75.9</td>
</tr>
<tr>
<td>Average</td>
<td>3.8%</td>
<td>6.4%</td>
<td>24.9%</td>
<td>64.9%</td>
</tr>
</tbody>
</table>

Table 6.9B Organisational impact
The results show that the majority of respondents (90%) agree, either strongly or slightly, that computer systems have an impact on their organisations.

Correlation between individual impacts and organisational impact

In terms of cross-correlations between the user impacts and the organisational impacts, the results discussed below relate to cases with $P<0.01$. The analysis implies the following:

- ‘Improves my speed of working’ versus ‘Improves the quality of managerial decisions’: The results show that users who agree that the computer systems improve the quality of managerial decisions also believe it improves the speed of working (chi-square value of 129.5 with 9 DF).

- ‘Improves my speed of working’ versus ‘Helps organisation to provide new services’: The results show that users who agree that the computer systems improve the speed of working also believe it helps the organisation to provide new services (chi-square value of 191.4 with 9 DF).

- ‘Improves my speed of working’ versus ‘Enhances communication with external bodies’: The results show that those who think computer
systems enhance communication with external bodies also agree it improves the speed of working (chi-square value of 283.5 with 9 DF).

- 'Improves my speed of working' versus 'Improves organisational productivity': The survey indicates that those respondents who agree that computer systems improve organisational productivity also believe it improves the speed of working (chi-square value of 250.7 with 9 DF).

- 'Improves my speed of working' versus 'Increasing use of computer is beneficial': The results show that users who said that increasing use of computer systems is beneficial also thought it improved their speed of working (chi-square value of 294.0 with 9 DF).

- 'Improves my speed of working' versus 'Improves the quality of managerial decisions': The survey shows that respondents who said computer systems improved the quality of decisions also said it improved the speed of working (chi-square value of 152.0 with 9 DF).

- 'Improves the quality of work' versus 'Helps organisation to provide new services': The results show that users who said computer systems help organisations to provide new services also said it improved the quality of work (chi-square value of 151.3 with 9 DF).

- 'Improves the quality of work' versus 'Enhance communication with external bodies': The results show that those respondents who agreed that computer systems enhance communication with external bodies
also thought it improved the quality of work (chi-square value of 180.8 with 9 DF).

- 'Improves the quality of work' versus 'Improves organisational productivity': The results show that those who thought that computer systems improved the quality of work also believed they improved organisational productivity (chi-square value of 273.1 with 9 DF).

- 'Improves the quality of work' versus 'Increasing use of computer is beneficial': The results show that the respondents who said that increasing use of a computer system is beneficial also claimed it improved the quality of work (chi-square value of 221.8 with 9 DF).

- 'Makes the work easier to perform' versus 'Improves the quality of decisions': The survey shows that users who said computer systems improved the quality of decisions also thought it made their work easier to perform (chi-square value of 122.8 with 9 DF).

- 'Makes the work easier to perform' versus 'Helps organisation to provide new services': Those respondents who believed that computer systems help organisations to provide new services also thought they made the work easier to perform (chi-square value of 223.4 with 9 DF).

- 'Makes the work easier to perform' versus 'Enhances communication with external bodies': The results show that users who said computer systems enhance communication with external bodies also said they
make the work easier to perform (chi-square value of 295.3 with 9 DF).

- ‘Makes the work easier to perform’ versus ‘Improves organisational productivity’: The results show that users who said computer systems made their work easier to perform also said it improved organisational productivity (chi-square value of 310.7 with 9 DF).

- ‘Makes the work easier to perform’ versus ‘Increasing use of computer is beneficial’: Those respondents who asserted that increasing use of computer systems is beneficial also thought they made the work easier to perform (chi-square value of 344.5).

- ‘Improves my effectiveness’ versus ‘Improves the quality of decisions’: The results show that users who said the computer systems improved their effectiveness also said that they improved the quality of decisions (chi-square value of 195.46 with 8 DF).

- ‘Improves my effectiveness’ versus ‘Helps organisation to provide new services’: The results show that users who said computer systems improved their effectiveness also thought they helped organisations to provide new services (chi-square value of 174.7 with 9 DF).

- ‘Improves my effectiveness’ versus ‘Enhance communication with external bodies’: The survey shows that users who said computer systems improved their effectiveness also said it enhanced communication with external bodies (chi-square value of 262.3 with 9 DF).
CHAPTER SIX  SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'Improves my effectiveness' versus 'Improves organisational productivity': Those respondents who thought that computer systems improved their effectiveness also thought they improved organisational productivity (chi-square value of 311.1 with 9 DF).

- 'Improves my effectiveness' versus 'Increasing use of computer is beneficial': The results show that users who said that increasing use of computer systems was beneficial also said it improved effectiveness (chi-square value of 290.1 with 9 DF).

- 'Enhance the ability to take decisions' versus 'Improves the quality of managerial decisions': The survey shows that users who said computer systems improve the quality of managerial decisions also said they enhanced the ability to take decisions (chi-square value of 371.8 with 9 DF).

- 'Enhance the ability to take decisions' versus 'Helps organisation to provide new services': Those respondents who said that computer systems help organisations to provide new services also said they enhanced the ability to take decisions (chi-square value of 156.2 with 9 DF).

- 'Enhance the ability to take decisions' versus 'Enhance communication with external bodies': Users who thought that computer systems enhance communication with external bodies, also believed that they enhanced the ability to take decisions (chi-square value of 82.2 with 9 DF).
• 'Enhance the ability to take decisions' versus 'Improves organisational productivity': Respondents who said computer systems improved organisational productivity also said they enhanced the ability to take decisions (chi-square of 163.2 with 9 DF).

• 'Enhance the ability to take decisions' versus 'Increasing use of computer is beneficial': Those who believed that increasing use of computer systems was beneficial also thought they enhanced the ability to take decisions (chi-square value of 121.0 with 9 DF).

• **Conclusions:** All the foregoing were significant at the P<0.01 level; there were no other correlations significant at the P<0.05 level. The overall result appears to be that computer systems are seen as having a related impact on both individual and organisational working. This impact is overwhelming beneficial: what is good for the individual is good for the organisation, and vice versa.

### 6.10 Correlation between usage and individual impact

In terms of cross-correlations between usage and individual impact, the results discussed below are those significant at the P<0.01 level. They imply the following:

• 'Improves the speed of working' versus 'Word processing': The results show that staff who used word processing also said that
computer systems improved the speed of working; in neither case was the correlation affected by frequency of use (chi-square value of 36.5 with 12 DF).

- 'Improves the speed of working' versus 'Spreadsheet': The result implies that staff who used spreadsheets also said that the computer systems improved the speed of working; in neither case was the correlation affected by frequency of use (chi-square value of 65.6 with 12 DF).

- 'Improves the speed of working' versus 'Internal database': The survey shows that users who used internal databases also said that computer systems improved the speed of working; in neither case was the correlation affected by frequency of use (chi-square value of 54.3 with 12 DF).

- 'Improves the speed of working' versus 'External database': The results show that users who used external databases also said that computer systems improved the speed of working; in neither case was the correlation affected by frequency of use (chi-square value of 34.4 with 12 DF).

- 'Improves the quality of work' versus 'Word processing': Those respondents who used the word processing also said that computer systems improved the quality of work; in neither case was the correlation affected by frequency of use (chi-square value 42.8 with 12 DF).
• ‘Improves the quality of work’ versus ‘Spreadsheet’: Staff who used spreadsheets also said that computer systems improved the quality of work; in neither case was the correlation affected by frequency of use (chi-square value of 46.6 with 12 DF).

• ‘Improves the quality of work’ versus ‘Internal database’: The results imply that staff who used the internal databases also said that computer systems improved the quality of work, irrespective of frequency of usage (chi-square value of 37.1 with 12 DF).

• ‘Improves the quality of work’ versus ‘External database’: Respondents who used external databases also said that computer systems improved the quality of work; in neither case was the correlation affected by frequency of use (chi-square value of 31.3 with 12 DF).

• ‘Makes the work easier to perform’ versus ‘Word processing’: The results show that users who used word processing also said that computer systems made their work easier to perform, irrespective of frequency of usage (chi-square value of 31.5 with 12 DF).

• ‘Makes the work easier to perform’ versus ‘Spreadsheet’: The result implies that users who used spreadsheets also said that computer systems made the work easier to perform, irrespective of frequency of usage (chi-square value of 54.7 with 12 DF).

• ‘Makes the work easier to perform’ versus ‘Internal database’: The results indicate that users who used internal databases also said that
computer systems made the work easier to perform, irrespective of frequency of usage (chi-square value of 59.5 with 12 DF).

- 'Makes the work easier to perform' versus 'External database': The results show that users who used external databases also said that computer systems made the work easier to perform; in neither case was the correlation affected by frequency of use (chi-square value of 37.0 with 12 DF).

- 'Improves the effectiveness' versus 'spreadsheet': Respondents who used spreadsheets also said that computer systems improved their effectiveness; in neither case was the correlation affected by frequency of use (chi-square value of 60.3 with 12 DF).

- 'Improves the effectiveness' versus 'Internal database': Those respondents who used internal databases also said that computer systems improved their effectiveness; in neither case was the correlation affected by frequency of use (chi-square value of 33.1 with 12 DF).

- 'Enhance the ability to take decisions' versus 'spreadsheets': Users who used spreadsheets also said that computer systems enhanced the ability to take decisions, irrespective of frequency of usage (chi-square value of 44.3 with 12 DF).

- 'Enhance the ability to take decisions' versus 'Internal database': Users who used internal databases also said that computer systems
enhanced the ability to take decisions, irrespective of frequency of usage (chi-square value of 48.7 with 12 DF).

- ‘Enhance the ability to take decisions’ versus ‘External database’: The survey shows that users who used external databases also said that computer systems enhanced the ability to take decisions, irrespective of frequency of usage (chi-square value of 30.9 with 12 DF).

- **Conclusions**: All these results were significant at the P<0.01 level; no other correlations were significant at the P<0.05 level. The results suggest that there is a strong link between using computer-based facilities and believing that computer systems are beneficial for managerial functions. It is again interesting that this correlation exists regardless of how frequently the computer facilities are used.

### 6.11 Correlation between satisfaction and individual impact

In terms of cross-correlations between user satisfaction and user impact, the concern here is with differences with P<0.01. The analysis of the foregoing results leads to the following:

- ‘Computer essential to work’ versus ‘Improves the speed of working’: The result of the survey shows that users who said the computer system improved the speed of working also said it was essential to their work (chi-square value of 46.9 with 6 DF).
CHAPTER SIX

SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'Computer essential to work' versus 'Improves the quality of work':
  The result shows that respondents who agreed that the computer improves the quality of work also said it was essential to their work (chi-square value of 42.0 with 6 DF).

- 'Computer essential to work' versus 'Makes the work easier to perform': The result shows that respondents who agreed that computer systems make the work easier to perform also said the computer system was essential to their work (chi-square value of 47.2 with 6 DF).

- 'Computer essential to work' versus 'Improves the effectiveness': The result shows that those who said the computer systems improved their effectiveness, also said it was essential to their work (chi-square value of 31.3 with 6 DF).

- 'Computer essential to work' versus 'Enhance the ability to take decisions': Respondents who indicated that the computers enhanced their ability to take decisions also said it was essential to their work (chi-square value of 19.8 with 6 DF).

- 'I am satisfied with the speed' versus 'Makes the work easier to perform': The survey indicates that users who were satisfied with speed of the computer systems also said computer systems made their work easier to perform (chi-square value of 29.3 with 6 DF).

- 'I am satisfied with the speed' versus 'Improves the effectiveness': Users who were satisfied with the speed of the computer systems also
said the computer systems improved their effectiveness (chi-square value of 25.6 with 6 DF).

- 'I am satisfied with the speed' versus 'Enhance the ability to take decisions': Those respondents who indicated that the computer systems enhanced the ability to take decisions were also satisfied with the computer speed (chi-square value of 21.2 with 6 DF).

- 'The system provides all the facilities' versus 'Improves the effectiveness': Those respondents who said that computer systems provide all the facilities needed also said it improved their effectiveness (chi-square value of 17.7 with 6 DF).

- 'The information is up-to-date' versus 'Improves the speed of working': The survey shows that users who said the information was up-to-date also said the computer systems improved the speed of their working (chi-square value of 19.9 with 6 DF).

- 'The information is up-to-date' versus 'Makes the work easier to perform': Respondents who said the information was up-to-date also said the computer systems made the work easier to perform (chi-square value of 27.2 with 6 DF).

- 'The information is up-to-date' versus 'Improves the effectiveness': Those respondents who indicated that the information was up-to-date also said the computer systems improved their effectiveness (chi-square value of 30.8 with 6 DF).
CHAPTER SIX  
SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'The information is up-to-date' versus 'Enhances the ability to take decisions': The result indicates that those who said the information was up-to-date also said that computer systems enhanced their ability to take decisions (chi-square value of 21.9 with 6 DF).

- 'Computer output is presented in useful way' versus 'Improves the effectiveness': Those respondents who indicated that the output was presented in a useful way also said the computer systems improved their effectiveness (chi-square value of 25.6 with 6 DF).

- **Conclusions**: All these are significant at the P<0.01 level, and there are no other correlations significant at P<0.05. The results suggest that satisfaction with the capabilities of the organisation's computer systems is strongly linked to a belief that computer systems can enhance the individual's managerial capabilities.

6.12 Infrastructure and support facilities

**Last significant change**

The results show that about half of the respondents said that their computer systems had been changed within the past two years. Leaving aside the ‘don’t knows’, it is apparent that Saudi firms update their systems quite frequently.
CHAPTER SIX    SAUDI ARABIA QUESTIONNAIRE ANALYSIS

The details of the last significant change in the computer systems are given below.

<table>
<thead>
<tr>
<th>Last significant change</th>
<th>No. of returns</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>I do not know</td>
<td>173</td>
<td>24.0</td>
</tr>
<tr>
<td>Less than 2 years</td>
<td>356</td>
<td>49.4</td>
</tr>
<tr>
<td>2-5 years</td>
<td>139</td>
<td>19.3</td>
</tr>
<tr>
<td>More than 5 years</td>
<td>53</td>
<td>7.4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>721</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.12A Last significant change

Differences of the significance change

About half of the respondents agreed that the hardware/software change had introduced significant changes into their work. The details of this impact are given in the table below.

<table>
<thead>
<tr>
<th>Differences of change</th>
<th>% of No</th>
<th>% of Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made the system easier to use</td>
<td>49.9</td>
<td>50.1</td>
</tr>
<tr>
<td>Improves information provision</td>
<td>53.0</td>
<td>47.0</td>
</tr>
<tr>
<td>Lead to higher productivity</td>
<td>55.6</td>
<td>44.4</td>
</tr>
<tr>
<td>More power/speed</td>
<td>44.1</td>
<td>55.9</td>
</tr>
<tr>
<td>Provided more applications</td>
<td>48.8</td>
<td>51.2</td>
</tr>
</tbody>
</table>

Table 6.12B Differences of the significance change
Other differences

<table>
<thead>
<tr>
<th>Difference</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology change</td>
<td>2.5</td>
</tr>
<tr>
<td>Integration between application and users</td>
<td>1.9</td>
</tr>
<tr>
<td>Negative impact</td>
<td>0.5</td>
</tr>
<tr>
<td>More supports</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Correlation between changes and differences

In terms of cross-correlations between the changes and the differences made, the results below refer to $P<0.01$. The analysis implies the following:

- 'Last significant change' versus 'Made the system easier to use': The results indicate that, regardless of how long ago the change had taken place, users said that the change made the system easier to use (chi-square value of 149.8 with 3 DF).
- 'Last significant change' versus 'Improves information provision': The results show that, regardless of how long ago the change had taken place, the staff said it improved information provision (chi-square value of 143.1 with 3 DF).
- 'Last significant change' versus 'higher productivity': The results show that, regardless of how long ago the change had taken place, the
staff said it led to higher productivity (chi-square value of 163.1 with 3 DF).

- 'Last significant change' versus 'More power/speed': The results show that, regardless of how long ago the change had taken place, the staff said it provided more power/speed (chi-square value of 212.9 with 3 DF).

- 'Last significant change' versus 'Provided more applications': The results show that, regardless of how long ago the change had taken place, the staff said it provided more applications (chi-square value of 174.1 with 3 DF).

- **Conclusion:** All these correlations were significant at the P<0.01 level, and there were no correlations significant at P<0.05. It is apparent that staff believe that changing or upgrading the computer system leads to improvements. This remained true regardless of how long ago the change had taken place.

**Correlation between usage and support**

In terms of cross-correlations between the usage and support, the results discussed below are significant at the P<0.01 level. The analysis implies the following:

- 'Easy to learn computer systems' versus 'A fellow member of staff':
  The results indicate that respondents who said a fellow member of
staff had been helpful also said it was easy to learn computer systems (chi-square value of 16.0 with 4 DF).

- ‘Easy to use computer keyboard’ versus ‘An external training course’: The results show that respondents who said an external training course was helpful also said it was easy to use a computer keyboard (chi-square value of 15.9 with 4 DF).

- ‘Easy to read from computer screen’ versus ‘An in house training course’: The survey shows that respondents who said an in-house training course was helpful also said it was easy to read from a computer screen (chi-square value of 17.3 with 4 DF).

- ‘Easy to log in and out from computer system’ versus ‘Manuals and printed aids’: The results indicate that respondents who said that manuals and printed aids were helpful, also said it was easy to log in or out from the computer system (chi-square value of 19.5 with 4 DF).

- ‘Easy to log in-out from computer systems’ versus ‘A fellow member of staff’: The survey shows that respondents who said a fellow member of staff had been helpful, also said it was easy to log in or out of the computer systems (chi-square value of 37.9 with 4 DF).

- ‘Easy to log in and out from computer system’ versus ‘An in-house computer expert’: The result show that respondents who said an in-house computer expert had been helpful also said it was easy to log in or out of computer systems (chi-square value of 15.6 with 4 DF).
CHAPTER SIX SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'Easy to log in and out' versus 'An in-house training course': The results show that respondents who said in-house training courses were helpful also said it was easy to log in or out from computer systems (chi-square value of 16.4 with 4 DF).

- 'Easy to use computer applications' versus 'A fellow member of staff': The results show that respondents who said a fellow member of staff had been helpful, also said it was easy to use computer applications (chi-square value of 20.7 with 4 DF).

**Conclusion:** All these correlations were significant at the P<0.01 level; no correlations at the P<0.05 level were found. The results clearly imply that there is a link between good support for managerial use of computer systems and the ease with which managers can use the systems.
CHAPTER SIX  SAUDI ARABIA QUESTIONNAIRE ANALYSIS

Assistance and support

Details of aids used by managers in their handling of computer systems are given in the table below.

<table>
<thead>
<tr>
<th>Assistance</th>
<th>% Never</th>
<th>% Occasionally</th>
<th>% Frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manuals and printed aids</td>
<td>21.9</td>
<td>53.5</td>
<td>24.5</td>
</tr>
<tr>
<td>On-line aids</td>
<td>26.9</td>
<td>49.1</td>
<td>24.0</td>
</tr>
<tr>
<td>A fellow member of staff</td>
<td>13.9</td>
<td>58.4</td>
<td>27.7</td>
</tr>
<tr>
<td>An in-house computer expert</td>
<td>29.5</td>
<td>49.8</td>
<td>20.7</td>
</tr>
<tr>
<td>An in-house training course</td>
<td>40.9</td>
<td>44.5</td>
<td>14.6</td>
</tr>
<tr>
<td>An external training course</td>
<td>45.4</td>
<td>42.6</td>
<td>12.1</td>
</tr>
<tr>
<td>Friends outside work</td>
<td>39.3</td>
<td>48.8</td>
<td>11.9</td>
</tr>
<tr>
<td>Average</td>
<td>31.1</td>
<td>49.5</td>
<td>19.4</td>
</tr>
</tbody>
</table>

Table 6.12C Assistance and support

It is clear that most aids are used occasionally by some half of the managers. However, looking at the percentage of responses saying ‘never’, it is apparent that external aids are less used than in-house assistance.
6.13 Correlation between support and user satisfaction

In terms of cross-correlations between support and user satisfaction, the results below refer to the P<0.01 level. The analysis implies the following:

- 'Word processing' versus 'Manuals and printed aids': The results indicate that respondents who said the manuals and printed aids were helpful also used word processing; in neither case was the correlation affected by frequency of use (chi-square value of 42.6 with 8 DF).

- 'Word processing' versus 'On-line aids': Respondents who indicate that on-line aids were helpful also said they used word processing, irrespective of frequency of usage (chi-square value of 47.5 with 8 DF).

