An Automated bibliographic network for the libraries
of Riyadh, Saudi Arabia:

a feasibility study

by

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The purpose of this study has been to investigate the desirability and possibility of establishing an automated bibliographic network among Riyadh's libraries, to examine the technical problems involved which prevent Riyadh libraries' computer systems being linked on-line for the purposes of co-operation and sharing, to assess the potential benefits of library networking, and to propose a management plan for Riyadh's libraries network.

The methodology used was the survey research technique. Data were collected with questionnaires, interviews, and analysis of relevant literature in order to survey the present networking activities in other countries, the important of standards and the different computer protocol suites. The questionnaire was designed to collect information on the present status of Riyadh City libraries' names, types, collections, computerization, computer type, operating systems, software retrieval systems, computer storage capacities, telecommunication networks, and information technology (IT) budgets. The questionnaire was distributed to the heads of forty-six libraries of all types in Riyadh City. Forty-two questionnaires were returned to the researcher. Interviews were conducted with twelve carefully selected libraries to obtain a view of interviewed libraries' purposes of using computers, the catalogue scripts, number of items purchased every month, number of serials subscription, number of materials waiting for technical processing every month, manpower resources and the expected benefits of library networking.

Based on the findings, Riyadh City has a sufficiently large range of different types of libraries - with varied collections and offering a wide range of services - to make the proposed network desirable and feasible. With regard to the automation used by Riyadh's
libraries, approximately half (twenty-one) of them employ some form of automation, while most of the remaining libraries were willing to become automated in the near future. With regard to the technical aspects of establishing the proposed network among Riyadh libraries and linking their computers on-line, an open system protocol suite is required to achieve information mobility and to ensure that all Riyadh's libraries' computers communicate to each other. Two main open protocol suites have now emerged: TCP/IP and OSI. In the case of the computerization circumstances of Riyadh's libraries, the study suggests that either of these protocol suites may be applicable, but the OSI protocol standards would be more feasible for a number of reasons described in the study. Finally, a management plan for Riyadh’s libraries network (RLNET) was presented according to the following: framework, mission; objectives; organizational structure; legal agreement; functions and services; technical solutions; funding; timetable and an action plan.
DEDICATION

To my parents, wife and children
ACKNOWLEDGEMENTS

Grateful acknowledgement is extended to the Government of The Kingdom of Saudi Arabia; The Ministry of Higher Education; Imam University, Social Sciences College, Department of Library and Information Science; and Saudi Arabian Cultural Bureau to the UK for their support, awarding me a scholarship and a study leave to carry out this research.