- 'Word processing' versus 'An in-house training course': Those respondents who said that in-house training courses were helpful also
said they used word processing; in neither case was the correlation affected by frequency of use (chi-square value of 24.7 with 8 DF).

- ‘Word processing’ versus ‘Friends outside work’: The results show that those who found friends outside work to be helpful also said they used word processing; in neither case was the correlation affected by frequency of use (chi-square value of 46.9 with 8 DF).

- ‘Spreadsheets’ versus ‘Manuals and printed aids’: Respondents who said manuals and printed aids were helpful also said they used spreadsheets; in neither case was the correlation affected by frequency of use (chi-square value of 39.3 with 8 DF).

- ‘Spreadsheets’ versus ‘On-line aids’: The results indicated that those who said on-line aids were helpful also made use of spreadsheets; in neither case was the correlation affected by frequency of use (chi-square value of 31.3 with 8 DF).

- ‘Spreadsheets’ versus ‘An external training course’: The respondents who said that external training courses were helpful also used spreadsheets, but with a frequency of once a week to once a month (chi-square value of 22.3 with 8 DF).

- ‘Internal database’ versus ‘Manuals and printed aids’: Users who said that manual and printed aids were helpful also made use of internal databases; in neither case was the correlation affected by frequency of use (chi-square value of 48.9 with 8 DF).
CHAPTER SIX  SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'Internal database' versus 'On-line aids': Respondents who found on-line aids helpful also used internal databases; in neither case was the correlation affected by frequency of use (chi-square value of 29.1 with 8 DF).

- 'Internal database' versus 'An in-house training course': Respondents who said that in-house training courses were helpful also made use of internal databases; in neither case was the correlation affected by frequency of use (chi-square value of 25.2 with 8 DF).

- 'External database' versus 'On-line aids': Respondents who said that on-line aids were helpful also used external databases (chi-square value of 32.2 with 8 DF).

- 'Graphics applications' versus 'An in-house training course': Respondents who said that in-house training courses were helpful also made use of graphic applications occasionally, mainly less than once a month (chi-square value of 22.5 with 8 DF).

- 'Graphics applications' versus 'An external training course': Users who said that an external training course was helpful also used graphic applications, but usually for less than once a month (chi-square value of 23.4 with 8 DF).

- 'Electronic mail' versus 'Manuals and printed aids': Users who found manuals and printed aids helpful also said electronic mail is easy to use; in neither case was the correlation affected by frequency of use (chi-square value of 46.1 with 8 DF).
CHAPTER SIX SAUDI ARABIA QUESTIONNAIRE ANALYSIS

- 'Electronic mail' Versus 'On line aids': Respondents who said on-line aids were helpful also made use of electronic mail; in neither case was the correlation affected by frequency of use (chi-square value of 44.9 with 8 DF).

- 'Electronic mail' versus 'An in-house computer expert': Respondents who found an in-house computer expert helpful also made use of electronic mail; in neither case was the correlation affected by frequency of use (chi-square value of 25.8 with 8 DF).

- 'Statistical packages' versus 'Manuals and printed aids': Respondents who said that manuals and printed aids were helpful also made use of statistical packages, though mainly for less than once a month (chi-square value of 22.3 with 8 DF).

- 'Statistical packages' versus 'On-line aids': Respondents who said that on-line aids were helpful also made use of statistical packages, though mainly for less than once a month (chi-square value of 21.3 with 8 DF).

- 'Statistical packages' versus 'An external training course': Respondents who said that an external training course was helpful also used statistical packages, but usually for less than once a month (chi-square value of 29.2 with 8 DF).

- Conclusion: All these were significant at the P<0.01 level; no other correlations were significant at the P<0.05 level. There is evidently a link between using computer applications and requiring assistance.
However, it appears that those who find such assistance particularly useful are managers who use computer applications only occasionally.
Chapter Seven

Data Analysis: The United Kingdom

Questionnaire

7.1 Introduction

The purpose of this chapter is to analyse the results of data collected from the questionnaires distributed in the UK. The findings are grouped into three main sections. The first section deals with background variables, the assessment of computer systems' availability, and the statistical significance of the results. The second section deals with the usage of the computer systems and its statistical significance. The final section deals with infrastructure and support facilities and, again, the statistical significance of the results.
Sample

As mentioned previously (Chapter 5), the study has involved three business companies from the UK. The first company was Shell, and the other two were Astra, and Andaris. The table below indicates the number of responses received in terms of the business sector, and the percentage of the response rate, for the questionnaires distributed in the UK. The questionnaires were targeted at managers on the basis of internal advice received from the companies.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>No. of questionnaire distributed</th>
<th>% of response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell</td>
<td>40</td>
<td>90.0</td>
</tr>
<tr>
<td>Others</td>
<td>100</td>
<td>67.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>140</td>
<td>74</td>
</tr>
</tbody>
</table>

Table 7.1 UK sample

7.2 Background variables

Position of respondent

The results show that nearly three-quarters were junior managers, together with a small number of respondents who were secretaries. The distribution between senior and junior managers in this sample was similar to the overall distribution between these grades in the firms concerned.
CHAPTER SEVEN

The table below indicates responses from managers by position.

<table>
<thead>
<tr>
<th>Position</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior manager</td>
<td>29.1</td>
</tr>
<tr>
<td>Junior manager</td>
<td>66.0</td>
</tr>
<tr>
<td>Secretary</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Table 7.2A UK managers’ position

Department distribution

The table below shows the distribution of managers by department.

<table>
<thead>
<tr>
<th>Departments</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer centre</td>
<td>20.4</td>
</tr>
<tr>
<td>Maintenance</td>
<td>15.5</td>
</tr>
<tr>
<td>Finance</td>
<td>5.8</td>
</tr>
<tr>
<td>Production</td>
<td>3.9</td>
</tr>
<tr>
<td>Management</td>
<td>2.9</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2.9</td>
</tr>
<tr>
<td>Marketing</td>
<td>1.9</td>
</tr>
<tr>
<td>Personnel</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Table 7.2B UK department distribution

These firms are highly research-oriented, and have individual researchers within departments, as well as research departments. Researchers formed
an additional 44.7% of the sample. As the table above shows, the main returns otherwise were from the computer centres and the maintenance departments.

Managers' experience

The respondents were asked about their computer experience. About half of the staff have less than 10 years such experience. The following table shows the distribution of managers in terms of computer systems experience.

<table>
<thead>
<tr>
<th>Experience</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 year</td>
<td>2.9</td>
</tr>
<tr>
<td>2-5 year</td>
<td>12.6</td>
</tr>
<tr>
<td>6-10</td>
<td>36.9</td>
</tr>
<tr>
<td>Over 10 year</td>
<td>47.6</td>
</tr>
</tbody>
</table>

Table 7.2C UK managers' experience

Managers' qualifications

About 60% of managers possessed graduate qualifications. As the table below shows, a considerable number also possessed a higher qualification (the PhD was, of course, most common amongst research-oriented staff).
The following table shows the managers’ distribution by qualification.

<table>
<thead>
<tr>
<th>Qualification</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D.</td>
<td>28.2</td>
</tr>
<tr>
<td>Master/MBA</td>
<td>11.7</td>
</tr>
<tr>
<td>BSc/BA</td>
<td>26.2</td>
</tr>
<tr>
<td>Diploma</td>
<td>10.7</td>
</tr>
<tr>
<td>Other</td>
<td>23.3</td>
</tr>
</tbody>
</table>

Table 7.2D UK managers’ qualifications

Managers’ gender

The following table shows the distribution of managers by gender.

<table>
<thead>
<tr>
<th>Gender</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>68.9</td>
</tr>
<tr>
<td>Female</td>
<td>31.1</td>
</tr>
</tbody>
</table>

Table 7.2E UK managers’ gender

There was a considerably high proportion of female managers in the UK firms than in the Saudi firms. However, all those calling themselves ‘secretary’ were female.
Managers’ age

The results show that about three-quarters of the sample were aged under 46 years old. The following table shows the managers’ distribution by age.

<table>
<thead>
<tr>
<th>Age</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25</td>
<td>10.7</td>
</tr>
<tr>
<td>25-35</td>
<td>36.9</td>
</tr>
<tr>
<td>36-45</td>
<td>25.2</td>
</tr>
<tr>
<td>46-55</td>
<td>24.3</td>
</tr>
<tr>
<td>Over 55</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Table 7.2F UK managers’ age

Correlation between background variables

In terms of cross-correlations between these background variables, analysis of the foregoing results implies the following:

At the P<0.01 level

- ‘Position’ versus ‘Qualification’: The survey indicates that junior staff are more qualified (chi-square value of 16.0 with 4 DF).
- ‘Department’ versus ‘Qualification’: The result shows that research staff are more qualified (chi-square value of 35.7 with 2 DF).
CHAPTER SEVEN UK QUESTIONNAIRE ANALYSIS

- ‘Experience’ versus ‘Age’: The survey shows that the older respondents were, the more years computer experience they had (chi-square value of 8.6 with 1 DF).

At the P<0.05 level

- ‘Position’ versus ‘Age’: The results show that the older people tend to have higher positions (chi-square value of 7.8 with 2 DF).
- ‘Experience’ versus ‘Qualification’: The survey shows that the more educated the respondents were, the more years computer experience they had (the chi-square value of 7.8 with 2 DF).

7.3 Assessment of the computer systems

Nearest computer system

The great majority of managers have some kind of computer system on their desks, and 98% have access within their offices. The following table shows the distribution of the managers by nearest computer system.

<table>
<thead>
<tr>
<th>Nearest computer</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>On desk</td>
<td>93.2</td>
</tr>
<tr>
<td>In office</td>
<td>4.9</td>
</tr>
<tr>
<td>In department</td>
<td>1.9</td>
</tr>
<tr>
<td>In computer centre</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Table 7.3A UK managers’ nearest computer system
CHAPTER SEVEN

UK QUESTIONNAIRE ANALYSIS

Kind of computer system

Almost all managers (98%) had network access. The following table shows the distribution of managers by kind of computer system.

<table>
<thead>
<tr>
<th>Kind of systems</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networked</td>
<td>68.9</td>
</tr>
<tr>
<td>Stand-alone</td>
<td>1.9</td>
</tr>
<tr>
<td>Both</td>
<td>29.1</td>
</tr>
</tbody>
</table>

Table 7.3B UK kind of computer system

Handling computer systems

The majority of the staff handle their computer systems by themselves, but a small number of managers have someone else, such as secretary, to do the work on the computer systems for them. The following table shows the managers’ distribution by the way they handle computer systems.

<table>
<thead>
<tr>
<th>Handle computer</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>By self</td>
<td>93.2</td>
</tr>
<tr>
<td>Via someone else</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Table 7.3C UK handling computer systems
7.4 Managers and their systems

Managers

The majority of the managers said that computer systems were easy to learn and easy to use. The penultimate row in the table shows that only about 14% definitely thought it was not easier to read from the screen, than from printouts. The final row shows that a third of the respondents did not use computer systems outside workplace. The following table shows the managers reactions to their computer systems.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>generally true %</th>
<th>partly true %</th>
<th>not true %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy to learn how to use computer system</td>
<td>71.8</td>
<td>24.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Easy to use a computer keyboard</td>
<td>92.2</td>
<td>6.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Easy to read from computer screen</td>
<td>75.7</td>
<td>19.4</td>
<td>4.9</td>
</tr>
<tr>
<td>Easy to login and out from a computer</td>
<td>93.2</td>
<td>5.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Easy to use computer applications</td>
<td>71.8</td>
<td>23.3</td>
<td>4.9</td>
</tr>
<tr>
<td>Easier to use printouts than on screen</td>
<td>39.8</td>
<td>46.6</td>
<td>13.6</td>
</tr>
<tr>
<td>Use computer systems outside workplace</td>
<td>49.5</td>
<td>18.4</td>
<td>32.0</td>
</tr>
</tbody>
</table>

Table 7.4A UK managers reactions to their computer systems

Systems

The majority of the managers said that computer systems were essential to their work. However, many of the respondents have some doubt as to their satisfaction in using the computer systems. This is reflected in
comments on such questions as whether the systems provide all the facilities required (45.6% do not entirely agree, whether), information is up to date and available (43.7%), and whether the output is presented in a useful way (58.3%). The following table shows the distribution of managers' opinions concerning the value of computer systems.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>generally true %</th>
<th>Partly true %</th>
<th>not true %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer systems are essential to the work</td>
<td>86.4</td>
<td>10.7</td>
<td>2.9</td>
</tr>
<tr>
<td>I am satisfied with the speed of response of the system</td>
<td>48.5</td>
<td>39.8</td>
<td>11.7</td>
</tr>
<tr>
<td>The systems provides all the facilities I expect</td>
<td>43.7</td>
<td>45.6</td>
<td>10.7</td>
</tr>
<tr>
<td>The information is up to date and available</td>
<td>44.7</td>
<td>43.7</td>
<td>11.7</td>
</tr>
<tr>
<td>The computer output is presented in a useful way</td>
<td>35.0</td>
<td>58.3</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Table 7.4B UK managers' opinions concerning the value of computer systems

**Correlation between manager’s opinions and systems**

In terms of cross-correlations between managers’ opinions and the systems, analysis of the foregoing results implies the following:

**At the P<0.05 level**

- ‘Easy to learn computer systems’ versus ‘Computer essential to my work’: The results may imply that those users who find computer systems are essential to work also find them easy to learn (chi-square value of 12.5 with 4 DF).
- ‘Easy to use computer applications’ versus ‘Essential to my work’: The results may suggest that those who find it easy to use applications
also consider the computer to be essential for their work (chi-square value of 10.1 with 4 DF).

7.5 Usage of computer systems

7.5.1 Applications

The question regarding computer systems applications assesses the actual use of these applications in a manager’s job. Selected applications were assessed in terms of their frequency of usage by managers. Computer systems applications were measured via five indicators chosen to reflect the most likely frequencies of usage. The percentage responses for these indicators are listed below:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not at all</th>
<th>Less than once a month</th>
<th>Once a week to once a month</th>
<th>Several times a week</th>
<th>Several times each day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word-processing</td>
<td>1.0</td>
<td>1.0</td>
<td>3.9</td>
<td>40.8</td>
<td>53.4</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>9.7</td>
<td>15.5</td>
<td>20.4</td>
<td>37.9</td>
<td>16.5</td>
</tr>
<tr>
<td>Internal database</td>
<td>13.6</td>
<td>19.4</td>
<td>34.0</td>
<td>11.7</td>
<td>21.4</td>
</tr>
<tr>
<td>External database</td>
<td>40.8</td>
<td>18.4</td>
<td>27.2</td>
<td>7.8</td>
<td>5.8</td>
</tr>
<tr>
<td>Graphics</td>
<td>19.4</td>
<td>21.4</td>
<td>29.1</td>
<td>25.2</td>
<td>4.9</td>
</tr>
<tr>
<td>E-mail</td>
<td>2.9</td>
<td>0.0</td>
<td>0.0</td>
<td>8.7</td>
<td>88.4</td>
</tr>
<tr>
<td>Statistical</td>
<td>53.4</td>
<td>24.3</td>
<td>12.6</td>
<td>4.9</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Table 7.5.1 UK managers’ computer systems application
CHAPTER SEVEN UK QUESTIONNAIRE ANALYSIS

**Word-processing**

Almost all of the respondents used word-processing (99%). About 94% of the respondents used it at least several times a week in their work. The detailed frequency of word-processing usage by respondents is given below.

![Bar Chart of Word-processing Frequency](image)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>0%</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>0%</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>0%</td>
</tr>
<tr>
<td>Several times a week</td>
<td>60%</td>
</tr>
<tr>
<td>Several times each day</td>
<td>40%</td>
</tr>
</tbody>
</table>
Spreadsheets/financial reports

Most of the respondents used spreadsheets. However, about a quarter of the respondents rarely or never used them. The detailed frequency of spreadsheet usage by respondents is given below.
Internal databases

Most of the staff used internal databases, but not necessarily very frequently. About a third used them rarely or never. The detailed frequency of internal database usage by respondents is given below.
External databases

More than half of the respondents used external databases. However, only a relatively small percentage of the staff used them with any frequency. The detailed frequency of external database usage by respondents is given below.

![Bar chart showing frequency of external databases usage]

- 45% of respondents used external databases not at all.
- 30% used them less than once a month.
- 25% used them several times a week.
- 15% used them several times each day.
Graphics applications

About 80% of the staff used graphics applications: 60% once a month, or more frequently. The detailed frequency of graphics application usage by respondents is given below.

![Graph showing frequency of graphics applications usage](image)
Electronic mail/communications

Almost all of the staff used electronic mail frequently. The detailed frequency of electronic mail usage by respondents is given below.

![Chart showing electronic mail frequency](image)

- **Not at all**: 0%
- **Less than once a month**: 10%
- **Once a week to once a month**: 20%
- **Several times a week**: 30%
- **Several times each day**: 40%

% of frequency for Electronic mail

---

248
CHAPTER SEVEN

UK QUESTIONNAIRE ANALYSIS

Statistical packages

Less than a quarter of the staff used statistical packages with any regularity (i.e. once a month, or more frequently). The detailed frequency of statistical package usage by respondents is given below.

![Graph showing frequency of statistical package usage]
### Other computer systems application usage

<table>
<thead>
<tr>
<th>Application</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft project</td>
<td>5.8</td>
</tr>
<tr>
<td>CAD, DPT, Project planning</td>
<td>4.9</td>
</tr>
<tr>
<td>Finance, Administration</td>
<td>2.9</td>
</tr>
<tr>
<td>Instrument packages</td>
<td>1.9</td>
</tr>
<tr>
<td>Web browser document management</td>
<td>1.9</td>
</tr>
<tr>
<td>Virus checker, scheduling systems</td>
<td>1.9</td>
</tr>
<tr>
<td>Loads operation (scientific application)</td>
<td>1.9</td>
</tr>
<tr>
<td>Scheduling systems</td>
<td>1.9</td>
</tr>
<tr>
<td>Visio</td>
<td>1.0</td>
</tr>
<tr>
<td>Compilers</td>
<td>1.0</td>
</tr>
<tr>
<td>Internet</td>
<td>1.0</td>
</tr>
<tr>
<td>Data analysis programming</td>
<td>1.0</td>
</tr>
<tr>
<td>Document work (optical disk archive management systems)</td>
<td>1.0</td>
</tr>
<tr>
<td>Network units</td>
<td>1.0</td>
</tr>
<tr>
<td>Lotus, organiser</td>
<td>1.0</td>
</tr>
<tr>
<td>Molecular modelling</td>
<td>0.9</td>
</tr>
<tr>
<td>Electronic dictionary</td>
<td>0.9</td>
</tr>
<tr>
<td>PowerPoint</td>
<td>0.9</td>
</tr>
</tbody>
</table>
7.6 Usage of computer systems for tasks

The respondents were asked how computer systems helped them in their tasks. Selected tasks were assessed in terms of their usage by managers:

The use of computer systems for tasks was measured in terms of five indicators chosen to reflect appropriate frequencies of usage. The percentages in terms of these indicators are as follows:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not at all</th>
<th>Less than once a month</th>
<th>Once a week to once a month</th>
<th>Several times a week</th>
<th>Several times each day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looking for trends</td>
<td>36.9</td>
<td>23.3</td>
<td>19.4</td>
<td>14.6</td>
<td>5.8</td>
</tr>
<tr>
<td>Analysing problems</td>
<td>32.0</td>
<td>13.6</td>
<td>31.1</td>
<td>15.5</td>
<td>7.8</td>
</tr>
<tr>
<td>Accounting</td>
<td>44.7</td>
<td>26.2</td>
<td>19.4</td>
<td>5.8</td>
<td>3.9</td>
</tr>
<tr>
<td>Making decisions</td>
<td>38.8</td>
<td>17.5</td>
<td>15.5</td>
<td>18.4</td>
<td>9.7</td>
</tr>
<tr>
<td>Auditing</td>
<td>72.8</td>
<td>15.5</td>
<td>7.8</td>
<td>2.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Communication</td>
<td>2.9</td>
<td>1.0</td>
<td>3.9</td>
<td>11.7</td>
<td>80.6</td>
</tr>
<tr>
<td>Planning</td>
<td>18.4</td>
<td>11.7</td>
<td>30.1</td>
<td>29.1</td>
<td>10.7</td>
</tr>
<tr>
<td>Controlling</td>
<td>19.4</td>
<td>10.7</td>
<td>32.0</td>
<td>24.3</td>
<td>13.6</td>
</tr>
</tbody>
</table>

Table 7.6 UK usage of computer systems for tasks
CHAPTER SEVEN UK QUESTIONNAIRE ANALYSIS

Looking for trends

A comparison of ‘looking for trend’ usage by respondents is given below.

![Graph showing frequency of looking for trends]

About 60% of the respondents used computer systems for looking for trends rarely or never.
**Analysing problems/alternatives**

The detailed frequency of 'analysing problems/alternatives' usage by respondents is given below.

Over half of the respondents used computer systems for analysing problems with a frequency of at least once a week to once a month.
**Accounting/budgeting**

The detailed frequency of accounting/budgeting usage by respondents is given below.

![Bar chart showing the frequency of accounting usage.]

Nearly three-quarter of the respondents made little, or no use of computer systems for accounting purposes. It is clearly regarded as a specialist activity.
CHAPTER SEVEN

UK QUESTIONNAIRE ANALYSIS

Making decisions

The detailed frequency of 'making decisions' usage by respondents is given below.

Nearly 40% of respondents did not use computer systems for decision-making at all. The remainder spread relatively uniformly across the different frequencies of usage.
Auditing

About quarter of the respondents used computer systems for auditing, but few of them used this facility frequently. The detailed frequency of auditing usage by respondents is given below.
Communication

'Communication' assesses the actual usage of computer systems for communicating with external bodies, as required for public relations activities, or other communicating tasks which are the job of organisations. Almost all of the staff used computer systems for these kinds of communication, with over 80% using this facility several times each day. The detailed frequency of communication usage by respondents is given below.
Planning

About 80% of the respondents used the computer system for planning. In this case, the maximum frequency was in the range from 'once a week to once a month' and 'several times a week'. The detailed frequency of planning usage by respondents is given below.
CONTROLLING/GUIDING ACTIVITIES

The results here were rather similar to those found for 'planning', with the maximum frequency again between 'several times a week' and 'once a week to once a month'. The detailed frequency of controlling/guiding activity usage by respondents is given below.

![Bar chart showing frequency of controlling/guiding activities]
Other tasks

<table>
<thead>
<tr>
<th>Tasks</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation/reporting</td>
<td>1.9</td>
</tr>
<tr>
<td>Finding Information</td>
<td>1.0</td>
</tr>
<tr>
<td>Data handling/processing</td>
<td>1.0</td>
</tr>
<tr>
<td>Data analysis and reporting</td>
<td>1.0</td>
</tr>
<tr>
<td>Various inputs</td>
<td>1.0</td>
</tr>
</tbody>
</table>

7.7 Correlations between applications and tasks

In terms of cross-correlations between applications and users, analysis of the foregoing results implies the following:

At the P<0.01 level

- 'Graphics' versus 'Analysing problems': The survey indicate that users who use graphics applications, also use the system for analysing problems (chi-square value of 36.1 with 16 DF).

- 'Electronic mail' versus 'Communication': The results indicate that users who use electronic mail, also use the system for more formal communications with others, more especially if they use the system with reasonable frequency (chi-square value of 487.6 with 16 DF).
At the P<0.05 level

- ‘Word processing’ versus ‘Looking for trends’: The results show that users who use word processing also employ the system for looking for trends, regardless of how often they use it (chi-square value of 30.1 with 16 DF).

- ‘Spreadsheet’ versus ‘Analysing problems’: The results show that users who use spreadsheets also use the system for analysing problems, regardless of how often they use it (chi-square value of 29.7 with 16 DF).

7.8 Correlations between type of usage and ease-of-usage

In terms of cross-correlations between usage and satisfaction, the foregoing results imply the following:

At the P<0.01 level

- ‘Easy to learn computer systems’ versus ‘Communication’: The results show that those who find it easy to learn computer systems also use communications with reasonable frequency (chi-square value 27.6 with 8 DF).

- ‘Easy to use computer keyboard’ versus ‘Accounting/budgeting’: The respondents indicate that, if they find it easy to use computer systems, they are also likely to use them for accounting, regardless of the
frequency with which they use the systems (chi-square value of 27.3 with 8 DF).

- 'Easy to log in-out from computer systems' versus 'Accounting/budgeting': The survey indicates that, if it is easy to log in and out from computer systems, use is also made of accounting, regardless of the frequency of use for this purpose (chi-square value of 27.8 with 8 DF).

**At the P<0.05 level**

- 'Easy to learn computer systems' versus 'Planning': The results show that, if the respondents indicated that it is easy to learn computer systems, they were also likely to use them for planning, regardless of the frequency of usage (chi-square value of 18.4 with 8 DF).
- 'Easy to read from computer screen' versus 'Making decisions': The results indicate that, if it is easy to read from the computer screen, the system is also likely to be use for making decisions, regardless of the frequency of usage (chi-square value of 17.5 with 8 DF).
- 'Easy to log-in-out from computer systems' versus 'Communication': The results show that the respondents involved in communication via computer systems also find it is easy to log in or out, regardless of the frequency of usage (chi-square value of 17.6 with 8 DF was significance).
CHAPTER SEVEN

UK QUESTIONNAIRE ANALYSIS

- **Conclusions:** The correlations suggest that particular types of usage can be linked to the ease with which the manager uses the system. It appears, however, that the frequency of usage is not a major factor in this link.

### 7.9 The impact of computer systems

**Individual impact**

The majority of respondents agree that computer systems have an impact on their work. The following table shows the degree of impact of various factors affecting work activities.

<table>
<thead>
<tr>
<th>Opinion</th>
<th>strongly disagree %</th>
<th>slightly disagree %</th>
<th>slightly agree %</th>
<th>strongly agree %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves my speed of working</td>
<td>1.9</td>
<td>4.9</td>
<td>28.2</td>
<td>65.0</td>
</tr>
<tr>
<td>Improves the quality of my work</td>
<td>1.0</td>
<td>3.9</td>
<td>28.2</td>
<td>67.0</td>
</tr>
<tr>
<td>Makes my work easier to perform</td>
<td>2.9</td>
<td>1.0</td>
<td>32.0</td>
<td>64.1</td>
</tr>
<tr>
<td>Improves my effectiveness</td>
<td>1.9</td>
<td>3.9</td>
<td>35.9</td>
<td>58.3</td>
</tr>
<tr>
<td>Enhance my ability to take decisions</td>
<td>9.7</td>
<td>28.2</td>
<td>32.0</td>
<td>30.1</td>
</tr>
<tr>
<td>I would have too little information without computer systems</td>
<td>9.7</td>
<td>25.2</td>
<td>20.4</td>
<td>44.7</td>
</tr>
</tbody>
</table>

**Table 7.9A UK individual impact**

For the first four entries, the overwhelming majority of the respondents see benefits. There is appreciably more doubt concerning the ability of computers to enhance decision making, and also in their importance for supplying all the essential information.
The interesting result is the last two entries, where it appears that a substantial minority (over a third of the respondents) do not agree that computer systems enhance their ability to take decisions, or are essential for their information requirements. This is appreciably higher than the figures for Saudi respondents, even though the interviews suggest that UK managers are rather better served by the information on their computer systems than their Saudi counterparts. There appear to be two main reasons for this. The first is a question of expectations. As the answers to some of the other questions also suggest, UK managers seem to have higher expectations of their systems than do Saudi managers. Equally importantly, the higher-technology firms investigated in the UK require information that is extremely up-to-date, the difficulty of ensuring that the computer system supplies this seems to have influenced the opinions of some respondents adversely.

Organisational impact

The results show that the majority of respondents agree that computer systems have a range of impacts on the organisation and its activities. The first row in the table improving quality of decisions (with 65% agreement) differs somewhat from the next four, where agreement ranges from 86% to 94%. Connecting this row with the last two rows in the previous table (on individual impact), we can conclude that qualitative assessment by managers seem to be seen as less helped by the use of
computer systems than quantitative factors. The following table shows the level of agreement regarding these impacts.

<table>
<thead>
<tr>
<th>Opinion</th>
<th>strongly disagree %</th>
<th>slightly disagree %</th>
<th>slightly agree %</th>
<th>strongly agree %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves the quality of managerial decision</td>
<td>5.8</td>
<td>29.1</td>
<td>46.6</td>
<td>18.4</td>
</tr>
<tr>
<td>Helps the organisation to provide new services</td>
<td>1.0</td>
<td>6.8</td>
<td>48.5</td>
<td>43.7</td>
</tr>
<tr>
<td>Enhances communication with external bodies</td>
<td>3.9</td>
<td>8.7</td>
<td>34.0</td>
<td>53.4</td>
</tr>
<tr>
<td>Improves organisational productivity</td>
<td>1.0</td>
<td>13.6</td>
<td>43.7</td>
<td>41.7</td>
</tr>
<tr>
<td>Increasing use of computer is beneficial</td>
<td>1.0</td>
<td>4.9</td>
<td>27.2</td>
<td>67.0</td>
</tr>
</tbody>
</table>

Table 7.9B UK organisational impact

Correlations between individual impacts and organisational impacts

In terms of cross-correlations between user impacts and organisational impacts, analysis of the foregoing results implies the following:

At the P<0.01 level

- 'Improves my speed of working' versus 'Enhance communication with external bodies': The results show that when computer systems are seen to enhance communication with external bodies, they are also assessed as improving the speed of working (chi-square value of 22.8 with 9 DF).
• ‘Improves my speed of working’ versus ‘Increasing use of computer is beneficial’: The results show that, if increasing use of the computer is seen as beneficial, it is also seen as improving the speed of working (chi-square value of 77.5 with 9 DF).

• ‘Improves the quality of work’ versus ‘Improves the quality of managerial decisions’: The results show that, if computer systems are believed to help improve the quality of managerial decisions, they are also seen as assisting the quality of work (chi-square value of 24.7 with 9 DF).

• ‘Improves the quality of work’ versus ‘Increasing use of computer is beneficial’: The results show that, if respondents indicated that increasing use of computer system is beneficial, they also believed it helped the quality of work (chi-square value of 129.5 with 9 DF).

• ‘Makes the work easier to perform’ versus ‘Increasing use of computer is beneficial’: The survey shows that, if increasing use of computer systems is considered beneficial, it is also believed that they make the work easier to perform (chi-square value of 65.6 with 9 DF).

• ‘Improves my effectiveness’ versus ‘Improves the quality of decisions’: The results show that, if users believe that computer systems improve their effectiveness, then they believe that systems improve the quality of decisions (chi-square value of 23.8 with 9 DF).

• ‘Improves my effectiveness’ versus ‘Helps organisation to provide new services’: The results show that, if users believe that computer
systems improve user effectiveness, they also believe that the systems help the organisation to provide new services (chi-square value of 32.2 with 9 DF).

- ‘Improves my effectiveness’ versus ‘Improves organisational productivity’: The survey shows that, if users believed that the computer system improves effectiveness, they also thought that it helped organisational productivity (chi-square value of 23.6 with 9 DF).

- ‘Improves my effectiveness’ versus ‘Increasing use of computer is beneficial’: The results show that, if increasing use of computer systems is considered beneficial, they are also thought to improve effectiveness (chi-square value of 77.1 with 9 DF).

- ‘Enhance the ability to take decisions’ versus ‘Improves the quality of managerial decisions’: The survey shows that, if users believed that the computer system improves the quality of managerial decisions, they also believed that it could enhance the ability to take decisions (chi-square value of 52.6 with 9 DF).

- ‘Enhance the ability to take decisions’ versus ‘Improves organisational productivity’: The survey shows that, if users believed that the computer system improves organisational productivity, they also believed that it could enhance ability to take decisions (chi-square of 28.9 with 9 DF).
- 'Enhance the ability to take decisions' versus 'Increasing use of computer is beneficial': The results show, if users thought that increasing use of computer systems is beneficial, they also thought that it could enhance the ability to take decisions (chi-square value of 25.2 with 9 DF).

At the P<0.05 level

- 'Improves my speed of working' versus 'Improves the quality of managerial decisions': The results show that, if users agree that computer systems improve the quality of managerial decisions, they also believe that the systems can improve the speed of working (chi-square value of 17.6 with 9 DF).

- 'Improves my speed of working' versus 'Improves organisational productivity': The survey indicates that, if respondents agree that computer systems improve organisational productivity, they also believe they improve the speed of working (chi-square value of 17.6 with 9 DF).

- 'Improves the quality of work' versus 'Improves organisational productivity': The results show that, if users agree that computer systems improve the quality of work, they also think the systems aid organisational productivity (chi-square value of 19.1 with 9 DF).

- 'Makes the work easier to perform' versus 'Improves the quality of decisions': The survey shows that, if users agree that computer
systems improve the quality of decisions, they also believe it makes the work easier to perform (chi-square value of 24.6 with 9 DF).

- ‘Makes the work easier to perform’ versus ‘Improves organisational productivity’: The results show that, if users believe that the computer system makes the work easier to perform, they also believe it improves organisational productivity (chi-square value of 19.3 with 9 DF).

- **Conclusions:** The results show that there is a strong correlation between thinking that use of computer systems is valuable for the individual and in believing that it is good for the organisation.

### 7.10 Correlations between usage and individual impact

In terms of cross-correlations between usage and individual impact, analysis of the foregoing results implies the following:

**At the P<0.01 level**

- ‘Improves the speed of working’ versus ‘Word processing’: The result shows that staff who use word processing also find that the computer system improves their speed of working (chi-square value of 40.9 with 12 DF).

- ‘Improves the speed of working’ versus ‘Spreadsheet’: The result shows that staff who use spreadsheets also find that the computer
system improves their speed of working (chi-square value of 26.6 with 12 DF).

- 'Implements the speed of working' versus 'Internal database': The result shows that staff who use internal databases also find that the computer system improves their speed of working (chi-square value of 29.4 with 12 DF).

- 'Improves the quality of work' versus 'Word processing': The result shows that staff who use word processing also find that the computer system improves their quality of work (chi-square value 51.7 with 12 DF).

- 'Makes the work easier to perform' versus 'Word processing': The result shows that staff who use word processing also find that the computer system makes their work easier to perform (chi-square value of 113.3 with 12 DF).

- 'Improves the effectiveness' versus 'Word-processing': The result shows that staff who use word-processing also find that the computer system improves their effectiveness (chi-square value of 81.7 with 12 DF).

- 'Improves the effectiveness' versus 'E-mail/communications': The result shows that staff who use electronic mail also find that the computer system improves their effectiveness (chi-square value of 27.9 with 9 DF).
At the $P<0.05$ level

- 'Makes the work easier to perform' versus 'Spreadsheet': The result shows that staff who use spreadsheets also find that the computer system makes their work easier to perform (chi-square value of 24.9 with 12 DF).

- 'Makes the work easier to perform' versus 'Internal database': The result shows that staff who use internal databases also find that the computer system makes their work easier to perform (chi-square value of 22.7 with 12 DF).

- 'Improves the effectiveness' versus 'Internal database': The result shows that staff who use internal databases also find that the computer system improves their effectiveness (chi-square value of 23.1 with 12 DF with 12 DF).

- 'Enhance the ability to take decisions' versus 'Word-processing': The result shows that staff who use word-processing also find that the computer system enhances their ability to take decisions (chi-square value of 25.2 with 12 DF).

- 'Enhance the ability to take decisions' versus 'E-mail': The result shows that staff who use electronic mail also find that the computer system enhances their ability to take decisions (chi-square value of 20.1 with 9 DF).

- **Conclusions**: These correlations do not depend on the frequency with which the computer systems are used. Consequently, a belief that
computer systems improve personal efficiency and effectiveness of working exists amongst all staff who make use of computer applications, regardless of the actual amount of usage.

7.11 Correlations between satisfaction and individual impact

In terms of cross-correlations between user satisfaction and user impact, analysis of the foregoing results implies the following:

At the P<0.01 level

- 'Computer essential to work' versus 'Improves the speed of working': The result of the survey shows that, if users agree that the computer system improves the speed of working, they also consider it essential to work (chi-square value of 30.2 with 6 DF).

- 'Computer essential to work' versus 'Improves the quality of work': The results show that, if respondents agree that the computer system improves the quality of work, they also consider it is essential to work (chi-square value of 21.04 with 6 DF).

- 'Computer essential to work' versus 'Makes the work easier to perform': The results show that, if respondents agree that computer systems make the work easier to perform, they also believe that computers are essential to work (chi-square value of 24.2 with 6 DF).
CHAPTER SEVEN UK QUESTIONNAIRE ANALYSIS

- 'Computer essential to work' versus 'Improves the effectiveness': The results show that, if the computer system is thought to improve effectiveness, then it is also seen as essential to work (chi-square value of 26.1 with 6 DF).

- 'The information is up-to-date' versus 'Improves the effectiveness': If respondents believe that the information is up-to-date, they also believe that computer systems improve effectiveness (chi-square value of 17.2 with 6 DF).

At the P<0.05 level

- 'Computer essential to work' versus 'Enhance the ability to take decisions': The survey indicates that, if computers are believed to enhance the ability to take decisions, they are also considered essential to work (chi-square value of 15.9 with 6 DF).

- Conclusions: Belief that it is essential for managers to use computer systems is linked to satisfaction with the improvements to managerial practices that they bring, but the information conveyed by the computer systems must be up-to-date.
7.12 Infrastructure and support facilities

Last significant change

The details of the last significant change made to the computer systems are given below.

<table>
<thead>
<tr>
<th>Last significant change</th>
<th>% of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>I do not know</td>
<td>21.4</td>
</tr>
<tr>
<td>Less than 2 years</td>
<td>71.8</td>
</tr>
<tr>
<td>2-5 years</td>
<td>6.8</td>
</tr>
</tbody>
</table>

*Table 7.12A UK last significant change*

The result shows that nearly three-quarters of the respondents said that their computer systems had been changed within the previous two years.

Differences relating to the significance of the change

About half of the respondents agreed that the change had introduced differences of significance for their work. One-fifth of the respondents thought that the changes had led to higher productivity, while about a third thought that the changes had provided more power/speed. The other suggested differences were noted by about a high of the respondents.
The details of the different changes are given in the table below.

<table>
<thead>
<tr>
<th>Differences of change</th>
<th>% of No</th>
<th>% of Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made the system easier to use</td>
<td>54.4</td>
<td>45.6</td>
</tr>
<tr>
<td>Improves information provision</td>
<td>45.6</td>
<td>54.4</td>
</tr>
<tr>
<td>Lead to higher productivity</td>
<td>79.6</td>
<td>20.4</td>
</tr>
<tr>
<td>More power/speed</td>
<td>37.9</td>
<td>62.1</td>
</tr>
<tr>
<td>Provided more applications</td>
<td>46.6</td>
<td>53.4</td>
</tr>
</tbody>
</table>

Table 7.12B UK differences relating to the significance of the change

Other differences

<table>
<thead>
<tr>
<th>Difference</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provided new systems, and better communication with other sites</td>
<td>6.8</td>
</tr>
<tr>
<td>Services less reliable</td>
<td>1.0</td>
</tr>
<tr>
<td>More hassle, less system integrity</td>
<td>1.0</td>
</tr>
<tr>
<td>More complicated to use</td>
<td>1.0</td>
</tr>
<tr>
<td>Lost several facilities which were previously available</td>
<td>1.0</td>
</tr>
</tbody>
</table>
Correlations between changes and consequent differences

In terms of cross-correlations between a change in computer systems and the differences that follow, analysis of the foregoing results implies the following:

At the P<0.01 level

- 'Last significant change' versus 'Made the system easier to use': The results indicate that, regardless of when the change was made, the respondents thought it made the system easier to use (chi-square value of 28.9 with 2 DF).

- 'Last significant change' versus 'Improves information provision': The results show that regardless of when the change was made, the respondents believed it had improved information provision (chi-square value of 33.3 with 2 DF).

- 'Last significant change' versus 'More power/speed': The results show that regardless of when the change was made, the respondents believed it had led to more power/speed (chi-square value of 47.3 with 2 DF).

- 'Last significant change' versus 'Provided more applications': The results show that regardless of when the change was made, the respondents stated it had provided more applications (chi-square value of 35.2 with 2 DF).
CHAPTER SEVEN UK QUESTIONNAIRE ANALYSIS

At the P<0.05 level

- 'Last significant change' versus 'higher productivity': The results show that regardless of when the change was made, the respondents believed it had led to higher productivity (chi-square value of 8.5 with 2 DF).

- Conclusion: Changes in the computer system are thought by managers to have led to improvements to the efficiency of the system and to the help it provided. Since this applied regardless of when the last change was made, it appears that managers are in favour of updating computer systems whenever feasible.

Assistance and support

The details of the assistance and support are given in the table below.