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<th>Full Form</th>
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<td>AACR2</td>
<td>Anglo-American Cataloguing Rules, 2nd edition</td>
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<td>ABN</td>
<td>Australian Bibliographic Network</td>
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<td>ANSI</td>
<td>American National Standard Institute</td>
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<tr>
<td>ARP</td>
<td>Address Resolution Protocol</td>
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<td>ARPANET</td>
<td>Advanced Research Projects Agency Network</td>
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<td>ATM</td>
<td>Asynchronous Transfer Model</td>
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<tr>
<td>AT&amp;T</td>
<td>American Telegraph and Telephone Company</td>
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<td>ATU</td>
<td>Arab Telecommunications Union</td>
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<td>A/V</td>
<td>Audio-visual</td>
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<td>BITNET</td>
<td>Because It's Time Network</td>
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<td>BL</td>
<td>British Library</td>
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<td>BLAISE</td>
<td>British Library Automated Information Services</td>
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<td>BLCMP</td>
<td>Library Services Ltd. Formerly Birmingham Libraries Co-operative Mechanization Project</td>
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<td>BLDSC</td>
<td>British Library Document Supply Centre</td>
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<td>BNBMARC</td>
<td>British National Bibliography Machine Readable Cataloguing</td>
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<tr>
<td>bps</td>
<td>bits per second</td>
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<td>BSI</td>
<td>British Standards Institution</td>
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<td>BT</td>
<td>British Telecom</td>
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<td>BUBL</td>
<td>Bulletin Board for Libraries</td>
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<td>CANMARC</td>
<td>Canadian Machine Readable Cataloguing</td>
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<td>CATSS</td>
<td>Catalogue Support Service (Canada)</td>
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<td>CCITT</td>
<td>Consultative Committee for International Telegraphy and Telephony. The International Telephone and Telegraph Consultative Committee</td>
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<tr>
<td>CD-ROM</td>
<td>Compact disc - read only memory</td>
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<td>CERL</td>
<td>Consortium of European Research Libraries</td>
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<td>CILLA</td>
<td>Co-operative of Indic Language LASER Libraries (UK)</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<td>CJK</td>
<td>Chinese, Japanese and Korean-Script (RLIN, US)</td>
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<td>CPU</td>
<td>Central Processor Unit</td>
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<td>CURL</td>
<td>Consortium of University Research Libraries (UK)</td>
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<tr>
<td>CWIS</td>
<td>Campus-wide Information Service</td>
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<tr>
<td>DDC</td>
<td>Dewey Decimal Classification</td>
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<td>DEC</td>
<td>Digital Equipment Corporation</td>
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<td>DECnet</td>
<td>DEC network</td>
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<td>DNA</td>
<td>Digital Network Architecture (DEC)</td>
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<td>DNS</td>
<td>Domain Name Service</td>
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<td>DOBIS/LIBIS</td>
<td>Dortmunder Bibliothekssystem Leuven Integraall Bibliotheek System (Germany, Belgium)</td>
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<td>EARN</td>
<td>European Academic and Research network</td>
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<td>EBONE</td>
<td>European backbone</td>
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<td>EDI</td>
<td>Electronic Data Interchange</td>
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<td>EDIFACT</td>
<td>EDI for Administration Commerce and transport</td>
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<td>EJO</td>
<td>Electronic Journal On-line (OCLC)</td>
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<td>E-mail</td>
<td>Electronic mail</td>
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<td>ENA</td>
<td>External network Access</td>
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<td>FRAD</td>
<td>Frame Relay Access Device</td>
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<td>FTAM</td>
<td>File Transfer Access and Management</td>
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<td>FTP</td>
<td>File Transfer Protocol</td>
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<td>GB</td>
<td>Gigabytes</td>
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<td>Gulf Co-operation Countries</td>
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<td>Gulfnet Academic network</td>
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<td>HMSO</td>
<td>Her Majesty's Stationery Office</td>
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<td>HP</td>
<td>Hewlett-Packard</td>
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<td>HUMBUL</td>
<td>Humanities Bulletin Board (JANET)</td>
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<td>IBM</td>
<td>International Business Machine Inc.</td>
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<td>ICMP</td>
<td>Internet Control Message Protocol</td>
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<td>Acronym</td>
<td>Description</td>
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<td>IDI</td>
<td>Information Dimensions Inc. (OCLC)</td>
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<td>IDS</td>
<td>Institute of Diplomatic Studies</td>
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<td>IEC</td>
<td>International Electrotechnical Commission</td>
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<td>IEEE</td>
<td>Institute of Electrical and Electronic Engineers (USA)</td>
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<td>ILL</td>
<td>Inter-library loan</td>
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<td>ILLINET</td>
<td>Illinois' Library and Information Network</td>
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<td>iNet</td>
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<td>ION</td>
<td>Interlending Open Systems Interconnection Network</td>
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<td>IPA</td>
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<td>International Standard Bibliographic Description</td>
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<tr>
<td>ISBN</td>
<td>International Standard Book Number</td>
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<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
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<tr>
<td>ISSN</td>
<td>International Standard Serial Number</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
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<td>International Telecommunication's Union</td>
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<td>IU</td>
<td>Imam University</td>
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<td>JACKPHY</td>
<td>Japanese, Arabic, Chinese, Korean, Persian, Hebrew and Yiddish (RLIN)</td>
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<td>JANET</td>
<td>Joint Academic Network</td>
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<td>JNT</td>
<td>Joint Network Team (JANET)</td>
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<td>JUGL</td>
<td>JANET User Group for Libraries</td>
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<td>KACST</td>
<td>King Abdulaziz City for Science and Technology</td>
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<td>KACSTNET</td>
<td>KACST Network</td>
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<td>KAPL</td>
<td>King Abdulaziz Public Library</td>
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<td>KFC</td>
<td>King Faisal Centre</td>
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<td>KFNKL</td>
<td>King Fahd National Library</td>
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<td>KFUPM</td>
<td>King Fahd University for Petroleum and Minerals</td>
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<td>KSU</td>
<td>King Saud University</td>
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LAN Local Area Network
LASER London and South-Eastern Library Region
LAT Local Area Transport Protocol
LC Library of Congress
LCMARC Library of Congress Machine Readable Cataloguing
LIBRIS Library Information System (Sweden)
LSP Linked Systems Project
LUC London Union Catalogue
MAP Manufacturing Automation Protocol
MARC Machine Readable Cataloguing
MB Megabytes
MCC Manchester Computer Centre
MEDLARS Medical Literature Analysis and Retrieval System
MEDLINE MEDLARS On-line
MINISIS Minicomputers-Integrated Set of Information Systems (Canada)
MOTIS Message Oriented Text Interchange System
MP Ministry of Planning
Mss Manuscript
NACO Name Authority File Co-operative
NACSIS National Centre for Science Information System (Japan)
NAFS Name Authority File Service
NCA Network Computing Architecture
NCFEFI National Centre for Economic and Financial Information
NCWCD National Commission for Wildlife Conservation and Development
NSFNET National Science Foundation Network (USA)
NISO National Information Standards Organization
NISP Networked Information Service Project
NISS National Information Services and Systems (JANET)
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<td>NISS-BB</td>
<td>NISS Bulletin Board</td>
</tr>
<tr>
<td>NISSPAC</td>
<td>NISS Public Access Collection</td>
</tr>
<tr>
<td>OCLC</td>
<td>On-line Computer Library Centre</td>
</tr>
<tr>
<td>OLIS</td>
<td>On-line Library and Information System</td>
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<tr>
<td>OLUC</td>
<td>On-line Union Catalogue</td>
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<tr>
<td>OPAC</td>
<td>On-line Public Access catalogue</td>
</tr>
<tr>
<td>OSI</td>
<td>Open System Interconnection</td>
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<tr>
<td>OSTI</td>
<td>Office for Scientific and Technical Information</td>
</tr>
<tr>
<td>PC</td>
<td>Personal Computer</td>
</tr>
<tr>
<td>PCSN</td>
<td>Program Support Communication Network</td>
</tr>
<tr>
<td>PICA</td>
<td>Project Gelentegreerde Catalogus Automatisering (Netherlands)</td>
</tr>
<tr>
<td>PSS</td>
<td>Packet Switched Service</td>
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<tr>
<td>PSPDN</td>
<td>Packet Switched Public Data network</td>
</tr>
<tr>
<td>PTT</td>
<td>Postal telephone and telegraph Organisation</td>
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<tr>
<td>RFP</td>
<td>Request for Proposal</td>
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<tr>
<td>RLG</td>
<td>Research Libraries Group Inc. (USA)</td>
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<tr>
<td>RLIN</td>
<td>Research Libraries Information Network (USA)</td>
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<tr>
<td>RLNET</td>
<td>Riyadh Libraries Network</td>
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<tr>
<td>SABINET</td>
<td>South Africa Bibliographic and Information Network</td>
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<tr>
<td>SASO</td>
<td>Saudi Arabian Organization for Specification and measurement</td>
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<td>SaudiNET</td>
<td>Saudi Network</td>
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<tr>
<td>SERC</td>
<td>Rutherford Appleton Laboratory (UK)</td>
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<tr>
<td>SERLS</td>
<td>South-Eastern Library System</td>
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<tr>
<td>SLS</td>
<td>Information System Ltd. (UK). Formerly SWALCAP</td>
</tr>
<tr>
<td>SMDS</td>
<td>Switched Multimegabit Data Service (British Telecom)</td>
</tr>
<tr>
<td>SMTP</td>
<td>Simple Mail Transfer Protocol</td>
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<tr>
<td>SNA</td>
<td>System Network Architecture (IBM)</td>
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<tr>
<td>SNI</td>
<td>Standard Network Interconnection (LSP)</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>SPAN</td>
<td>Saudi Payment Network</td>
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<tr>
<td>SR</td>
<td>Search and Retrieve (Protocol)</td>
</tr>
<tr>
<td>SUNIST</td>
<td>Serveur Universitaire National de l'Information Scientifique et Technique (France)</td>
</tr>
<tr>
<td>SWALCAP</td>
<td>South-West Academic Libraries Co-operative Automation Project (UK)</td>
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<tr>
<td>TC</td>
<td>Technical Committee (ISO)</td>
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<tr>
<td>TCP/IP</td>
<td>Transmission Control Protocol/Internet Protocol</td>
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<tr>
<td>TOP</td>
<td>Technical Office Protocol</td>
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<tr>
<td>UCL</td>
<td>University College London</td>
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<td>UDP</td>
<td>User Datagram Protocol</td>
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<tr>
<td>UFC</td>
<td>University Funding Committee</td>
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<td>UGC</td>
<td>University Grants Committee</td>
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<tr>
<td>UKERNA</td>
<td>UK Education and Research Networking Association</td>
</tr>
<tr>
<td>UKOLN</td>
<td>UK Office for Library and Information Networking</td>
</tr>
<tr>
<td>UNIMARC</td>
<td>Universal MARC Format</td>
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<tr>
<td>USMARC</td>
<td>United States MARC</td>
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<tr>
<td>UTLAS</td>
<td>University of Toronto Library Automation System</td>
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<tr>
<td>VISCOUNT</td>
<td>Viewdata and Interlibrary Systems Communication Network</td>
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<tr>
<td>VTLS</td>
<td>Virginia Tech Library System</td>
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<td>WLN</td>
<td>Western Library Network (USA)</td>
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<td>WAN</td>
<td>Wide Area Networks</td>
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<td>WSL</td>
<td>Washington State Library</td>
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<tr>
<td>XNS</td>
<td>Xerox Network Standard</td>
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<td>is less than</td>
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INTRODUCTION