<table>
<thead>
<tr>
<th>Assistance</th>
<th>% Never</th>
<th>% Occasionally</th>
<th>% Frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manuals and printed aids</td>
<td>13.6</td>
<td>66.0</td>
<td>20.4</td>
</tr>
<tr>
<td>On-line aids</td>
<td>9.7</td>
<td>57.3</td>
<td>33.0</td>
</tr>
<tr>
<td>A fellow member of staff</td>
<td>1.9</td>
<td>45.6</td>
<td>52.4</td>
</tr>
<tr>
<td>An in-house computer expert</td>
<td>2.9</td>
<td>52.4</td>
<td>44.7</td>
</tr>
<tr>
<td>An in-house training course</td>
<td>19.4</td>
<td>60.2</td>
<td>20.4</td>
</tr>
<tr>
<td>An external training course</td>
<td>53.4</td>
<td>38.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Friends outside work</td>
<td>51.5</td>
<td>42.7</td>
<td>5.8</td>
</tr>
</tbody>
</table>

Table 7.12C UK assistance and support
The majority of respondents said that they had sought assistance. As the table indicates, all types of in-house assistance seem to be used by most staff. However, the last two rows in the table indicate a lower level of usage, which implies that external assistance is less well used. Clearly, the most used form of assistance is discussion with in-house colleagues.

Other assistance

<table>
<thead>
<tr>
<th>Assistance</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience</td>
<td>1.0</td>
</tr>
<tr>
<td>External consultants</td>
<td>1.0</td>
</tr>
<tr>
<td>Experiment/trial and error</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Correlations between usage and support

In terms of cross-correlations between usage and support, analysis of the foregoing results implies the following:

At the P<0.01 level

- 'Easy to learn computer systems' versus 'A fellow member of staff': The result shows that managers who had assistance from a fellow member of staff also found that the computer system was easy to learn (chi-square value of 17 with 4 DF).
7.13 Correlations between support and user satisfaction

In terms of cross-correlations between support and user satisfaction, analysis of the foregoing results implies the following:

At the P<0.01 level

- 'Word processing' versus 'On-line aids': The result shows that staff who use on-line aids also use word processing (chi-square value of 20.9 with 8 DF).
- 'Spreadsheets' versus 'Manuals and printed aids': The result shows that staff who use manuals and printed aids also use spreadsheets (chi-square value of 25.9 with 8 DF).
- 'Graphics applications' versus 'On-line aids': The result shows that staff who use online aids also use graphics applications (chi-square value of 25.1 with 8 DF).
- 'Electronic mail' versus 'An in-house computer training course': The result shows that staff who have in-house training also use electronic mail, more especially if they communicate frequently (chi-square value of 18 with 6 DF).

At the P<0.05 level

- 'Internal database' versus 'Manuals and printed aids': The result shows that staff who use manuals and printed aids also use internal databases (chi-square value of 17.9 with 8 DF).
‘External database’ versus ‘Friends outside work’: The result shows that staff who used friends outside work for assistance, also used external databases, regardless of frequency (chi-square value of 16.8 with 8 DF).

Conclusion: The results suggest that there are links between the provision of assistance and the use of computer applications. However, the correlations imply that the links may be between specific applications and specific types of assistance.
Chapter Eight

Data analysis: Interview survey

8.1 Introduction

The purpose of this chapter is to analyse the results of data collected from interviews conducted in both Saudi Arabia and the UK. The findings are grouped into two main sections. The first section deals with data collected from Saudi Arabia relating to computer centres and managers' use of computer system. The second section deals with data collected from the UK, and will cover the same range of topics.

In order to structure the interview responses, topics were grouped to examine the current situation and resultant problems as follows:

- The position of the computer centre and its support to managers.
8.2 Saudi Arabia

As mentioned previously (Chapter 5), for the interview with managers, a total of nineteen managers from different departments and different levels of management were selected. The sample interviewed included eight managers from different banks and eleven from different oil companies. For the interviews with the computer centre managers, eight managers were selected from different banks and oil companies.

8.2.1 Computer centres

To investigate the computer centres' current situation and the support they offer to managers, a number of interviews with computer centre managers at banks and oil organisations were carried out. Respondents in
the computer centres were all male, and had all specialised in the field of computing in their Bachelor’s degree. They were all aged over 35 years.

Respondents were asked about the computer system configurations that were used in their organisations. All the computer centres studied possessed mainframes, PCs, networking and applications software. They all had over 30 staff, and their main activities included:

- Operation and maintenance of computer systems (hardware and software).
- Systems analysis.
- Development of in-house computer programs.
- Training.
- Providing computer services to other departments within the organisation.

Operating systems and application programs were purchased from well-known international companies (off-the-shelf). When respondents were asked whether they were satisfied with the present computer systems for management, computer centre managers in oil companies indicated that, although they were satisfied that the systems did the present job for management purposes, they were dissatisfied with networking in the organisation. For example, some of the managers said ‘All managers in the organisation should have e-mail to communicate with each other and with top management, also with the different branch managers for a
number of purposes. The computer centre managers in banks responded that they were dissatisfied because the computer systems did not match all their information needs, and they, too, complained about poor networking. Most of these managers wished to have more advanced computer systems and networking which could help staff be aware of competitors' marketing. In addition, several of these interviewed wished to be connected by the computer system to the top level management at head-quarters, as this would help to speed some of the work. For example, one of the managers said 'I consider our networking to be basic, because, when we need to know other commercial information and other international information via computer systems, it must be done immediately'. These issues will be discussed later in more detail.

Policy concerning the planning of upgrades of computer systems is decided in banks jointly by senior management, middle management, junior management and the computer centre. The banks all had a committee which included a senior member, a member representing middle management, a member representing junior management and a representative from the computer centre. The committee is usually scheduled to meet only when necessary, usually once or twice a year, to plan and discuss the firm's IT policy. It only discusses the major outline of the changes needed, and leaves the minor changes for the individual departments to decide up on. In addition, the banks included in the
present survey seek external consultation with major international IT companies concerning the need for any major changes regarding hardware and software. These consultations are with national IT companies, or with international IT companies which are located in an Arab country and are acquainted with Arabic software.

The high-level management and the computer centres of the oil companies make the decisions concerning the planning and upgrading of their computer systems. In addition, for major changes in hardware and software, they prefer to consult national IT companies, and only consult international IT companies when it is essential.

All respondents were familiar with the future plans for development (hardware and software) in their organisations. All were making plans for the year 2000, but considered the information to be confidential, although they could say, in all cases, that there was a plan to buy new computers and applications software. All respondents thought that the limiting factors for making major changes were money and skills. Although, there was a budget for IT development for each department, in many cases these budgets would not cover the expenses required to make major changes. In addition, there was a shortage of the well-qualified and skilled staff needed for operating modern computer systems. Respondents from the banks thought that one of the main factors in the lack of
fulfilment of plans was that the staff who used the systems were not skilled enough. This suggests that more effective and intensive training is needed before new computer systems are introduced.

To encourage managers/staff to use the available computer systems, the computer centres provide training courses. These include:

- In-house training by senior staff from the computer centre.
- In-house training by an outside company.
- External training courses (national).
- External training courses (abroad).
- Publishing regular leaflets, manuals and handouts to junior staff.

All respondents considered that in-house training was the most helpful support to be offered because it could be directly related to the managers’ work.

### 8.2.2 Managers

To investigate the managers’ use, level of satisfaction and considered importance of computer systems, managers in different departments and at different levels of management in oil companies and banks were interviewed. The questions they were asked related to experience, policy, planning and funding.
The managers who were interviewed were all male, and came primarily from the finance departments and the management services departments. The education of the respondents was as follows: 70% had BSc/BA degrees, 15% had diplomas, 15% had other degrees. The age ranges of the respondents were: 75% were over 35 years old, and 25% were under 35 years old; but all bank respondents were over 35 years old. Respondents were asked about their computer systems experience. All the bank managers had over 10 years of computer experience, while all the managers of oil companies had less than 10 years.

Concerning the importance of computer systems for their work, all managers' thought that they were very important, because they were necessary for them to do their work. In addition, computer systems increased the speed with which they could carry out their work. Banks managers thought that they could not do their work at all without the assistance of a computer system, since all their transactions, both internal and external, depended on computers. The majority of respondents also thought that computer systems improved the quality of the work, as well as speeding it up. This meant there was an increase in both the quality and quantity of the work performed.

Regarding the role of computer systems in making decisions, all managers thought that computer systems were very helpful in this,
because they provided as much information as was necessary for making decisions quickly.

As regards the extent of use, all the managers interviewed made use of the computer system several times each day. The majority were satisfied that it did the job they required, but they were also looking forward to the advent of more advanced systems. Some of them added that they were satisfied because they were provided with newer systems approximately every two years. On the other hand, some respondents were dissatisfied because of the poor networking (e.g. for e-mail), or of a delay in providing more advanced systems. They also needed access to the Internet, because they required the information available on their commercial activities. The managers therefore agreed with what the computer centre managers had reported previously, a lack of satisfaction with networking. With regard to policy and planning for the upgrading of their computer systems, respondents also agreed with what the computer centre managers had reported previously.

All respondents knew in general what sort of plans were being made for the future, but they did not know the details. They knew there would be new computers and software implemented, as the firm tried to keep up with IT advances. However, like the computer centre managers, they
thought the limiting factors for the plans were money, lack of skills and the need for more training.

It was apparent from the respondents that all the firms organised training courses, either in-house or outside the company. Each department could request any type of IT training from high-level management, and then the computer centre would be asked to prepare for it. Managers also used handouts and manuals, which they got from the computer centre. Though they could access outside training as necessary, they thought that in-house training was more helpful for the staff, because they could ask for specific needs to be covered. In addition, the in-house trainers were familiar with the skills of staff in the organisation, and so were aware of exactly what they needed to improve their skills.

8.3 UK

As mentioned before (Chapter 5), altogether twelve managers from different levels of management and different computer centres were interviewed. The interviewees included nine managers from different departments in the organisations. For the interviews with the computer centre managers, three computer centre managers were interviewed from the different organisations.
CHAPTER EIGHT

INTERVIEW DATA ANALYSIS

8.3.1 Computer centres

The interviews were carried out with computer centre managers at the UK organisations in order to investigate the computer centre position regarding the role of computer systems, policy, planning, and support offered to the managers.

All respondents were male, and were computer specialists with qualifications as follows: one-third of the respondents had a Ph.D., one-third of the respondents had master's degree, the rest of the respondents holding other qualifications. Two-thirds of the respondents were under 35 years old, and one-third of the respondents were over 35 years old.

Respondents were asked about the computer system configurations that were used in their organisations. All the computer centres studied had mainframes, PCs, networking and applications software. One company had a small number of staff, because it was a new and still developing. The other had over thirty staff each. The main activities of the computer centres included:

- Operation of the computer systems.
- Developing in-house computer programs.
- IT strategy and development.
- Training.
Operating systems and large applications programs were bought off-the-shelf. Respondents were asked whether they were satisfied with their current computer systems for management. Overall, all were satisfied. There had been continuing changes, with which it was difficult to keep up, but, broadly, the policy worked very well.

Respondents were asked how the computer systems policy planning was currently decided. They replied it was mainly decided by top-level management and by the computer department. However, one company based decisions by top-level management recommendations from lower-level management, who were involved in the information systems steering committee (ISSC). The committee met as, and when, necessary.

All respondents were familiar with the future plans for computer systems development (hardware, and software) in their organisations. All the firms were making plans to keep up with others, and would soon be getting new computers and software. One of the formal plans made by one of the companies resulted in a document for management systems which was supposed to lead to a uniform system across both the site and the company. All were planning for enhancing and developing their networking.
All respondents considered that the limiting factor for making changes was money. Some companies added that another limiting factor was technical feasibility: whether the new systems could do the job and solve the problems of users. Skills, or lack of them, were also considered to be an important factor.

To encourage managers to use the available computer systems, respondents printed to a range of training aids. These included:

- In-house training.
- In-house training by other companies.
- Manuals and suitable documentation of the systems.

8.3.2 Managers

These interviews were intended to investigate the managers' use of computer systems, their level of satisfaction and the importance they placed on the system. Managers in different departments and at different levels of management in these UK organisations were interviewed.

All the managers interviewed were male. Two-thirds of the respondents were in research, while one-third of the respondents were from management services. Most of the respondents were Ph.D. holders (80%), and the rest were BSc/BA holders (20%). All respondents were
over 35 years old. Respondents were asked about their computer systems experience: 80% of them had over 10 years experience, while 20% had less than 10 years experience.

Managers were asked about the importance of computer systems for their work. They all thought that computer systems were very important for their work. As they used computer systems for the majority of their job activities, and most of their work depended on the computer system, they thought that it would be very difficult to do their job without them. All respondents thought that computer systems were helpful in making decisions, because they provided good quality information, very quick access to information and quick, easy-to-absorb responses. All the managers interviewed used the computer system several times each day.

All respondents were satisfied with their current computer system, because it provided the information they needed, and did its job well. They also believed, however, that the computer system must be improved on a regular basis. Managers reported that there were sometimes problems, such as network crashes and application problems, but, in general, they were satisfied with their current level of computer development.

All decisions regarding computer systems policy, planning and funding were made by the top management and the computer department.
However, respondents from one company said that they had an information systems steering committee (ISSC) which involved managers from different levels of management. This committee decided on the major changes only: for small changes, each department made its own decisions and paid for them from their own budget.

Most of the respondents knew what sorts of plans were being made for the future, but they did not know the details. Managers from one of these companies knew that they would be acquiring a specific management document system. The others knew, more generally, that they would be getting new computers and applications, along with networking developments. They all considered that the limiting factor would be money. Some managers thought that training and flexibility of the systems were other restricting factors.

To encourage managers and staff to use the available computer systems, all respondents had in-house training. This was provided either by the organisation, or as in-house training carried out by other firms when necessary. They also all used manuals and handouts from their computer centres. Moreover, they could request any special training from the centres, and any help required with computer systems problems come from the computer centre.
Chapter Nine

Comparison of Saudi Arabia and the UK

9.1 Introduction

The purpose of this chapter is to compare the data obtained from Saudi Arabia with that from the UK. The findings are grouped into two main sections. The first section compares the results of the questionnaire data in terms of backgrounds, systems, usage, tasks, computer systems' importance, upgrade and assistance. The significant differences between the two countries are noted. The second section compares the results of the interviews in terms of the responses from computer centre managers and other managers.
Although neither country can necessarily be regarded as a ‘typical’ example, it is reasonable to see a comparison between Saudi Arabia and the UK as being a comparison between a developing country and a developed country. The intention in carrying out this comparison is that developing countries, in general, and Saudi Arabia, in particular, may gain by looking for significant differences. These may suggest trends and insights into the introduction and use of computer systems in commercial companies.

There are some characteristics that might affect this comparison of differences. An obvious one is that use of computer systems may depend on the type of company, because certain types of companies (such as a chemical company) require very large amounts of information for management and research. There are a number of other possible characteristics which could affect comparisons, but which appear to be less applicable to the present study. For example, the geographical position of the firm is unlikely to be important here, because the business organisations which were examined in this study were all in the vicinity the cities, and the overall type of geographical location was rather similar for each company in both countries. One difference that might be important is that the UK has more experience in the area of computer systems, while Saudi Arabia is still a relatively new
to this technology (see Chapter 1). Differences such as this will be discussed in more detail later.

9.2 Questionnaire

Background

The table below shows the results of a comparison between the Saudi responses and the responses from the UK.

<table>
<thead>
<tr>
<th>Variables</th>
<th>UK</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 years or Less</td>
<td>15.5%</td>
<td>45.1%</td>
</tr>
<tr>
<td>6 years or Over</td>
<td>84.5%</td>
<td>54.9%</td>
</tr>
<tr>
<td>Position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Manager</td>
<td>29.1%</td>
<td>18.0%</td>
</tr>
<tr>
<td>Junior Manager</td>
<td>66.0%</td>
<td>73.8%</td>
</tr>
<tr>
<td>Secretary</td>
<td>4.9%</td>
<td>8.2%</td>
</tr>
<tr>
<td>Qualification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Graduate</td>
<td>39.8%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Graduate</td>
<td>36.9%</td>
<td>67.0%</td>
</tr>
<tr>
<td>Others</td>
<td>23.3%</td>
<td>22.9%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>68.9%</td>
<td>98.6%</td>
</tr>
<tr>
<td>Female</td>
<td>31.1%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 or Less</td>
<td>47.6%</td>
<td>55.1%</td>
</tr>
<tr>
<td>36 or Over</td>
<td>52.4%</td>
<td>44.9%</td>
</tr>
</tbody>
</table>

Table 9.2A Managers’ Background comparison
It can be seen that there are differences between the managers' characteristics in the UK and in Saudi Arabia. In the UK, 29.1% of the managers were senior, while in the Saudi Arabia only 18% were senior. On the other hand, there were only 4.9% secretarial staff in the UK, compared with 8.2% in Saudi Arabia. Most of the staff in Saudi were graduates, while in the UK many were postgraduates ($X=66.6$, $DF=1$, $P<0.01$). The data show that the UK staff were slightly older than the Saudi staff. There was a major difference in experience in the use of computer systems between the two countries, with UK staff having much more experience than Saudi staff ($X=32.4$, $DF=1$, $P<0.01$). Concerning gender distribution, there is a difference between the countries, with a much higher percentage of male employees in Saudi firms ($X=164.13$, $DF=1$, $P<0.01$).

Most of these differences are real. For example, this is true of the age distribution (which can be related to the age distribution the two countries) and of the low proportion of female employees in Saudi Arabia. However, the difference in qualifications is due to the higher proportion of research-oriented staff in the UK sample.
The availability of computer systems

The results show that UK staff have more networked computers ($X=20.5$, $DF=1$, $P<0.01$) inside their offices ($X=8.43$, $DF=1$, $P<0.01$), and they handle the computer system for themselves slightly more often than the Saudi staff.

See the table below.

<table>
<thead>
<tr>
<th>Systems</th>
<th>UK</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest computer systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inside Office</td>
<td>98.1</td>
<td>88.9</td>
</tr>
<tr>
<td>Outside Office</td>
<td>1.9</td>
<td>11.1</td>
</tr>
<tr>
<td>Kind of computer systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Networked</td>
<td>98.1</td>
<td>79.7</td>
</tr>
<tr>
<td>Stand-alone</td>
<td>1.9</td>
<td>20.2</td>
</tr>
<tr>
<td>Handle computer systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myself</td>
<td>93.2</td>
<td>89.0</td>
</tr>
<tr>
<td>Someone else</td>
<td>6.8</td>
<td>11.0</td>
</tr>
</tbody>
</table>

*Table 9.2B Managers' availability of computer systems*

The managers' use of computer systems

Managers in both countries were asked about their general acceptance and use of computer systems. The results show that there is a close similarity between reactions in the two countries in such areas as satisfaction with speed, facilities provided, ease of use and how essential the systems were to managers' work. However, there were some differences in other areas. For example, when asked about the ease of use of computer applications, 71.8% of UK staff found it easy, compared with 57.4% of Saudi staff. Similarly, as regards logging in and out, 93.2% of UK staff found it easy, compared with
79.8% of Saudi staff. The data also show that more UK staff used computers outside work than Saudi staff. The results in the table below allow a comparison of these differences. The general impression is that UK staff found computers easier to use than Saudi staff, but levels of satisfaction were more comparable. Note, however, the more adverse UK reaction to the final questions.
<table>
<thead>
<tr>
<th>Variables</th>
<th>UK</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Easy to learn computer systems</td>
<td>71.8</td>
<td>66.0</td>
</tr>
<tr>
<td>Generally true</td>
<td>92.2</td>
<td>81.1</td>
</tr>
<tr>
<td>Partly true</td>
<td>6.8</td>
<td>17.3</td>
</tr>
<tr>
<td>Not true</td>
<td>4.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Easy to read from computer screen</td>
<td>75.7</td>
<td>76.0</td>
</tr>
<tr>
<td>Generally true</td>
<td>57.4</td>
<td>57.4</td>
</tr>
<tr>
<td>Partly true</td>
<td>36.1</td>
<td>36.1</td>
</tr>
<tr>
<td>Not true</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>Easy to log in-out</td>
<td>93.2</td>
<td>79.8</td>
</tr>
<tr>
<td>Generally true</td>
<td>49.4</td>
<td>49.4</td>
</tr>
<tr>
<td>Partly true</td>
<td>34.7</td>
<td>34.7</td>
</tr>
<tr>
<td>Not true</td>
<td>16.0</td>
<td>16.0</td>
</tr>
<tr>
<td>I use computer outside workplace</td>
<td>49.5</td>
<td>34.8</td>
</tr>
<tr>
<td>Generally true</td>
<td>82.8</td>
<td>82.8</td>
</tr>
<tr>
<td>Partly true</td>
<td>13.5</td>
<td>13.5</td>
</tr>
<tr>
<td>Not true</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Computer essential to my work</td>
<td>86.4</td>
<td>82.8</td>
</tr>
<tr>
<td>Generally true</td>
<td>48.5</td>
<td>49.8</td>
</tr>
<tr>
<td>Partly true</td>
<td>39.8</td>
<td>38.6</td>
</tr>
<tr>
<td>Not true</td>
<td>11.7</td>
<td>11.7</td>
</tr>
<tr>
<td>I am satisfied with speed</td>
<td>43.7</td>
<td>39.7</td>
</tr>
<tr>
<td>Generally true</td>
<td>45.6</td>
<td>46.9</td>
</tr>
<tr>
<td>Partly true</td>
<td>10.7</td>
<td>13.5</td>
</tr>
<tr>
<td>The system provides all the facilities</td>
<td>44.7</td>
<td>44.1</td>
</tr>
<tr>
<td>Generally true</td>
<td>43.7</td>
<td>45.2</td>
</tr>
<tr>
<td>Partly true</td>
<td>11.7</td>
<td>10.7</td>
</tr>
<tr>
<td>The information is up to date</td>
<td>35.0</td>
<td>57.7</td>
</tr>
<tr>
<td>Generally true</td>
<td>58.3</td>
<td>38.4</td>
</tr>
<tr>
<td>Partly true</td>
<td>6.8</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Table 9.2C Comparison of managers’ use of computer systems
Usage of computer systems applications

Managers were also asked about the use of computer systems applications. In general, the results show that UK managers used computer applications more than Saudi managers, especially in the areas of word processing ($X=55.4$, $DF=1$, $P<0.01$) and electronic mail ($X=146.7$, $DF=1$, $P<0.01$), but not for statistical packages. The result are shown in the table below.
<table>
<thead>
<tr>
<th>Variables</th>
<th>UK</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td><strong>Word processing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>1.0</td>
<td>21.8</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>1.0</td>
<td>7.6</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>3.9</td>
<td>14.7</td>
</tr>
<tr>
<td>Several times a week</td>
<td>40.8</td>
<td>21.1</td>
</tr>
<tr>
<td>Several times each day</td>
<td>53.4</td>
<td>34.8</td>
</tr>
<tr>
<td><strong>Spreadsheet/financial report</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>9.7</td>
<td>25.2</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>15.5</td>
<td>10.0</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>20.4</td>
<td>22.5</td>
</tr>
<tr>
<td>Several times a week</td>
<td>37.9</td>
<td>20.8</td>
</tr>
<tr>
<td>Several times each day</td>
<td>16.5</td>
<td>21.5</td>
</tr>
<tr>
<td><strong>Internal database</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>13.6</td>
<td>24.5</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>19.4</td>
<td>12.1</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>34.0</td>
<td>17.8</td>
</tr>
<tr>
<td>Several times a week</td>
<td>11.7</td>
<td>15.5</td>
</tr>
<tr>
<td>Several times each day</td>
<td>21.4</td>
<td>30.1</td>
</tr>
<tr>
<td><strong>External database</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>40.8</td>
<td>45.5</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>18.4</td>
<td>13.2</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>27.2</td>
<td>15.8</td>
</tr>
<tr>
<td>Several times a week</td>
<td>7.8</td>
<td>12.8</td>
</tr>
<tr>
<td>Several times each day</td>
<td>5.8</td>
<td>12.8</td>
</tr>
<tr>
<td><strong>Graphics application</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>19.4</td>
<td>40.2</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>21.4</td>
<td>20.0</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>29.1</td>
<td>19.8</td>
</tr>
<tr>
<td>Several times a week</td>
<td>25.2</td>
<td>13.2</td>
</tr>
<tr>
<td>Several times each day</td>
<td>4.9</td>
<td>6.8</td>
</tr>
<tr>
<td><strong>Electronic mail/communications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>2.9</td>
<td>49.2</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>0.0</td>
<td>6.2</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>0.0</td>
<td>10.4</td>
</tr>
<tr>
<td>Several times a week</td>
<td>8.7</td>
<td>11.4</td>
</tr>
<tr>
<td>Several times each day</td>
<td>88.4</td>
<td>22.7</td>
</tr>
<tr>
<td><strong>Statistical packages</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>53.4</td>
<td>49.0</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>24.3</td>
<td>18.6</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>12.6</td>
<td>15.5</td>
</tr>
<tr>
<td>Several times a week</td>
<td>4.9</td>
<td>7.6</td>
</tr>
<tr>
<td>Several times each day</td>
<td>4.9</td>
<td>9.3</td>
</tr>
</tbody>
</table>

Table 9.2D Comparison of computer system applications usage
CHAPTER NINE

COMPARISON ANALYSIS

Tasks

The results of the comparison in the table below show that Saudi staff used computer systems more for accounting/budgeting ($X=11.15$, $df=1$, $P<0.01$) and auditing ($X=20.6$, $df=1$, $P<0.01$), while UK managers used the computers more for communication. This result may be partly due to the higher percentage of research staff in the UK sample.
## Table 9.2E Comparison of tasks usage

<table>
<thead>
<tr>
<th>Variables</th>
<th>UK</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looking for trends</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>36.9</td>
<td>39.8</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>23.3</td>
<td>15.7</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>19.4</td>
<td>21.5</td>
</tr>
<tr>
<td>Several times a week</td>
<td>14.6</td>
<td>14.0</td>
</tr>
<tr>
<td>Several times each day</td>
<td>5.8</td>
<td>9.0</td>
</tr>
<tr>
<td>Analysing problems/alternatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>32.0</td>
<td>35.2</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>13.6</td>
<td>17.5</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>31.1</td>
<td>21.5</td>
</tr>
<tr>
<td>Several times a week</td>
<td>15.5</td>
<td>15.1</td>
</tr>
<tr>
<td>Several times each day</td>
<td>7.8</td>
<td>10.7</td>
</tr>
<tr>
<td>Accounting/budgeting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>44.7</td>
<td>42.6</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>26.2</td>
<td>19.0</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>19.4</td>
<td>14.0</td>
</tr>
<tr>
<td>Several times a week</td>
<td>5.8</td>
<td>13.5</td>
</tr>
<tr>
<td>Several times each day</td>
<td>3.9</td>
<td>11.0</td>
</tr>
<tr>
<td>Making decisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>38.8</td>
<td>39.9</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>17.5</td>
<td>19.0</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>15.5</td>
<td>16.8</td>
</tr>
<tr>
<td>Several times a week</td>
<td>18.4</td>
<td>14.3</td>
</tr>
<tr>
<td>Several times each day</td>
<td>9.7</td>
<td>10.0</td>
</tr>
<tr>
<td>Auditing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>72.8</td>
<td>47.7</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>15.5</td>
<td>13.9</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>7.8</td>
<td>15.1</td>
</tr>
<tr>
<td>Several times a week</td>
<td>2.9</td>
<td>8.6</td>
</tr>
<tr>
<td>Several times each day</td>
<td>1.0</td>
<td>14.7</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>2.9</td>
<td>35.0</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>1.0</td>
<td>9.4</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>3.9</td>
<td>16.4</td>
</tr>
<tr>
<td>Several times a week</td>
<td>11.7</td>
<td>13.2</td>
</tr>
<tr>
<td>Several times each day</td>
<td>80.6</td>
<td>26.1</td>
</tr>
<tr>
<td>Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>18.4</td>
<td>32.3</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>11.7</td>
<td>14.1</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>30.1</td>
<td>21.1</td>
</tr>
<tr>
<td>Several times a week</td>
<td>29.1</td>
<td>18.6</td>
</tr>
<tr>
<td>Several times each day</td>
<td>10.7</td>
<td>13.9</td>
</tr>
<tr>
<td>Controlling/guiding activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>19.4</td>
<td>33.3</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>10.7</td>
<td>13.7</td>
</tr>
<tr>
<td>Once a week to once a month</td>
<td>32.0</td>
<td>19.7</td>
</tr>
<tr>
<td>Several times a week</td>
<td>24.3</td>
<td>16.1</td>
</tr>
<tr>
<td>Several times each day</td>
<td>13.6</td>
<td>17.2</td>
</tr>
</tbody>
</table>
Computer systems’ importance

The comparison of computer systems’ importance in the preceding table shows that there is a high of similarity, but that Saudi managers found it more helpful for their work than the British managers did. For example, Saudi managers were more likely to feel that computers enhanced the ability to take decisions ($X=11.8$, $DF=1$, $P<0.01$), improved the quality of managerial decisions ($X=23.1$, $DF=1$, $P<0.01$) and improved organisational productivity ($X=9.24$, $DF=1$, $P<0.01$). In addition, the proportion saying ‘strongly agree’ is higher for respondents from Saudi Arabia for all the questions asked.
<table>
<thead>
<tr>
<th>Variables</th>
<th>UK  %</th>
<th>SA  %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves my speed of working</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1.9</td>
<td>4.0</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>4.9</td>
<td>3.3</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>28.2</td>
<td>15.4</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>65.0</td>
<td>77.3</td>
</tr>
<tr>
<td>Improves the quality of my work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>3.9</td>
<td>3.2</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>28.2</td>
<td>15.4</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>67.0</td>
<td>78.1</td>
</tr>
<tr>
<td>Makes my work easier to perform</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>2.9</td>
<td>3.5</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>1.0</td>
<td>3.7</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>32.0</td>
<td>16.4</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>64.1</td>
<td>76.4</td>
</tr>
<tr>
<td>Improves my effectiveness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1.9</td>
<td>4.2</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>3.9</td>
<td>5.0</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>35.9</td>
<td>18.6</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>58.3</td>
<td>72.3</td>
</tr>
<tr>
<td>Enhance my ability to take decisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>9.7</td>
<td>9.4</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>28.2</td>
<td>12.9</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>32.0</td>
<td>33.8</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>30.1</td>
<td>43.8</td>
</tr>
<tr>
<td>Without computer I would have too little info</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>9.7</td>
<td>9.4</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>25.2</td>
<td>18.7</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>20.4</td>
<td>26.9</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>44.7</td>
<td>44.9</td>
</tr>
<tr>
<td>Improves the quality of managerial decisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>5.8</td>
<td>5.4</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>29.1</td>
<td>10.1</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>46.6</td>
<td>32.7</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>18.4</td>
<td>51.7</td>
</tr>
<tr>
<td>Helps organisation to provide new services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>6.8</td>
<td>7.6</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>48.5</td>
<td>25.5</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>43.7</td>
<td>63.5</td>
</tr>
<tr>
<td>Enhance communication with external bodies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>3.9</td>
<td>5.8</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>8.7</td>
<td>5.8</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>34.0</td>
<td>24.3</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>53.4</td>
<td>64.1</td>
</tr>
<tr>
<td>Improves organisational productivity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1.0</td>
<td>1.9</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>13.6</td>
<td>4.3</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>43.7</td>
<td>24.5</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>41.7</td>
<td>69.2</td>
</tr>
<tr>
<td>Increasing use of computer is beneficial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1.0</td>
<td>2.8</td>
</tr>
<tr>
<td>Slightly disagree</td>
<td>4.9</td>
<td>4.0</td>
</tr>
<tr>
<td>Slightly agree</td>
<td>27.2</td>
<td>17.3</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>67.0</td>
<td>75.9</td>
</tr>
</tbody>
</table>

Table 9.2F Table comparison of computer systems importance
CHAPTER NINE

COMPARISON ANALYSIS

Significant upgrades and differences noticed

Managers were asked about the last significant upgrade to their computer systems and whether they had noticed any difference after that upgrade. Their responses are shown in the table below.

<table>
<thead>
<tr>
<th>Variables</th>
<th>UK</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Last significant change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I do not know</td>
<td>21.4</td>
<td>24.0</td>
</tr>
<tr>
<td>Less than 2 Years</td>
<td>71.8</td>
<td>49.4</td>
</tr>
<tr>
<td>2-5 Years</td>
<td>6.8</td>
<td>19.3</td>
</tr>
<tr>
<td>More than 5 Years</td>
<td>0.0</td>
<td>7.4</td>
</tr>
<tr>
<td>Differences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Made the system easier to use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>54.4</td>
<td>49.9</td>
</tr>
<tr>
<td>Yes</td>
<td>45.6</td>
<td>50.1</td>
</tr>
<tr>
<td>Improves information provision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>45.6</td>
<td>53.0</td>
</tr>
<tr>
<td>Yes</td>
<td>54.4</td>
<td>47.0</td>
</tr>
<tr>
<td>Lead to higher productivity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>79.6</td>
<td>55.6</td>
</tr>
<tr>
<td>Yes</td>
<td>20.4</td>
<td>44.4</td>
</tr>
<tr>
<td>More power/speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>37.9</td>
<td>44.1</td>
</tr>
<tr>
<td>Yes</td>
<td>62.1</td>
<td>55.9</td>
</tr>
<tr>
<td>Provided more applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>46.6</td>
<td>48.8</td>
</tr>
<tr>
<td>Yes</td>
<td>53.4</td>
<td>51.2</td>
</tr>
</tbody>
</table>

Table 9.2G comparison of significance change

The results indicate that UK computer systems are upgraded more frequently than in Saudi Arabia ($X=19.4$, $DF=1$, $P<0.01$). The proportions of staff noticing differences after the upgrading of the system were similar for UK staff and the Saudi staff, except that more Saudi staff believed that the upgrades led to higher productivity than UK staff ($X=21.4$, $DF=1$, $P<0.01$).
**Support**

The following table compares the use of computer support and advice in Saudi firms and UK firms.

<table>
<thead>
<tr>
<th>Variables</th>
<th>UK</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Manuals and printed aids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>13.6</td>
<td>21.9</td>
</tr>
<tr>
<td>Occasionally</td>
<td>66.0</td>
<td>53.5</td>
</tr>
<tr>
<td>Frequently</td>
<td>20.4</td>
<td>24.5</td>
</tr>
<tr>
<td>On-line aids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>9.7</td>
<td>26.9</td>
</tr>
<tr>
<td>Occasionally</td>
<td>57.3</td>
<td>49.1</td>
</tr>
<tr>
<td>Frequently</td>
<td>33.0</td>
<td>24.0</td>
</tr>
<tr>
<td>A fellow member of staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>1.9</td>
<td>13.9</td>
</tr>
<tr>
<td>Occasionally</td>
<td>45.6</td>
<td>58.4</td>
</tr>
<tr>
<td>Frequently</td>
<td>52.4</td>
<td>27.7</td>
</tr>
<tr>
<td>An in-house computer expert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>2.9</td>
<td>29.5</td>
</tr>
<tr>
<td>Occasionally</td>
<td>52.4</td>
<td>49.8</td>
</tr>
<tr>
<td>Frequently</td>
<td>44.7</td>
<td>20.7</td>
</tr>
<tr>
<td>An in-house training course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>19.4</td>
<td>40.9</td>
</tr>
<tr>
<td>Occasionally</td>
<td>60.2</td>
<td>44.5</td>
</tr>
<tr>
<td>Frequently</td>
<td>20.4</td>
<td>14.6</td>
</tr>
<tr>
<td>An external training course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>53.4</td>
<td>45.4</td>
</tr>
<tr>
<td>Occasionally</td>
<td>38.8</td>
<td>42.6</td>
</tr>
<tr>
<td>Frequently</td>
<td>7.8</td>
<td>12.1</td>
</tr>
<tr>
<td>Friends outside work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>51.5</td>
<td>39.3</td>
</tr>
<tr>
<td>Occasionally</td>
<td>42.7</td>
<td>48.8</td>
</tr>
<tr>
<td>Frequently</td>
<td>5.8</td>
<td>11.9</td>
</tr>
</tbody>
</table>

*Table 9.2H Comparison of support*

The comparison shows that UK staff got more support from on-line services than the Saudi staff did ($X=14.31$, DF=1, P<0.01). More importantly, it is clear that in-house support in UK firms was much stronger than that in Saudi
firms. Thus, UK managers received more assistance from fellow members of staff ($X=11.82$, $DF=1$, $P<0.01$), in-house computer experts ($X=33.04$, $DF=1$, $P<0.01$), and in-house training courses ($X=17.63$, $DF=1$, $P<0.01$). Equally, external support through training courses was more frequent in Saudi firms than in UK firms, as was advice from friends outside work ($X=5.6$, $DF=1$, $P<0.05$).

9.3 Interviews

Computer centres

The comparison (see the table on the next page) shows that there are differences between Saudi Arabia and UK in some areas. The majority of Saudi computer staff were dissatisfied with their present computer systems, while all the UK staff were satisfied. Policy planning was different in the two countries, with Saudi firms having external involvement in their plans while the UK firms did not. All the Saudi interviewees believed that skills were one of the important limiting factors, while only one from the UK believed that skills were a limiting factor. Finally, the Saudi firms were involved in international training programmes, while the UK firms were not.
## CHAPTER NINE

### COMPARISON ANALYSIS

<table>
<thead>
<tr>
<th>Questions</th>
<th>Saudi Arabia</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Computer systems configuration</strong></td>
<td>• Mainframes (8)</td>
<td>• Mainframes (3)</td>
</tr>
<tr>
<td></td>
<td>• PC's (8)</td>
<td>• PC's (3)</td>
</tr>
<tr>
<td></td>
<td>• Networking (8)</td>
<td>• Networking (3)</td>
</tr>
<tr>
<td></td>
<td>• Applications (8)</td>
<td>• Applications (3)</td>
</tr>
<tr>
<td><strong>Number of staff working in Computer department</strong></td>
<td>• Over 30 (8)</td>
<td>• Over 30 (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• One person (1)</td>
</tr>
<tr>
<td><strong>Does the department develop any programs?</strong></td>
<td>• Yes (8)</td>
<td>• Yes (3)</td>
</tr>
<tr>
<td><strong>Are you satisfied with the computer systems?</strong></td>
<td>• Yes (3)</td>
<td>• Yes (3)</td>
</tr>
<tr>
<td></td>
<td>• No (5)</td>
<td></td>
</tr>
<tr>
<td><strong>How is computer systems policy planning currently decided?</strong></td>
<td>• Head management(8)</td>
<td>• Head management(3)</td>
</tr>
<tr>
<td></td>
<td>• Mid-management (5)</td>
<td>• IT department (3)</td>
</tr>
<tr>
<td></td>
<td>• Low management (5)</td>
<td>• Recommendation from dower down (1)</td>
</tr>
<tr>
<td></td>
<td>• Computer centre (8)</td>
<td>• ISSC committee (1)</td>
</tr>
<tr>
<td></td>
<td>• IT development committee (5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Consult International IT company (8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Consult National IT company (8)</td>
<td></td>
</tr>
<tr>
<td><strong>Do you know what sort of plan is being made?</strong></td>
<td>• Yes (8)</td>
<td>• Yes (3)</td>
</tr>
<tr>
<td><strong>Limiting factors</strong></td>
<td>• Money (8)</td>
<td>• Money (3)</td>
</tr>
<tr>
<td></td>
<td>• Skills (8)</td>
<td>• Skills (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Technical feasibility (1)</td>
</tr>
<tr>
<td><strong>How do you encourage staff to use the computer systems?</strong></td>
<td>• Documentation (8)</td>
<td>• Documentation (3)</td>
</tr>
<tr>
<td></td>
<td>• Training courses inside (8)</td>
<td>• Training courses inside (3)</td>
</tr>
<tr>
<td></td>
<td>• Training inside by outside company (8)</td>
<td>• Training inside by outside company (3)</td>
</tr>
<tr>
<td></td>
<td>• Training courses outside(national and international) (8)</td>
<td></td>
</tr>
</tbody>
</table>
Managers