The history of library automation can be traced to the early 1960s; as Rowley (1993: 291) noted, “Experimentation with computer-based systems started in the 1960s with the MARC project by the Library of Congress.” The first generation of library automation, therefore, was related to the creation of the MARC format to enable the exchange of bibliography records in a machine-readable form. Today, the MARC format exists in a range of variants in many countries, such as LCMARC, UKMARC and BNBMARC. The MARC standard has helped libraries to share and exchange their bibliographic records. In the 1960s, many bibliographic utilities were set up, such as OCLC (the On-line Computer Library Centre) in the USA and BLCMP (Library Services Ltd.) in the UK.

The second phase of library automation development was the establishment of library systems. "During the early 1970s, many libraries began using their parent bodies' computer systems to develop local systems, usually designed and implemented by staff in the related computer centres" (Tedd, 1993: 4). "The emergence of this generation of systems was based on new availability of affordable minicomputers" (Heseltine, 1994: 5). Furthermore, Heseltine (1993: 125 f.) notes, library automation has now reached a critical point of generational change. He identifies three generations of library automation. The first generation consisted of the old, mainframe-based, offline circulation and cataloguing systems. The second generation was made possible by the availability of inexpensive minicomputers. The third generation, that appeared in the 1990, saw the emergence of new, immensely powerful, relatively inexpensive machines; high-speed transfer of vast quantities of text, image, and sound; and the dramatic improvements in user interface incorporating the use of colour, graphics, windows, icons and so forth.
Automation, therefore, is a process which has already brought and will continue to bring changes to the library world. It is also a tool that enables libraries to provide services and facilities to their patrons in a more efficient manner. "Advances in computer technology during the last three decades have made automation more affordable and available to a wide variety of libraries" (Mwiya, 1994: 26). Many libraries have now acquired their own computers for a range of purposes such as acquisitions, cataloguing, circulation, inter-library loans, serials control, bibliographic exchange and telecommunication. Tedd (1991: 1) observes that over the past few years there have been many technological developments which have affected the use made by libraries of computers. Firstly, there has been the availability of cheap microcomputer systems. Secondly, telecommunication networks have also decreased in cost and become more readily available, so that many libraries today utilize these networks to gain access to such facilities as shared bibliographic records.