The comparisons indicate that there are some differences between Saudi Arabia and the UK. The Saudi staff had less computer experience than the UK staff. (This difference in experience may relate, in part, to the type of company). Saudi managers found the computer system more important for their work and more helpful for making decisions than the British managers did. At the same time, the result of the comparison shows that Saudi staff were less satisfied with their current computer system than the UK staff were. UK staff knew about computer system plans for the future in more detail than the Saudi staff did, and the committee structure for making these plans was different. Saudi firms, for example, had external involvement in their planning. All the Saudi managers believed that skills and training were limiting factors, while only one of the UK staff did. However, all the respondents from both Saudi Arabia and the UK believed money to be the most important limiting factor. Finally, the Saudi staff had international training, while the UK staff did not. These differences will be discussed again in chapter ten.
The following table compares the responses from interviews of managers in Saudi Arabia and the UK.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Saudi Arabia</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer systems experience.</td>
<td>- Over 10 Yr. (8)</td>
<td>- Over 10 Yr. (7)</td>
</tr>
<tr>
<td></td>
<td>- Less than 10 yr. (11)</td>
<td>- Less than 10 Yr. (2)</td>
</tr>
<tr>
<td>The importance of computer systems</td>
<td>- Very important (19)</td>
<td>- Very important (6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Important (3)</td>
</tr>
<tr>
<td>Helps in making decisions.</td>
<td>- Very helpful (19)</td>
<td>- Helpful (9)</td>
</tr>
<tr>
<td>The extent of use</td>
<td>- Several times each day (19)</td>
<td>- Several times each day</td>
</tr>
<tr>
<td>The satisfaction of the computer</td>
<td>- Satisfied (11)</td>
<td>- Satisfied (9)</td>
</tr>
<tr>
<td>systems.</td>
<td>- dissatisfied (8)</td>
<td></td>
</tr>
<tr>
<td>Computer systems policy/planning.</td>
<td>- H. management (19)</td>
<td>- H. Management (9)</td>
</tr>
<tr>
<td></td>
<td>- Computer Dep. (19)</td>
<td>- IT dep. (9)</td>
</tr>
<tr>
<td></td>
<td>- Committee (8)</td>
<td>- ISS Committee (6)</td>
</tr>
<tr>
<td></td>
<td>- IT consultant (8)</td>
<td></td>
</tr>
<tr>
<td>Plans for future.</td>
<td>- Partially (19)</td>
<td>- Yes (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Partially (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No (2)</td>
</tr>
<tr>
<td>Limiting factors.</td>
<td>- Money (19)</td>
<td>- Money (9)</td>
</tr>
<tr>
<td></td>
<td>- Skills (19)</td>
<td>- Flexibility (1)</td>
</tr>
<tr>
<td></td>
<td>- Training (19)</td>
<td>- Training (1)</td>
</tr>
<tr>
<td>Training.</td>
<td>- Training courses in-house (19)</td>
<td>- Training courses in-house (9)</td>
</tr>
<tr>
<td></td>
<td>- Training courses in-house by external (19)</td>
<td>Training courses in-house by external (7)</td>
</tr>
</tbody>
</table>
Chapter Ten

Discussion and conclusion

10.1 Introduction

In this chapter, the results from the analysis of the data collected in Saudi Arabia and the UK are discussed in the light of the original objectives of the study. Five main sections are included in this chapter. The first covers the results of the questionnaires from both Saudi Arabia and the UK. The second covers the results of the interviews, again in both Saudi Arabia and the UK. The third provides a comparative analysis of the two countries. The fourth compares the findings of the study with previous research. The final section provides a general conclusion to the whole work, together with recommendations.
10.2 Saudi Arabian questionnaire

10.2.1 Background

The majority of the managers included in this study were junior managers, while a small number of respondents were secretaries. This is certainly due to the sample that was chosen, taking into consideration the aims and the objectives of the study, which aimed to look at the use of CBIS by managers (see chapter 1). It can be seen that junior managers account for the largest percentage of managers within a company, and are involved in CBIS use more than managers at a higher level (chapter 4).

Although all the departments use CBIS for their work, the finance department uses it more than the other departments. This is because that department is dependent on computer systems for most of its activities. There are departmental differences between the oil companies and banks, but the finance department always appears in all the different organisations. However, the frequency of usage does depend heavily on the departmental activities. The majority of managers were young, probably because the majority of the Saudi population is young.

Most managers had less than ten years computer experience. This is due to the fact that computer systems are still a relatively recent innovation not only in organisations in Saudi Arabia, but in Saudi Arabia as a whole.
(see chapter 3): it is not due to the relative youth of the sample. About
quarter of respondents had had more than ten years of computer
experience; the majority of these were bank employees. This is due to the
fact that banks were early users of IT, and their managers use computers
more frequently than others, depending on them for most of their tasks.
However, more computer experience generally would lead to both the
managers and the companies gaining more benefits from the use of CBIS.
The majority of the managers represented in this study were educated up
to graduate degree level. This can be related to recent developments in
educational opportunities within Saudi Arabia, which now provides free
education up to, and including higher education (see chapter 2). However,
there is a shortage of postgraduate degrees available in Saudi Arabia, so
most organisations send some of their staff to study for postgraduate
degrees overseas, particularly in places such as the UK and the USA.

The results show that most of the managers in the sample were male. This
reflects the fact that the majority of the staff in the business organisations
studied were male, although there were a few females working as
secretaries. This is because Saudi customs, and Islamic rules discourage
men and women from working together in the same place. In some
instances, there are separate gender-specific parts of organisations, for
example there are some female-only bank branches.
CHAPTER TEN  DISCUSSION AND CONCLUSION

There is now a need for the Saudi organisations to concentrate on the development of IT, in order to keep pace with the rapid changes that are taking place in IT throughout the world. It would appear that, currently, most commercial networking only exists within the specific company site: some companies do not even have networking between the company’s branches. This is because networking is still a relatively recent innovation throughout Saudi Arabia, including in business organisations.

Most of the managers had access to the firm’s computer system within their offices, also had access to the network, and handled their systems by themselves. This reflects the fact that the Saudi Arabian economy and the organisations examined are both quite healthy (see chapters 2 and 3). As a result, the organisations have been able to supply their staff with their own terminals. It appears that all the organisations have realised the potential benefits of the use of a computer system. In banks, it is recognised as essential for all bank managers to access the computer systems, since they use them heavily and are entirely dependent on them.

Most of the managers handled their own systems, because most were junior managers and had no secretary to do the job for them. It was found that almost all Saudi managers were willing to use computer systems
directly for their work, and perceived then as being valuable for their activities.

The results of this study showed that most of the managers wished to obtain more benefit from their use of CBIS, but felt that more networking development was needed. However, this can be stated in a more positive way: once Saudi firms become aware of new CBIS and networking, they tend to use them as possible. The limiting factor is more often skills than money. This suggests that the CBIS infrastructure needs to be developed further incorporating plans for the development of human skills to match the rapid change of IT that is taking place currently.

10.2.2 Managers and their systems

Most of the managers found that computer systems were easy to learn and easy to use. A very high proportion of the respondents reported they had found the computer systems easy in these respects, useful in their work, and that they had encountered no major difficulty in acquiring the necessary skills. This might be linked to the fact that most of the managers were educated and were likely to have had previous exposure to the computers in higher education. In addition, recent technology is more user-friendly, and has proved to be easier to learn and use. The managers are well motivated because they have found that the computer
systems are helpful for them in carrying out their work. Ease of use and ease of learning appeared to be equally important to Saudi firms for gaining the maximum benefits from CBIS for their work. It might be expected that upgrading the computer system should lead to increased ease of use and ease of learning.

It is clear that managers perceived CBIS as being valuable for their work in oil companies, banks and other companies. Managers who found CBIS easy to use and learn also tended to be satisfied with the CBIS. This was especially the case because CBIS helped to them to increase their speed of working. Because the managers found CBIS increasingly easy to use and helpful, this resulted in them using the CBIS for a greater range of work activities, which further increased the value of the CBIS for both the manager and the company. In addition, each input of new technology with improved quality of systems helped with the ease of use, etc, and so encouraged managers to use the systems and to increase their own usefulness for work purposes.

10.2.3 Usage of CBIS

The results show that most managers used a variety of computer applications for a range of tasks. However, it appears that word-processing and spreadsheets were more used than other applications. The
high use of word-processing may be due, in part, to the lack of secretaries. But it is also true that word-processing and spreadsheets are major office applications (see chapter 4) used by most of the managers for many different office activities in their daily work. The results show that internal databases are used more than external databases. This may be because of the existence of internal networking, and lack of external networking. This would support the previous conclusion about the shortage of networking available to Saudi firms. However, there is another possibility, which is that the policy of the companies is to protect confidential information, thus not much external communication is allowed. On balance, the interviews suggest that further developments are much needed, and would help to increase work performance and effectiveness. The graphics and statistics applications and other applications were much less used. This is due to the nature of the managers' work, these specialist applications are required for activities in particular departments.

A high level of use of CBIS and its applications leads to a higher levels of satisfaction, which, in turn, seems to encourage managers to use even more applications. In addition, the use of CBIS applications is correlated with satisfaction with the use of CBIS for decision-making. It must be noted that there are detailed differences in the use of CBIS applications in oil companies, and banks, mainly because of their different activities. For
example, banks obviously make more use of monetary system applications.

10.2.4 Employment of CBIS

It was found that Saudi managers used CBIS for a range of different tasks, but the amount of usage varied with the nature of the managers’ jobs and their work activities. The managers are now using computer systems for an increasing number of different jobs and tasks due to the improvement in, and the increased power provided by IT. In making the work easier to carry out, this has led to an increasing degree of dependence on computer systems for a number of tasks (see chapters 1 and 4). Managers from all sectors of a company use CBIS mainly to increase their efficiency and improve the quality of their work performance. For example, managers are increasingly using computer systems to help them in decision making. Because there is a basic similarity in managerial tasks, whether the company involved, the overall employment of CBIS in all such organisations as banks and oil companies was very similar. However, there were some differences in the use of CBIS in these organisations, probably because of the different strategies they were following.
It can be concluded that Saudi managers were willing to use computer systems, and they found them beneficial for their daily working activities. However, they felt that further CBIS development is needed, more especially in terms of networking and upgrading the systems. CBIS now affects managers’ daily working activities, and so is affecting tactical, as well as strategic decision-making by managers. One interesting result is that this general open-mindedness towards CBIS applied to managers who used the systems at all. It was not necessary to be a frequent user in order to appreciate the value of CBIS, but it was necessary to have had some experience.

10.2.5 Impact of CBIS

The majority of managers found that computer systems had had an impact on their work. For example, a high proportion found that it had improved their speed of working and the quality of their work. The majority of managers also believed that the CBIS had had an impact on the organisation and its activities. Again, this impact was noted by all managers who used CBIS, whether the use was frequent or not.

It can be concluded that CBIS have had an impact on both the individual and the organisation. For the former, information is provided more easily and CBIS have increased performance and effectiveness. For the latter,
the positive impact on the managers has had an impact on the organisation as well. This is due to the beneficial uses of CBIS in handling business information and in the development of IT in business organisations. CBIS are also necessary because the nature of work in business organisations has reached a high level of complexity for a majority of managerial jobs nowadays. Thus, banks would not survive without CBIS, not only for their internal needs, but also because, through them, they are connected to the rest of the world banks services. It can be seen from the above that CBIS have had a positive impact on business organisations.

10.2.6 Infrastructure and support facilities

The results show that about half of the managers reported that their computer system had been changed or upgraded within the previous two years. Similarly, about half of the respondents found that the change had made a significant difference to their work. Thus, changing and upgrading computer systems is generally seen as leading to further work improvements, regardless of how long ago the change had taken place. This is typically because of the increased power of the IT and the wider applicability (see chapter 1 and 4). For example, the growing speed of computer systems helps managers in increasing the speed with which
they work. Saudi managers therefore thought that further and more frequent upgrading or changing was desirable for the organisation.

In a modern society, which is characterised by rapid technological change, training plays a vital role in adapting the capabilities of a workforce so that successful economic development can take place. The presence of skilled staff is a key area in which developing countries lag behind. This often prevents them from implementing technological change. Computers have now become an essential part of the modern world, and this comment is particularly true of them in the case in developing countries.

The majority of managers obtained assistance and support from the organisation in a variety of ways. However, the results show that in-house assistance was most used by managers. This is due to the fact that in-house assistance is typically more supportive and useful, since the exact nature of the work and the specific need for assistance are known (see chapter 4). It is also more cost-effective for the company to carry out most of its assistance in-house. External support was still required because of a shortage of in-house assistance to help with particular needs.

It seems that infrastructural and support differences affect managerial use of CBIS. It can concluded from the data presented previously that good
support correlates with ease of usage and high usage of CBIS. This suggests that more assistance would help Saudi managers to use CBIS and to gain more satisfaction. Furthermore, increasing assistance when upgrading the computer systems would help banks, oil companies and others to improve the efficiency and quality of their working.

10.3 UK questionnaire

10.3.1 Background

The results show that the majority of managers were junior managers, which corresponds to the balance usually found in the UK firms. It appears that junior managers are more involved in the use of computer systems. All departments use CBIS for their work, but there is a particularly high level of involvement in research. This is reflected in the usage by researchers in each department, as well as in the research departments in the business organisations. Managers had a good level of computer experience, because of the higher level of IT experience in UK. The majority of respondents were holders of undergraduate degrees, but there were a good percentage of postgraduate degree holders, many of them involved in research activities. The results show that there was a ratio of two men to each woman in the organisations, though all the secretarial positions were held by women. This reflects the position found
in many firms in the UK. The results show that a quarter of the respondents were aged over 46 years which is older average than in Saudi Arabia, but again quite typical in the UK.

Almost all managers had a computer on their desks, and had access to networking. This reflects the high level of technology in UK business organisations. It seems that UK managers handle their systems by themselves, but, in this case, it seems not purely done to a lack of secretaries.

It can be concluded that UK staff have a wider range CBIS experience. Similarly, UK firms provided their staffs with an extensive range of different CBIS configurations in their offices.

10.3.2 Managers and their systems

The majority of managers found that computer systems were easy to learn and easy to use. This is because the new technologies were becoming increasingly user-friendly, the majority of managers were well-educated, and they had a significant amount of computer experience.

Managers generally found the computer system helpful for their work. However, though they regarded it essential for their work, many of them
had doubts about their satisfaction with the use of the computer system. They questioned whether the systems provided all the facilities required, whether the information was up-to-date, and whether the output was presented in a useful way. They stated that they wanted more frequently updated information and of better quality: further development of the system was needed to improve the managers' level of satisfaction.

It can be concluded that UK managers found the CBIS was easy to use and learn, and valuable for their work. It can also be concluded that UK managers had a good level experience, and knew how CBIS should be used to support their work, and the value of it for their work. The same conclusion concerning ease of use was drawn previously in the case of Saudi Arabia. However, it seems that UK managers had higher expectations and were therefore more critical.

10.3.3 Usage of CBIS

The results show that the majority of managers used a variety of different CBIS applications though with different frequencies. The results indicate a high use of office applications, such as word-processing and spreadsheets. There was also a fairly high use of graphics applications, and almost all of the managers used electronic mail frequently. The UK firms all had good internal and external networking. It seems that the
managers benefited from the availability of both types. However, despite these technological differences between the UK and Saudi Arabia, managers from both countries found it more flexible to use print-outs for extensive reading, rather than reading on screen.

10.3.4 Employment of CBIS

UK managers use CBIS for a wide range of tasks and with widely differing frequencies of usage. However, almost all managers used computer systems for communication. This included, for example, public relations and related communications tasks, which involve communicating with external bodies. This again reflects the high level of external networking that is in use within UK business organisations. Internally, most managers use the CBIS as an important aid to their decision making.

10.3.5 CBIS impacts

The majority of managers reported that computer systems had an impact on their work. There was appreciably more doubt whether the ability of computer systems to enhance decision making was adequate, and also whether they were able to supply extra essential information. This reflects the good level of experience of the UK managers with computer systems,
ensuring that they knew what the computer systems could offer. Overall, managers found that computer systems were helpful with carrying out their work, improving both the speed of working and the quality.

The majority of managers reported that computer systems had a range of impacts on organisational performance and activities. However, this was more likely to be a quantitative effect than a qualitative one, i.e. the systems increased the throughput of work, rather than the quality of work. It can be concluded, nevertheless, that use of computer systems is valuable for the individual, and this in turn is good for the organisation. Computer systems appear to improve the efficiency and effectiveness of working regardless of the actual amount of usage by managers. In general, the managers were happy with the role of CBIS, but they emphasised the need for up-to-date of both the system and of the information it conveyed.

10.3.6 Infrastructure and support facilities

The results show that the majority of the managers reported that their computer systems had been changed or upgraded within the previous two years. Several reported that the change had made a significant difference to their work, especially leading to higher productivity and more
It appears that such changes in the computer systems were thought to have led to improvements however long ago they occurred.

The majority of managers reported that they sought assistance in their work. All types of in-house assistance seemed to be used by most managers, whereas external forms of support were not very well used. This may be attributed to the good in-house assistance provided by the organisations.

It can be concluded that the UK firms had upgrading of their systems and provision of assistance to users well-organised. Changes and upgrades were recognised as leading to further increases in productivity. The provision of assistance had a significant value for encouraging the use of particular applications, regardless of the frequency with which each particular application was to be used.

10.4 Saudi Arabia interview

10.4.1 Computer centre managers

As discussed in chapter eight, computer centre managers were interviewed to find what support they offered to managers. The computer centres had different computer configurations, but all included
mainframes, PCs, networking, and applications software. The centres were involved in a range of activities, such as computer operation, maintenance and training.

Some of the computer centre managers were satisfied with the present computer systems for management because they did the present job acceptably for management purposes. However, others were dissatisfied, especially because of poor networking. It can be concluded that, looking to the future, all would agree that more improvement and upgrading is needed to the computer systems, especially in terms of networking.

For banks, specifically the bank were especially dissatisfied with the poor networking. They wished to be more aware of competitors' marketing, and have better connections with their own headquarters. At present, they only have monetary systems networking, partly of unresolved issues of confidentiality. This suggests that more advance networking is needed, to allow managers to communicate with each other when necessary.

The organisations typically have a committee for changing and upgrading the computer systems. In addition, for major changes in hardware and software, the organisations consult external bodies, either national or international. This was due to their lack of experience in the sphere of IT.
There tended to be differences in committees for planning in banks and oil companies, apparently because of the different strategies and needs.

All managers were familiar with future plans for development, primarily because of the involvement of their departments in the IT development committee of the organisation. Managers uniformly reported that the limiting factors for making major changes were money and skills. It was concluded that well qualified and skilled staff were needed to operate the increasingly sophisticated systems. This suggests that more training is needed before new systems are introduced (see chapter 4). In addition, all organisations were making plans for the year 2000, to get ready for the new century in the same way as the rest of the world.

Computer centres provide different levels of assistance using both internal and external sources. However, all the managers considered that in-house assistance was the most helpful support to offer, because it can be directly related to the work. External assistance was when there was a shortage of qualified assistance in the organisation.

10.4.2 Managers in the organisation

As discussed before in chapter eight, managers in different departments and at different levels of management were interviewed. Bank managers
had more computer experience than oil managers due to the fact that banks have depended on computer systems more heavily, and for longer, than oil companies. Managers reported that the CBIS were very important in helping them to carry out their work. CBIS led to a better quality of working and greater speed. Managers reported that CBIS were very helpful for decision making, because they provided all the information needed for making decisions quickly. Managers made use of the computer system many times each day in carrying out their daily working activities. As has been noted before, CBIS are more important for the banks, than for other business organisations.

The majority of managers were satisfied with their existing computer systems because they answered their present needs, except for in adequate networking. They nevertheless felt that managers needed more advanced systems, as well as much better networking, in order to enhance future management activities. Managers had some idea what sort of plans were set for the future, often because of the involvement of colleagues in the IT committee, and they expected improvements to be made. However, they believed that knowledgeable and skilled employees were more important than money for CBIS development.

All managers acknowledged access to assistance, either internally or externally. They regarded internal assistance as more useful, because the
in-house trainers were familiar with the skills of the staff, and were aware of exactly what was needed to improve their skills.

10.5 UK interviews

10.5.1 Computer centre managers

As discussed in chapter eight, computer centre managers were interviewed to find out what support they offered to managers. All managers were satisfied with their present computer systems: there had been many recent changes, and worked the systems well for their current needs, including networking. The organisations were all planning for upgrading or changing the computer systems, in order to keep up with other companies and to develop their own activities. Furthermore, managers were familiar with their company's future plans for computer systems, as their departments were involved in the planning. However, the limiting factor for making changes was money. To some extent, skills were also considered to be an important factor. To encourage staff to use the available computer systems, the computer centres offered extensive in-house assistance. Due to the good level of experience of UK firms with IT, it was rarely necessary to appeal to external aid.
10.5.2 Managers

As discussed before, in chapter eight, managers in different departments and at different levels of management were interviewed. Managers considered that CBIS were very important for their work as they helped them to do their work. They used computer systems for the majority of their job activities. The systems were helpful in making decisions, because they provided good quality information, very quick access to information, and easy handling. Managers typically used computer systems several times each day, not least to help them in the organisation of their work.