Rowley (1988: 8) describes the following four factors that have caused libraries to apply information technology (IT): the increased workload, the need for greater efficiency, the need to provide new services and functions, and its obvious usefulness for networking and co-operation. By making use of IT, today's libraries provide better services to their users.

The policy of co-operation and sharing of resources was practised before the coming of computerization. Thus, Jefferson (1977: 7) could state that "library co-operation...[was] essentially a development of the twentieth century. Its growth has its roots in the social, economic and technological changes taking place in the years from 1900 onwards". We
would therefore expect that the availability of computerization would increase libraries' use of computers and/or communication networks. Libraries in many countries have recognized that the linking of libraries via computer networks is necessary because individual libraries cannot be self-sufficient in every department. "The increase in publications and information sources, all costing more and more money, has meant that self-sufficiency is no longer a realizable goal and co-operative solutions among libraries have had to replace any ideal of self-sufficiency by a particular library system" (Jefferson, 1977: 7). Harrison and Beenham (1990: 191) have described the factors prohibiting individual libraries; being self-sufficient as follows:

1. A tremendous increase in knowledge and a corresponding growth in publishing.
2. The spread of education from primary through to university level, which has led to greater and more diverse demands on public library resources by a much more literate public.
3. The advance of technology with its effect on industry and commerce, and the necessity for employers and employees to develop new skills and techniques
4. Increased opportunities for travel and international economic co-operation, with the consequent demand for up-to-date information about foreign countries.

Because of these circumstances, many co-operative activities have been developed among libraries. Currently, bibliographic utilities exist in most countries to permit a group of libraries - varying in types, sizes, and quality - to share bibliographic records and to help local libraries to provide better services.
Hunter (1987: 3) has enumerated the objectives of computerized cataloguing as follows:

1. To save money, or at least reduce the rate of increase in costs.
2. To provide better control and improve efficiency.
3. To achieve higher productivity.
4. To extend the range of services offered.
5. To permit increased co-operation with other libraries or information services.

Dempsey (1992) lists forty-nine bibliographic networks in Europe. The USA and the UK in particular have established a number of these, the major ones among them being OCLC (the On-line Computer Library Centre), RLIN (the Research Libraries Information Network), WLN (the Western Library Network), BLAISE (the British Library Automated Information Service), BLCMP (Library Services Ltd.), SLS (Information System Ltd.), LASER (London and South-Eastern Library Region), and CURL (the Consortium of University Research Libraries). Some of these bibliographic networks, are, in fact, linked for the purpose of sharing and exchanging their records; for example, OCLC with CURL and SLS. “These bibliographic networks aim to make cataloguing data widely and conveniently available, to reduce staffing and the costs of technical operations, to increase processing speeds and efficiency, and to facilitate resource sharing” (Wynar & Taylor, 1985: 534).

Although the libraries in many countries make use of bibliographic network services, Saudi libraries, especially those in Riyadh City, although currently some are using computers, suffer from a lack of standardization in their technical processing.
telecommunications systems have improved in Saudi Arabia, so that Alwaseet (the Public Switched Public Data Network) is available for use by all the country's libraries. Alwaseet gives its users national access to the world at large. There is every indication, therefore, of a need to improve and speed up technical processing in Riyadh's libraries. Establishing a bibliographic network could be a means of improving services in these libraries. The feasibility of establishing this network is the aim of this study. To accomplish this aim, the study is divided into seven chapters. Chapter One provides a general background, describing the Kingdom of Saudi Arabia's national setting, with special attention being paid to the development of education and higher education. Riyadh City's different types of libraries are listed and discussed. Chapter Two identifies the problem dealt within the study, the need for the study, its purposes, the research questions, its limitations, and defines the terms and methodology used in the study. Chapter Three reviews previous related research. Chapter Four surveys and examines the existing library networking activities in other countries, with particular reference to the UK and the USA. Chapter Five describes the various computer protocol suites - whether proprietary or open - which are used for computer networks. Chapter Six analyses and presents the information found in the study's questionnaire survey and the interviews. Finally, Chapter Seven presents the study's conclusions and recommendations.
References


CHAPTER ONE

GENERAL BACKGROUND TO THE STUDY

1.1 National Setting

The Kingdom of Saudi Arabia, founded in 1925 by the late King Abdulaziz Al Saud, occupies the major part of the Arabian Peninsula (about 2,250,000 square kilometres, or 870,000 square miles [Ministry of Information, 1992: 271]), being bounded to the north by Jordan, Kuwait, and Iraq, to the south by Yemen, to the east by the Persian Gulf, and to the west by the Red Sea and the Gulf of Aqaba.

"The government of Saudi Arabia was formed when King Abdulaziz issued the Royal order on 23rd September 1932. In this Royal order, the name of the country was given [and] the major bodies of the government were established" (Ministry of Information, 1991: 18). King Abdulaziz ruled for fifty-one years, until he died in 1953. The territory of Saudi Arabia has been inhabited by nomadic Arab tribes for thousands of years. The basis of the country's present political regime was laid in the nineteenth century during the campaigns of the Wahhabi movement.

"The total population of the Kingdom is 12 million. The main cities have populations of one to two million people, whereas the smaller villages have populations of a few hundred" (Ministry of Information, 1992: 27).

More than half of Saudi Arabia is desert, its climate being basically hot and very dry. Along the Saudi coastal regions, as in places such as Jeddah, Dhahran, and Dammam, there is a humid climate that prevails for almost six months of the year.
The Kingdom is divided into four major regions. The first is Najd, which includes the capital of the country, Riyadh. Second, there is Hejaz, the region lying along the Red Sea coast in the north-west. Third, there is the region of Asir, in the southern Red Sea-Yemen border area. Finally, there is Al-Hasa, the sandy and stormy eastern part of the country, an area of tremendous petroleum reserves.

Saudi Arabia contains, in fact, 25% of the world's oil reserves and is considered to be the world's largest oil-exporter. The Kingdom's economy is based mainly on revenues from oil. "It was in 1938 that the country's first oil-field - in Dammam in the eastern region - was discovered" (Al-Farsy, 1986: 44).

1.1.1 Education

Recent years have witnessed a great deal of development in the Kingdom, including a major increase in the education sector. The educational system of Saudi Arabia comprises four levels: primary, intermediate, high school, and higher education. The Saudi government takes a special interest in providing access to education for all the people of the country.

The number of students of both sexes at general education stages reached 8383 in nursery schools, 688, 170 male students and 516,016 girl students in primary schools, 203,252 male students and 132,891 girl students in secondary schools, 101,270 male students, 7054 girl students in Teacher Institutes with the total number of those stages reaching 984,103 male students and 729,434 girl students, i.e. a percentage of 100% and 117% of the target plan respectively (Ministry of Education, 1994: 305).

Al-Shady (1994: 40) notes that the numbers of schools in 1970 were: primary 1,383; intermediate, 5,500; and high schools, 238; while in 1994 the numbers increased to: primary, 5,500; intermediate, 2,000; and high schools, 700.
Higher education in the Kingdom dates back to 1949 when the late King Abdulaziz established the College of Islamic Law in Mecca, which is now part of Um-Al-Qura University. Later on, another College of Islamic Law and one for Arabic language were established in Riyadh. They are now part of Imam University (Ministry of Information, 1991: 26).

The Ministry of Higher Education was founded in 1975 to support the Saudi higher education system. Seven universities have now been opened in the country, offering many programmes of study, leading to both masters' and Ph.D. degrees. They are Imam Muhammad Ibn Saud Islamic University, King Saud University in Riyadh, King Abdulaziz University in Jeddah, King Fahd University for Petroleum and Minerals in Dhahran, King Faisal University in Al-Hasa and Dammam, Um-Al-Qura University in Mecca, and the Islamic University in Medina. Each university teaches its own range of subjects. For example, Imam University specializes in Islam, the social sciences, and education. King Saud University is considered to be a general propose university, as it specializes in all subjects including education, the humanities, engineering, and medical sciences. It is an undeniable fact that higher education in Saudi Arabia has received tremendous support from the Saudi government during the last twenty years, as it has sought to meet the demand for highly skilled professionals in all fields.