All managers were satisfied with the present computer systems, because they provided the needed information, and did their job well. Despite this, problems could occur, such as the network crashing or applications software problems. All the firms were planning for future changes, and most of the managers knew in some details what sorts of plans, were set for the future. Managers were involved in the plans or they might have been asked about their needs for systems. The policy was always to keep the company up with the state of the art. Managers considered the limiting factor to be money, though some thought training and flexibility of the systems were other restricting factors.
Managers were given in-house assistance as needed. They rarely required any other aid due to the long experience of the firms in IT, which enabled them to provide their assistance internally.

10.6 Comparison of Saudi Arabia and UK

In both Saudi Arabia and the UK, there was an awareness and use of CBIS. Furthermore, the responses in both Saudi Arabia and the UK suggest that once a firm becomes aware of CBIS, it tends to use them more and more. This implies that all firms had an awareness of the potential benefits of CBIS for both the managers and the organisations. However, there are differences between Saudi Arabia and the UK in terms of use of, and satisfaction with CBIS.

The results indicated that there were differences between the backgrounds of managers in Saudi Arabia and the UK. For example, those in the UK had more computer experience than those in Saudi Arabia and there was a greater availability of computer systems for the UK managers. These factors could be a result of the fact that Saudi Arabia is a developing country, and has only started developing and using computer systems recently; as compared with the UK, which is a developed country and has longer use of, and more advanced IT.
UK managers found computer systems were easier to use and learn than Saudi managers did, in line with the higher level of experience they had. In addition, UK managers used computer applications more than Saudi managers did, especially in the areas of word processing and electronic mail. It appears that UK managers were also somewhat more likely to carry out their own tasks than Saudi managers. UK managers used computers for communication considerably more than Saudi managers. This must be related, in part, to the fact that the UK has a more advanced networking system than Saudi Arabia.

Saudi managers found that computer systems were more helpful for their work than UK managers. This is probably due to the fact that Saudi managers often had to work manually until recently. Consequently, they have noticed a big difference with the introduction of CBIS. UK managers have been accustomed to using computer systems for some time, and have more computer experience. They therefore seem to have a clear understanding of how the CBIS may be used to support their work, and consequently have higher expectations.

UK firms upgraded their systems more frequently than the Saudi firms. The reason for this seems to be that the UK managers were using more advanced computer applications than Saudi managers, and these new applications were consequently demanding more speed, storage and
computation power. In-house assistance was more common in UK firms than in Saudi firms, while external assistance was more frequent in Saudi firms than in the UK firms. This again reflects the fact that UK firms were more experienced in IT than the Saudi firms.

The responses indicate that Saudi firms encounter more problems than British firms with CBIS. These problems included such factors as networking, staff skills, the development of CBIS, and training. This suggests that the Saudi firms need to concentrate on solving these kinds of problems if they are to satisfy fully their managerial and organisational needs. The only problem for UK firms seems to be with the frequency of updating information, and the quality of the output.

The results of this study suggest that current CBIS in Saudi Arabia may be sufficient in terms of number and range of tasks for the existing demands of management activities. However, the results indicate more development is needed to increase the level satisfaction for both individuals and organisations. The UK firms and managers were generally more satisfied with their integration of CBIS into the firm than Saudi firms and managers were.

It can be concluded that the overall difference between the UK and Saudi Arabia in their usage of CBIS was the following. The UK firms and
managers had more advanced CBIS, infrastructure and training support. This led to better usage and satisfaction. However, Saudi managers thought CBIS were of greater importance than the UK managers did: a reflection of the more routine status that such systems now had in the UK firms.

10.7 Study findings and previous research

The literature review, chapter four, included some points which are related to the present study. The summary in that chapter has been compared with the findings of this study. This suggests the following as regards best practice in the use of CBIS and differences in the usage of IT.

Organisational support

Some of the study findings confirm what was described earlier in the literature review. The present results and the literature review show that the organisation plays an important role in supporting managers in their use of computer systems. The benefits of this information support for managers include increased motivation and better use, timely availability of information, the ability to analyse business problems more thoroughly, and increased personal productivity. Computer centres play a major role in supporting managers, standardising hardware and software, providing
training, technical support, consulting support, assistance, and satisfying the demands of managers.

The results of the study also extend earlier studies in emphasising factors relating to support and assistance. For example, they have shown that the strength of internal assistance and training is an indicator of the ability of a firm to cope with new CBIS. This suggests that large firms should seek to be as self-sufficient as possible in their staff support. Correspondingly, the current level of the computer centre support in Saudi Arabia organisations is not good enough. This difference, based in part on a lack of skills, seems likely to affect most developing countries.

**Information technology and the manager**

All the points summarised in the literature review on the value of IT for managers are supported by the present results. The managers believed that the computer system had an important role to play in helping individuals and organisations with their work. The computer systems have provided essential support for decision making from their introduction, suggesting that, despite the problems, developing countries should introduce them as soon as possible. The results of the study indicate that Saudi managers used word-processing and spreadsheet more than other applications, while UK managers used communication more. This bias in usage, dependent on the facilities available, has been mentioned, but not thoroughly tackled in the
literature. It clearly emphasises the importance of networking for commercial organisations.

User satisfaction

With regard to satisfaction, the results again agree with the points listed in the literature review. Managers were satisfied when using computer systems, because they increased productivity, effectiveness, information provided to support management, sharing with others, and the speed of management operations. But the results indicated problems with satisfaction in Saudi Arabian business organisations due to the lack of networking. Correspondingly, satisfaction with the computer systems when evaluating tasks such as analysing problems, accounting and planning, was offset problems with communication tasks.

Information technology impact

The results and literature review agree in terms of the overall impact that CBIS has had on individuals and organisations. Managers mainly use computer systems as tools to improve their job performance and productivity. Computer systems support managers' work activities and productivity, and have increased the speed of work and capacity of the organisation to process information. The overall impact has clearly been positive, again underlining the need for firms in developing countries to introduce CBIS at the earliest opportunity. Moreover, the result has been to
allows the same number of managers to do more work. This is another point that has not been thoroughly explored in the literature. Where a developing country is short of managerial personnel—as in Saudi Arabia—the introduction of CBIS allows further expansion.

The literature review indicated that the critical factors affecting the lack of success of CBIS are poor infrastructure, lack of foreign exchange to buy spare parts, poor supplier services, lack of education and training facilities, (and, therefore, lack of skilled personnel), and lack of management commitment and co-operation. The present results suggest that, for a country like Saudi Arabia, scarcity of knowledge and training are more critical factors for the success of CBIS than has previously been acknowledged.

Summary

It can be concluded that there is general agreement between the present results and these summarised in the literature review in chapter four. The computer centre and organisational support plays an important role in encouraging managers to use computer systems. The benefits of this support to managers include increased motivation, better use and increased productivity. Managers were satisfied when using computer systems which increased productivity, effectiveness, information provided to management information, sharing with others, and speed of management operations.
CHAPTER TEN DISCUSSION AND CONCLUSION

Computer systems are therefore playing an important role in helping individuals and organisations with their work both developed and developing countries.

10.8 Appropriateness of the approach used

It is reasonable finally to go back and consider the methodology adopted for the present research. As noted earlier, the aims and objectives for this project determined that a quantitative approach would have to dominate. A qualitative element was added in order to explore less clearly defined questions (such as policy decisions). It would have been possible to have used a rather different framework for asking these questions. For example, the review of previous work mentioned a study for Chervany, Dickson and Kózar (1972) which used a rather different set of variables from those employed here. An examination of their variables suggests, however, that the actual questions asked in this survey might not have changed a great deal. In any case, the Delone and Mclean model (1992) was selected as a basis specifically because it represents a careful analysis and selection of the most appropriate variables for the present type of investigation.

Hence, the main question is whether the approach depicted in the modified model used in the present study (Figure 5.2) satisfactorily
represents the situation actually found as a result of the survey. The main assumptions in that model are that (1) the four variables (individual characteristics, support characteristics, systems quality, information quality) affect both CBIS use and the managers' level of satisfaction; (2) the cumulative impact on individuals represents the impact on the organisation. The first assumption seems to be supported by the good level of correlation that was found between usage and satisfaction. However, there were indications that this correlation was less good at the level of the individual variables. For example, there was adverse comment on the information quality that was not reflected in terms of use. The second assumption seems to be supported by the similarity between the factors that were seen as positive for individual use and satisfaction, and those seen as positive for organisational benefit. This level of acceptability may depend on the fact that CBIS in Saudi Arabia had not advanced much beyond straightforward automation of some managerial activities. The link between CBIS and increased productivity and efficiency was therefore evident. In more advanced forms of CBIS, this link is often more subtle, and so the modelled interaction between use and satisfaction, along with the use of the same set of variables for both, might well require a more sophisticated approach. However, it can be concluded that the methodology and model employed here seem, on the basis of the results obtained, to have been adequate.
10.9 Conclusions and recommendation

The model used in this dissertation to examine the uses of CBIS helped tackle unclear problems relating to organisational use of CBIS. The methods of investigation which it suggested—such as interviews and questionnaires—were sufficient for this study and relevant to the investigation of the uses of CBIS by managers.

The results have shown there was a high use of CBIS by managers in both Saudi Arabia and the UK. CBIS were perceived as being very important for their work and for all their organisations. Managers used a variety of applications, and used CBIS in different companies for different tasks. CBIS proved to be valuable in supporting managerial work and the organisation as a whole. Managers and organisations found CBIS beneficial and helpful for most of their jobs, and for most of the firm’s requirements. Computer systems and applications have improved performance of a range of different tasks. The efficiency and effectiveness of decision-making is correlated with improved use of CBIS, regardless of how often they were used. The Computer Centre played an important role in supporting managers’ use of CBIS, and most managers found that CBIS were easy to use and learn.

However, the results have shown that there was a certain lack of awareness and development of CBIS in business organisations in Saudi
Arabia. The same is true, though to a much lesser extent, in the UK. In the use of CBIS and CBIS development, Saudi Arabia business organisations suffer from a number of problems. It has become clear from this study that any use of CBIS, even if infrequent, assists managers and considerably affects their thinking about computer systems. It is therefore desirable that all Saudi managers should be encouraged to make occasional use of CBIS,

There is, in particular, a problem with the training programmes, because most Saudi Arabian business organisations still use appreciable external training. The managers were still facing problems, especially that they were not aware of certain applications. Correspondingly, it can be recommended that the government and the organisations should concentrate on training programme development. It may be that one or more IT centres of a very high standard could be developed for training, consultancy and support, with highly knowledgeable staff. Such a centre(s) could serve and assist private and public companies with regard to their IT development.

Lack of training and experience of IT means that there is a still problem with skills. It appears that knowledge is scarcer than money in the development of computer systems in Saudi Arabia. It is recommended that organisations should try to provide good quality training and
assistance before any major updating of CBIS, or the installation of any new systems. Support by designated staff would be preferable, because they understand precisely what the manager needs. However, the government and the organisations might facilitate some kind of interaction between Saudi universities and business organisations to help transfer expertise and information related to Saudi requirements. It would also be helpful to develop staff IT knowledge by organised contact with overseas expertise, as with UK business companies and UK universities.

The poor networking remains a problem. It can be recommended that the Saudi government concentrates on developing the infrastructure of the networking in Saudi Arabia, and especially developing and supporting access to the Internet. This would help all bodies to gain maximum benefit from external and marketing information. It would also help all managers to maintain their skills and keep up-to-date with developments. In addition, business organisations should develop proper Intranets for their companies. This would help to integrate internal and external information, which should help to further increase work performance and effectiveness.

The quality of the systems, in the presence of continuing change, still appears to be a problem. More frequent upgrading of the computer systems for managers would help them to use CBIS better, and would
further increase their ease of use and ease of learning. Obviously, companies should upgrade the CBIS for managers frequently to keep up with the rapid changing IT. There is a need here for the Saudi government and business organisations to establish methods of evaluating the IT development and services they provide: particularly in terms of user needs, user satisfaction and performance measurement criteria.

The above mentioned problems need to be considered by the Saudi government and organisations if the IT infrastructure in Saudi Arabia is to be improved.

It was found that the UK managers were not happy with output quality and up-to-date information. The improvement of these would help managers improve their job quality, work performance and effectiveness. At present, organisations seem to have no standard way of evaluating the quality of information, or for planning the development of IT. This suggests that more theory might usefully be applied to helping business organisations on these points.

The results of this study lead to the conclusion that there are differences between firms in their use of CBIS which depend on certain characteristics of the firm (see chapter 9). Similarly, there are differences between managers in their use of CBIS, which depend on certain
characteristics of the managers. The results, as a whole, show that there are differences between Saudi Arabia and the UK in their use of CBIS (which depend on certain characteristics such as IT experience, skills, and type of firms). Such micro and macro-differences must be taken into account when trying to try and transfer CBIS expertise from one group to another.

Recommendations summary

- It is suggested that the Saudi government should consider the need to develop IT centres of a very high standard for training, consultant and support, with highly knowledgeable staff.
- It is recommended that good quality training and assistance should always be provided by firms before the installation of any new system.
- It is recommended that there should be some kind of interaction between Saudi universities and business organisations in order to exchange expertise.
- The government should concentrate on developing the networking infrastructure in Saudi Arabia, including developing and supporting access to the Internet.
- It is recommended that companies should develop properly planned Intranets.
- It is suggested that companies should try to upgrade the CBIS for managers frequently.
It is recommended that companies should try to establish methods of evaluating the IT development and services they provide, particularly in terms of user needs, user satisfaction and performance measurement criteria.

It can be recommended that problems of output quality and the currency of information should receive further study in the context of business organisations.
Bibliography


Norusis, M. *SPSS for windows base system users guide release 6.0*, Loughborough University.


APPENDICES
Managers interviews Analysis form

Oil [ ] Bank [ ] Code # [ ]

Computer-based Information systems: Experience and Importance

1) For how many years have you been using computer systems?
   0-1 Year [ ] 2-5 Years [ ] 6-10 Years [ ] Over 10 Years [ ]

2) How Important are computer systems for your work?
   Very Important [ ] Important [ ] Not Important [ ] Not very Important [ ]

3) How do they help you in making decisions?
   Very Helpful [ ] Helpful [ ] Not helpful [ ] Not very helpful [ ]

4) To what extent do you use computer systems?
   Not at all [ ] Less than once a month [ ] Once a week to once a month [ ]
   Several times a week [ ] Several times each day [ ]

Computer-based information systems: policy, planning, and funding

1) Are you satisfied with the present computer systems?
   No [ ] Yes [ ] No, with comments [ ]

2) How is computer systems policy/planning currently decided?
   Head management[ ] Middle-management[ ] Lower management[ ]

3) What plans have you for training staff in the use of computer systems?
   Training courses inside [ ]
   Training courses outside [ ]
   Other assistance [ ]

4) Do you know what sort of plans are being made for the future computer systems?
   No [ ] Yes [ ] Partially [ ]

What are the limiting factors (if any)?
   Money[ ] Skills[ ] Manpower[ ] Accommodation[ ] Others[ ]

377
Current status of computer-based information systems:

1) What computer systems configuration is used in the organisation?
- Mainframes [ ]
- PC's [ ]
- Networking [ ]
- Applications [ ]

2) How many staff are working in the department?
- Over 30 [ ]
- Less or equal 30 [ ]

3) Does the department develop any computer system software for the organisation?
- No [ ]
- Yes [ ]

Computer-based information systems: policy, planning, and funding

1) Are you satisfied with the present management/staff computer systems?
- No [ ]
- Yes [ ]
- No, with comments [ ]

2) How is computer systems policy/planning currently decided?
- Head management [ ]
- Middle-management [ ]
- Lower management [ ]

3) Do you know what sort of plans are being made for the future management/staff computer systems?
- No [ ]
- Yes [ ]
- Partially [ ]

What are the limiting factors (if any)?
- Money [ ]
- Skills [ ]
- Manpower [ ]
- Accommodation [ ]
- Others [ ]

Training, Support, Helps

1) How do you encourage managers/staff to use the available computer systems?
- Training courses inside [ ]
- Training courses outside [ ]
- Other assistance [ ]
Computer-Based Information Systems

I am currently registered for a PhD at Loughborough University in order to carry out an investigation into the way computer-based information systems are being used for management purposes. The aim of the study is to compare the application of such systems in this country with their application in Saudi Arabia. British firms may be ahead of most Saudi firms in exploiting these systems, but the comparison should lead to an increasing compatibility between operations in the two countries, and this should benefit both.

As you will know, your company has considerable experience in the use of computer-based information systems. I am most grateful therefore for the opportunity to approach you with a request for a short interview. I understand how busy you are, and am only asking for an interview lasting 15 minutes. This will be aimed primarily at establishing what importance you attach to the use of computer-based information systems, and how you see their development in the firm. Your views will be important whether you currently make considerable use of such systems, or not. Your comments will, of course, be regarded as confidential.

I would also like to ask your permission to circulate a short questionnaire to some of your staff (sample copy attached).

If you do feel you can help me in this way, I should be most grateful, and will contact you in due course to arrange a mutually convenient time.

Alkahtani Mufleh
Background
1. Manager’s position is -------------------

2. Sex:
   Male □  Female □

3. Highest degree attained :
   Ph.D. □  Master/MBA □  BSc/BA □
   Diploma □  Other (specify)-------------------------------------------

4. Age:
   Under 35 □  35-45 □  46-55 □  Over 55 □

An Interview with the Computer Centre/Information Centre

Current status of computer-based information systems:
1) What computer systems configuration is used in the organisation ?
2) How many staff are working in the computer/information department ?
3) Does the department develop any computer system software for the organisation?

Computer-based information systems: policy, planning, and funding
1) Are you satisfied with the present management/staff computer systems?
2) How is computer systems policy/planning currently decided?
3) Do you know what sort of plans are being made for future management/staff computer systems? What are the limiting factors (if any) ?

Training, Support, Helps
1) How do you encourage managers/staff to use the available computer systems?
Background

1. Manager's position is

2. Department / Division
   - Finance
   - Personnel
   - Marketing
   - Information Centre
   - Research
   - Health & Safety
   - Management Service
   - Manufacturing
   - Production
   - Other (specify)

3. Sex:
   - Male
   - Female

4. Highest degree attained:
   - Ph.D.
   - Master/MBA
   - BSc/BA
   - Diploma
   - Other (specify)

5. Age:
   - Under 35
   - 35-45
   - 46-55
   - Over 55

Interview with Manager

15 minutes

Computer-based Information Systems: Experience and Importance

1. For how many years have you been using computer systems?
2. How important are computer systems for your work?
3. How do they help you in making decisions?
4. To what extent do you use computer systems?

Computer-based Information systems: Policy, Planning, and Funding

1. Are you satisfied with the present computer systems?
2. How is computer systems policy/planning currently decided?
3. What plans have you for training staff in the use of computer systems?
4. Do you know what sort of plans are being made for the future? What are the limiting factors (if any)?
Computer-Based Information Systems

As part of my doctoral studies at Loughborough University, I am investigating the way computer-based information systems are being used for management purposes in Saudi Arabian organisations.

As you will know, your organisation has considerable experience in the use of computer-based information systems. The intention is to seek your opinion of these systems (whether they play a major role in your day-to-day activities or not). Please take a few minutes to answer one questionnaire (English or Arabic). I hope you will find it quick and easy to complete. Your responses will, of course, be treated as confidential.

When you have completed the questionnaire, please hand it back to ......................: Since only a limited number are being distributed, it is important that as many as possible are returned.

Thank you very much for your time and your co-operation.

Alkahtani Mufleh
Computer-Based Information Systems

I am currently registered for a PhD at Loughborough University in order to carry out an investigation into the way computer-based information systems are being used for management purposes. The aim of the study is to compare the application of such systems in this country with their application in Saudi Arabia. British firms may be ahead of most Saudi firms in exploiting these systems, but the comparison should lead to an increasing compatibility between operations in the two countries, and this should benefit both.

As you will know, Shell has considerable experience in the use of computer-based information systems. I am most grateful therefore that it has been agreed I can distribute questionnaires to some members of the firm. The intention is to seek your opinion of these systems (whether they play a major role in your day-to-day activities or not). I attach a copy of the questionnaire: I hope you will find it quick and easy to complete. Your responses will, of course, be treated as confidential.

When you have completed the questionnaire, please hand it back to ...............: since only a limited number are being distributed, it is important that as many as possible are returned.

Thank you very much for your time and your co-operation.