1.2 Riyadh and its libraries

Riyadh is the capital city of the Kingdom of Saudi Arabia and is located almost in the geographical centre of the country. Riyadh today is a thoroughly modern city. As the capital, it is the home of the government offices and the large number of government buildings gives the city its distinctive appearance. The distances separating Riyadh from other cities in the country are as follows: to Hail in the north, about 800 kilometres; to Abha
in the south-west, over 1,000 kilometres; to Dammam in the east, about 450 kilometres; and to Jeddah in the west, about 1,100 kilometres. Riyadh City is now connected with other cities and regions of Saudi Arabia by a renewed road system, plus a railway line linking it to Al-Hasa and Dammam.

Telecommunications have improved throughout the country during the last twenty years.

The Ministry of Post, Telegraphs, and Telephones (P.T.T.) has completed a number of large-scale telecommunications projects using satellites and co-axial cables. There are 17 automatic telephone exchanges in Riyadh with a total capacity of 253,000 lines, in addition to 951 lines for coin-operated telephones (Ministry of Information, 1992: 45).

In recent years, many libraries and information centres in Saudi Arabia have been modernized and equipped with the latest library equipment and technology. For example, such facilities as computer technology, on-line searching, CD-ROM facilities, and microforms are all now in use in the country's libraries.

Riyadh City has a range of libraries which may be considered to be well equipped, well arranged, and with adequate collections. Riyadh contains different types of library, including national, academic, special, public, and school libraries. These different kinds of library may be briefly described in the following pages.

1.2.1 The National Library

King Fahd National Library (KFNL) was officially established in Riyadh in 1990. Its functions have been described as follows:

1. Collecting all Saudi literature, currently as well as retrospectively as far as possible.
2. Collecting, organizing and preserving any publication dealing with any aspect of Saudi Arabia, wherever published, irrespective of language.
3. Collecting any publications by Saudi nationals outside their home country.
4. Collecting any publications considered useful for Saudi Arabia.
5. Establishing bibliographical information databases.
6. Preparing and publishing a national bibliography and a union catalogue.
7. Acquiring and preserving any available manuscripts which may have national or international value.
8. Co-operating and sharing resources with other national and international libraries and associations.
9. Enforcing the legal deposit law requiring copies of all Saudi publications to be deposited in the national library.
10. Providing reference and lending services to all officials, the public, and private institutions.

The library is automated and uses a mainframe computer. It employs the MINISIS System for the handling of its operations.

1.2.2 Academic Libraries

As a result of the immense increase in the number of students and the significant need in the country for professionals and technicians in all fields, the country has witnessed a great increase in higher education establishments. Riyadh City has two universities: Imam Muhammad Ibn Saud Islamic University and King Saud University (KSU). Riyadh also has four military academies for higher studies: King Abdul Aziz Military Academy, King Faisal Air Academy, King Khaled Military Academy, and King Fahd Academy for Security Forces.

Imam Muhammad Ibn Saud Islamic University

The nucleus of Imam University,
The University, now in its new premises, is considered to be one of the best equipped in the world. "It has 1,512 teachers and 23,922 students" (World of learning, 1995: 1321).

The University established a Department of Library and Information Science in 1974, offering study programmes leading to the degrees of B.A., M.A., and Ph.D.

Presently, the university has a large new Central Library, which is very rich in Islamic books and particularly so in manuscripts. It began to automate its functions in 1980 with an in-house system. The Library is under the direction of the Dean of Library Affairs. It holds more than 70,000 monographs, 200 current periodical titles, 20,000 manuscripts, and over 600 items of audio-visual material (as of 1993).

**King Saud University**

King Saud University was the first university to be established in Saudi Arabia. "It was founded in 1957 as Riyadh University, but its name was changed in 1982" (World of learning, 1995: 1322). The University's new campus "covers an area of 3½ square miles and includes all the University's academic, administrative, residential and service facilities" (Ministry of Information, 1992: 49). "It has 2,679 teachers and 29,341 students" (World of learning, 1995: 1322). It has established a Department of Library and Information Science, but for undergraduate study only.