Alkahtani Mufleh
**Questionnaire**

Please answer the questions below by ticking the appropriate box
(Please complete the whole of questionnaire)

**Background**

1. What is your position?

2. To which department do you belong?
   - Finance
   - Computer centre
   - Marketing
   - Manufacturing
   - Research
   - Personnel
   - Production
   - Other (specify)

3. For how many years have you been using a computer?
   - 0 - 1 year
   - 2-5 years
   - 6-10 years
   - Over 10 years

4. What is your highest qualification?
   - Ph.D.
   - Master/MBA
   - BSc/BA
   - Diploma
   - Other (specify)

5. What is your gender?
   - Male
   - Female

6. What is your age group?
   - Under 25
   - 25-35
   - 36-45
   - 46-55
   - Over 55

**Assessment of computer-based information systems**

7. Where is your nearest computer terminal?
   - On my desk
   - In my office
   - In my department
   - In the computer centre
   - Elsewhere (specify)

8. What kind of computer do you use?
   - Networked
   - Stand-alone (PC/Mac)
   - Both
   - Neither

9. How do you handle computer-based information systems?
   - By myself
   - Via someone else

384
10. Questions about you and your system

1= Generally true 2= Partly true 3= Not true

Assessment | Generally true | Not true
--- | --- | ---

**Yourself**

- I find it easy to learn how to use computer systems
- I find it easy to use a computer keyboard
- I find it easy to read from a computer screen
- I find it easy to log in and out from a computer
- I find it easy to use computer applications
- I find it easier to use print-outs than on-screen
- I use computer systems outside my workplace

**Your system**

- Computer systems are essential to my work
- I am satisfied with the speed of response of the system
- The system provides all the facilities I expect
- The information is up-to-date and available whenever I need it
- The computer output is presented in the most useful way for me

**Usage of computer systems**

11. How often do you use the following computer-based applications in your work?

1= Not at all 2= Less than once a month 3= Once a week to once a month
4= Several times a week 5= Several times each day

| Application                               | Not at all | 1 | 2 | 3 | 4 | 5 |
--- | --- | --- | --- | --- | --- | --- |
Word processing                          |           |   |   |   |   |   |
Spreadsheet/financial report preparation |           |   |   |   |   |   |
Internal database                        |           |   |   |   |   |   |
External database                        |           |   |   |   |   |   |
Graphics application                     |           |   |   |   |   |   |
Electronic mail/communications           |           |   |   |   |   |   |
Statistical packages                     |           |   |   |   |   |   |
Other packages/programs (specify)        |           |   |   |   |   |   |
12. How often do you use a computer system for the following tasks?

<table>
<thead>
<tr>
<th>Tasks</th>
<th>1= Not at all</th>
<th>2= Less than once a month</th>
<th>3= Once a week to once a month</th>
<th>4= Several times a week</th>
<th>5= Several times each day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looking for trends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Analysing problems/alternatives</td>
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<tr>
<td>Accounting/budgeting</td>
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<tr>
<td>Making decisions</td>
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<tr>
<td>Auditing</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Communication</td>
<td></td>
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<tr>
<td>Planning</td>
<td></td>
<td></td>
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<tr>
<td>Controlling and guiding activities</td>
<td></td>
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<tr>
<td>Other (specify)</td>
<td></td>
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</tbody>
</table>

13. How helpful do you find computer systems?

<table>
<thead>
<tr>
<th>Opinion</th>
<th>1= Strongly disagree</th>
<th>2= Slightly disagree</th>
<th>3= Slightly agree</th>
<th>4= Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using computer systems improves my speed of working</td>
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<td></td>
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</tr>
<tr>
<td>Using computer systems improves the quality of my work</td>
<td></td>
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</tr>
<tr>
<td>Using computer systems makes my work easier to perform</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using computer systems improves my effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer systems enhance my ability to take decisions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without computer systems, I would have too little information</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisation</td>
<td></td>
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<tr>
<td>Using computer systems improves the quality of managerial decisions</td>
<td></td>
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<tr>
<td>Using computer systems helps the organisation to provide new services for staff</td>
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<tr>
<td>Computer systems enhance communication between my organisation and external bodies/services</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Use of computer systems improves organisational productivity</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Overall, increasing use of computer systems within the organisation is beneficial</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Infrastructure and support facilities**

14. When was the last significant change in your organisation's computer systems?
   - I do not know
   - Less than 2 years
   - 2-5 years
   - More than 5 years

   If your answer is 'I do not know' go to question 16.

15. Can you recall what differences, if any, the change made to your work?
   - Made the system easier to use
   - More power / speed
   - Improved information provision
   - Provided more applications
   - Led to higher productivity
   - Other (specify)

16. In using computing systems, to what extent have you obtained assistance from the following?
   1 = Never  
   2 = Occasionally  
   3 = Frequently

<table>
<thead>
<tr>
<th>Assistance</th>
<th>Never</th>
<th>Occasionally</th>
<th>Frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational aids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manuals and printed aids</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>On-line aids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A fellow member of staff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>An in-house computer expert</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>An in-house training course</td>
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<td></td>
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<tr>
<td>An external training course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friends outside work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   Thank you for completing this questionnaire.
QUESTIONNAIRES ANALYSIS FORM

COMPARSION ANALYSIS

<table>
<thead>
<tr>
<th>Variables</th>
<th>UK</th>
<th>SA</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
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<tr>
<td>Computer experience</td>
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<tr>
<td>5 years or Less</td>
<td>15.5</td>
<td>45.1</td>
</tr>
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<td>6 years or Over</td>
<td>84.5</td>
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<td>Senior Manager</td>
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<td>8.2</td>
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<td>1.4</td>
</tr>
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<td>Age</td>
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<td></td>
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<tr>
<td>35 or Less</td>
<td>47.6</td>
<td>55.1</td>
</tr>
<tr>
<td>36 or Over</td>
<td>52.4</td>
<td>44.9</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Systems</th>
<th>UK</th>
<th>SA</th>
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<tr>
<td>Nearest computer systems</td>
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<tr>
<td></td>
<td>4.9</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
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<td>17</td>
</tr>
<tr>
<td></td>
<td>67.0</td>
<td>75</td>
</tr>
<tr>
<td>Variables</td>
<td>UK</td>
<td>SA</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Last significant change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I do not know</td>
<td>21.4</td>
<td>24.0</td>
</tr>
<tr>
<td>Less than 2 Years</td>
<td>71.8</td>
<td>49.4</td>
</tr>
<tr>
<td>2-5 Years</td>
<td>6.8</td>
<td>19.3</td>
</tr>
<tr>
<td>More than 5 Years</td>
<td>0.0</td>
<td>7.4</td>
</tr>
<tr>
<td>Differences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Made the system easier to use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>54.4</td>
<td>49.9</td>
</tr>
<tr>
<td>Yes</td>
<td>45.6</td>
<td>50.1</td>
</tr>
<tr>
<td>Improves information provision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>45.6</td>
<td>53.0</td>
</tr>
<tr>
<td>Yes</td>
<td>54.4</td>
<td>47.0</td>
</tr>
<tr>
<td>Lead to higher productivity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>79.6</td>
<td>55.6</td>
</tr>
<tr>
<td>Yes</td>
<td>20.4</td>
<td>44.4</td>
</tr>
<tr>
<td>More power/speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>37.9</td>
<td>44.1</td>
</tr>
<tr>
<td>Yes</td>
<td>62.1</td>
<td>55.9</td>
</tr>
<tr>
<td>Provided more applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>46.6</td>
<td>48.8</td>
</tr>
<tr>
<td>Yes</td>
<td>53.4</td>
<td>51.2</td>
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<td>Variables</td>
<td>UK</td>
<td>SA</td>
</tr>
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<td>---------------------------------</td>
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<td>-------</td>
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<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Manuals and printed aids</td>
<td>13.6</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>66.0</td>
<td>53.5</td>
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<tr>
<td></td>
<td>20.4</td>
<td>24.5</td>
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<td>On-line aids</td>
<td>9.7</td>
<td>26.9</td>
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<td></td>
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<td>49.1</td>
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<td></td>
<td>33.0</td>
<td>24.0</td>
</tr>
<tr>
<td>A fellow member of staff</td>
<td>1.9</td>
<td>13.9</td>
</tr>
<tr>
<td></td>
<td>45.6</td>
<td>58.4</td>
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<tr>
<td></td>
<td>52.4</td>
<td>27.7</td>
</tr>
<tr>
<td>An in-house computer expert</td>
<td>2.9</td>
<td>29.5</td>
</tr>
<tr>
<td></td>
<td>52.4</td>
<td>49.8</td>
</tr>
<tr>
<td></td>
<td>44.7</td>
<td>20.7</td>
</tr>
<tr>
<td>An in-house training course</td>
<td>19.4</td>
<td>40.9</td>
</tr>
<tr>
<td></td>
<td>60.2</td>
<td>44.5</td>
</tr>
<tr>
<td></td>
<td>20.4</td>
<td>14.6</td>
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<td>An external training course</td>
<td>53.4</td>
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<td></td>
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<td>42.6</td>
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<tr>
<td></td>
<td>7.8</td>
<td>12.1</td>
</tr>
<tr>
<td>Friends outside work</td>
<td>51.5</td>
<td>39.3</td>
</tr>
<tr>
<td></td>
<td>42.7</td>
<td>48.8</td>
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<tr>
<td></td>
<td>5.8</td>
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</table>
بسم الله الرحمن الرحيم

السلام عليكم ورحمة الله وبركاته،

تحية طيبة وبعد:

فأتى أعد لرسالة الدكتوراه في جامعة لفترة، وكجزء من دراستي فإني أتبع طريقة استخدام
أنظمة المعلومات المعتمدة على الحاسبات لأغراض الإدارة في المؤسسات السعودية.
وبنورًا للخبرة مؤسستكم الطويلة في استخدام أنظمة المعلومات المعتمدة على الحاسبات فإني
أبحث عن رأيكم في هذه الأنظمة سواء كان للحاسبات الآلية دور بارز في نشاطكم اليومي
أم لا.

فأرجو تعبئة الاستبيان كاملاً باللغة العربية أو الإنجليزية سواء كنت من مستخدمي الحاسب
الآلي أم لا.

علماً أنها بذل الله سوف تكون سهلة وسريعة التعبئة وفي غاية السرية.

وأخيراً أرجو في نهاية تعبئة الاستبيان إرجاعه إلى المسؤول في مؤسستكم.

شكراً لكم حسن تجاوبكم معنا،

المحاضر/ مشاه محمد القحطاني
إستبيان

الرجاء الإجابة على الأسئلة أدناه بالتأكيد على الخط المناسب (الرجاء الإجابة على كل الأسئلة)

الخلفية:

1 - ما هو مركزك الوظيفي؟
- □ المالية
- □ التسويق
- □ البحث
- □ الذاتية / شؤون الموظفين
- □ الإنتاج
- □ أخرى (حدد)

2 - إلي أي قسم تنتمي؟
- □ مركز الحاسب الآلي / المعلومات
- □ التصنيع
- □ البحث
- □ الذاتية / شؤون الموظفين
- □ الإنتاج
- □ أخرى (حدد)

3 - كم سنة قضيتها في استخدام الحاسوب؟
- □ صفر - سنة
- □ 2 - 5 سنوات
- □ 6 - 10 سنوات
- □ أكثر من 10 سنوات

4 - ما هي أعلى شهادة حصلت عليها؟
- □ الدكتوراه
- □ الماجستير / الماجستير التطبيقي
- □ بكالوريوس علوم / تطبيق
- □ دبلوم
- □ أخرى (حدد)

5 - ما هو جنسك؟
- □ ذكر
- □ أنثى

6 - في أي حقل أدنى يقع عملك؟
- □ أقل من 25 سنة
- □ 26 - 35 سنة
- □ 36 - 45 سنة
- □ أكثر من 45 سنة
- □ أخرى (حدد)
تقسيم أنظمة المعلومات المعتمدة على الحاسب:

٧) ما هي أقرب محطة حاسوب؟
□ في مكتبي □ قسمي □ في مكان آخر (حدد ) □ مرتبطة بشبكة إتصالات □ حاسب شخصي/ ماكنتوش □ كلاهما □ لا تنطبق عليها أي من الحالات السابقة

٨) كيف تتعامل مع أنظمة المعلومات المبنية على الحاسبات؟
□ عن طريق شخص آخر □ بنفسك

٩) أسلوب حوك ولحل نظامك الأبلي
أختر تقييم واحد فقط
[(١) صحيح بصورة عامة (٢) صحيح جزئياً (٣) غير صحيح]
| تقييم | شخص
|---|---|
|   | صحيح بصوره عامة
|   | غير صحيح

|   | أنا أجد تعلم استخدام أنظمة الحاسبات سهلاً
|   | أنا أجد استخدام لوحة المفاتيح للحاسبات سهلاً
|   | أنا أجد القراءة من شاشة الحاسبات سهلة
|   | أنا أجد الدخول والخروج من / إلى أنظمة الحاسبات سهلة
|   | أنا أجد استخدام تطبيقات / برامج الحاسبات سهلة
|   | أنا أجد استخدام الطباعة أسهل من القراءة من الشاشة
|   | أنا أستخدم أنظمة الحاسبات خارج مكان عملي

**نظام حاسوب**

|   | أنظمة الحاسبات هي أساسية لعملي
|   | أنا مقتنع بسرعة التجاوب الحاسوبي
|   | النظام يجهز ويوفر كل التسهيلات التي أتوقعها
|   | المعلومات مجدد ومتوفرة كلما احتاج لها
|   | بخرج الحاسوب النتائج بصوره جيدة

398
1) ما هي درجة استخدامك لتطبيقات الحاسبات المدونة أدناه في عملك؟
- أختر تقييم واحد فقط:
  (1) لا استخدامها إطلاقاً
  (2) تستخدمها أقل من مرة واحدة في الشهر
  (3) تستخدمها مرة كل أسبوع إلى مرة كل شهر
  (4) عدة مرات في الأسبوع
(5) عدة مرات يومياً

لاستخدامها الإلزامية

التطبيق (برنامج)

1 2 3 4 5

6) عدد مرات يومياً

منسق الكلمات

خبير تقارير ماليه / بيانات

بيانات داخليه

بيانات خارجية

مخططات ورسومات

بريد الالكتروني / إتصالات

إحصائيات

برامج أخرى (حدد)

الوظائف التالية؟

2) ما هي درجة استخدامك لأنظمة الحاسبات في الوظائف التالية؟
- أختر تقييم واحد فقط:
  (1) لا استخدامها إطلاقاً
  (2) تستخدمها أقل من مرة واحدة في الشهر
  (3) تستخدمها مرة كل أسبوع إلى مرة كل شهر
(4) عدة مرات في الأسبوع
(5) عدة مرات يومياً
الوظيفة

البحث عن الإجراءات الصحيحة

خليل المشاكل والبدائل

الحاسب والبيزانيه

إتخاذ القرارات

فحص وتصحيح الحسابات

الإتصالات

tخطيط للعمل

التحكم والسيطرة على النشاطات

أخرى (حدد)

2) كيف تجد نائدة أنظمة الحاسبات لل؟ أختر تقييم واحد فقط

اختلف كلياً (4) أوافق جزئياً (3) أوافق كلياً (2) إختلف جزئياً (1) إختلف كلباً

الرأي

الأشخاص:

- إستخدام أنظمة الحاسبات يساعد في سرعة عملي
- إستخدام أنظمة الحاسبات يساعد في جودة عملي
- إستخدام أنظمة الحاسبات يساعد في سهولة عملي
- إستخدام أنظمة الحاسبات يساعد على كفاءة عملي
- إستخدام أنظمة الحاسبات يساعد من تدريبي على إتخاذ القرارات
- عدم استخدام أنظمة الحاسبات يحد من حصولي على المعلومات

الدوايا:

- إستخدام أنظمة الحاسبات يساعد على جودة القرارات الإدارية للموظفين
- إستخدام أنظمة الحاسبات يساعد الدوائر على توفير ما هو جديد
- أنظمة الحاسبات يساعد على الإتصالات بين الدوائر والأجهزة الخارجية
- إستخدام أنظمة الحاسبات يساعد على إنتاجية الدوائر

بصورة عامة كما رأى إستخدام أنظمة الحاسبات في الدوائر رائج، مما يعكس على النتائج الإيجابية.
البنية التحتية والخدمات المساندة:

14) متى كان آخر تغيير كبير في أنظمة الحاسبات في دائرتك؟

لا أعلم □ أقل من سنتين □ 2 - 5 سنوات □ أكثر من 5 سنوات □

إذا كان الجواب لا أعلم اذهب إلى السؤال رقم 16.

15) هل تذكر ما هي الظروف (إذا وجدت) التي تحصلت على أنظمة الحاسبات في دائرتك بعد التغييرات؟

جعلت النظام أسهل للإستخدام □

حسنت من توفير المعلومات □

أدى إلى إنتاجية عالية □

أدى إلى زيادة السرعة / الطاقة □

أدى إلى إستخدام تطبيقات / برامج جديدة □

أخرى (حدد) □

16) في إستخدامك لأنظمة الحاسبات إلى أي مدى حصلت على مساعدة مما يلي:

أختير تقييم واحد فقط [1) لم أحصل أبداً (2) إحياناً (3) غالباً (4) غالبًا]

لم أحصل أبداً □ غالباً □

المساعدة

لا الكتب والتطبيقات المساندة للإستخدام □

المساعدة عن طريق الخروج المباشر □

زميل في العمل □

خبر كمبيوتر في العمل □

دوره تدريب داخل العمل □

دوره تدريب خارج العمل □

صديق خارج العمل □

أخرى (حدد) □

شكراً على اكمالكم لهذا الإستبيان!!!
1. مركز الوظيفي هو:
   - الأمن والسلامة
   - المالية
   - الخدمات الإدارية
   - الذائية
   - التسويق
   - الإنتاج
   - البحث
   - آخر (حدد)

2. جنسك:
   - ذكر
   - أنثى

3. أعلى شهادة حصلت عليها:
   - ماجستير / ماجستير تطبيقي
   - بكالوريوس
   - أخرى (حدد)

4. عمرك:
   - فوق 55 سنة
   - 51 - 60 سنة
   - 41 - 50 سنة
   - 35 سنة
   - 35 سنة فحص

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402
أمثلة تتعلق بخبرتك في أنظمة المعلومات المعتمدة على الحواسيب وأهميتها:

1) منذ متى بدأت في استخدام الحاسوب؟
2) ما مدى أهمية الحاسوب في عملك؟
3) إلى أي مدى يساعدك الحاسوب في إتخاذ القرارات؟
4) ما مدى استخدامك لنظام الحاسوب؟

أمثلة تتعلق بسياسة وخطط والموارد المالية لأنظمة المعلومات المعتمدة على الحواسيب الآلية:

1) ما مدى إقتناعك بأنظمة الحاسابات الآلية في مؤسستك في الوقت الحالي؟
2) على من يعتمد خُذيد سياسة وخطط أنظمة الحاسابات الآلية في الوقت الحالي؟
3) ما هو تخطيطك لتدريب موظفيك في استخدام أنظمة الحاسابات الآلية؟
4) هل هناك أي تخطيط للمستقبل؟ على ماذا ينوي نازحه؟

403
أسئلة مركز الحاسب الآلي والمعلومات

خلفيتكم

1) مركز الوظيفي هو
2) جنسكم
   □ أنثى
   □ ذكر

3) أعلى شهادة حصلت عليها
   □ دبلوم
   □ بكالوريوس
   □ ماجستير / ماجستير تطبيقي
   □ الدكتوراه
   □ أخر (حدد)

4) عمرك
   □ تحت 35 سنة
   □ 36 - 40 سنة
   □ 41 - 45 سنة
   □ 46 - 50 سنة
   □ فوق 55 سنة

أسئلة تتعلق بالوقت الحالي لأنظمة المعلومات المتعددة على الحواسيب

1) ما هي أنظمة الحاسبات المستخدمة في مؤسستكم؟
2) كم عدد الموظفين في قسم الحاسب الآلي والمعلومات؟
3) هل قسم الحاسب الآلي في مؤسستكم بطور أو يعمل أي برامج للمؤسسة؟

أسئلة تتعلق بسياسة وخطط الوارد المالية لأنظمة المعلومات المتعددة على الحواسيب

1) ما مدى إقتناعك بأنظمة الحاسبات الآلية في مؤسستكم في الوقت الحالي؟
2) إذا كنت تعتقد كيف سيستفيده نظام الخدمة / خطط أنظمة الحاسبات الآلية في الوقت الحالي؟
3) هل هناك أي خطط للمستقبل؟ على ماذا يتوقف جائحة.

التدريب والمساعدة

1) كيف تدفع موظفي المؤسسة لإستخدام أنظمة الحاسبات الآلية؟