King Saud University Library is considered to be the oldest and largest library in the country. It is under the direction of the University Librarian and Dean of Library Affairs. The Library holds, 1,300,00 monographs, 2,000 current periodical titles, 1,500 manuscripts,
and 10,000 items of audio-visual material (as of 1993). In 1983 it installed its on-line information retrieval system, DOBIS/LIBIS, to handle its various functions.

In addition to the university libraries, Riyadh has libraries in the four military academies listed above, all of which are supported by government funding. They contain specialized collections to support the academies' curricula and research activities.

**King Abdulaziz Military Academy** was founded in 1955 and “provides courses in modern languages, including English, French, and Hebrew, science and military subjects. The college presently has 1,300 students” (*World of learning*, 1995: 1323). The Academy Library uses an in-house retrieval system for controlling its functions. The Library holds 30,000 monographs and 60 current periodical titles.

**King Faisal Air Academy** was opened in 1967. Its Library contains 8,000 monographs and 10 current periodical titles. It is not yet computerized.

**King Khaled Military Academy** was established in 1980. Its Library is very well arranged and well equipped. It holds 40,000 monographs, but has no periodical subscriptions. It is not yet automated.

**King Fahd Academy for Security Forces** was established in 1971. Its Library contains 21,500 monographs and 40 current periodical titles. It is not yet automated, but plans to become automated in the near future.
1.2.3 Special Libraries

This type of library was established in the country to provide the necessary information services for employees, administrators, experts, and all other personnel engaging in research. Riyadh City contains many special libraries, in a variety of subject areas, including technology and science, education and finance. In the following pages, some of Riyadh's excellent special libraries will be briefly discussed.

The Arab Bureau of Education for the Gulf States

This Bureau was established in Riyadh in 1975 to co-ordinate all aspects of education in the member states (UAE, Bahrain, Kuwait, Saudi Arabia, Oman, Qatar), to create joint education centres and organizations, and to co-ordinate the efforts of the member states in the field of education, science and culture, (World of learning, 1995: 1320).

Its Library contains over 20,000 monographs, 650 journal titles, and about 3,000 items of audio-visual material (as of 1993). It employs an in-house automated retrieval system to handle its various functions.

The Institute of Public Administration

"The Institute was opened in 1961. It offers courses and training to the government and private sector employees and conducts researches into and offers advice on administrative problems" (World of learning, 1995: 1323). Its training courses last from a few months to two years. The Institute is supported by its Library's good collections, equipment, and staff. It is particularly rich in materials on public and business administration, economics, and law, in both Arabic and English. "The most important feature of this library is the fact that it acts as a depository centre for all publications issued
by the government of Saudi Arabia" \textit{(Encyclopaedia of library and information science, 1979: 319).} The Institute gathers Saudi government documents and arranges them conveniently in one place. The Institute’s Library installed its automated library system, DOBIS/LIBIS, in 1983. The Library holds over 800,000 monographs, 12,000 periodical titles, and 250 items of audio-visual material (as of 1993).

**The Saudi Arabian Organization for Specification and Measurement (SASO)**

This organization was established in 1972 with the following objectives:

formulation and approval of national standards for all commodities and products, publishing of Saudi standards, promoting standardization awareness by publicity and other means, and setting the rules for granting certificates of conformity and quality mark and regulating their issuance and use (SASO, 1994).

In practice, SASO acts and participates as the representative of Saudi Arabia in the following organizations: (1) the International Organization for Standardization (ISO), (2) the International Electrotechnical Commission (IEC), (3) the Standardization and Metrology Organization for GCC Countries, and (4) the Arab Organization for Industrial Development and Mining.

SASO has a modern Library, with new IT equipment such as CD-ROMs, microfiches, and on-line services. Its collections, consisting of over 70,000 monographs, 100 periodical titles, and over 100 items of audio-visual material (as of 1993), relate mainly to standardization. The Library installed an in-house automated retrieval system in 1984.
King Faisal Centre for Research and Islamic Studies

This Centre, founded in 1983 as part of King Faisal Foundation (World of learning, 1995: 1320), is very active in supporting studies and research in various fields of Islamic civilization. It is financed by the sons of King Faisal Ibn Abdulaziz, so that it has been able to create a quite large Central Library containing fine Islamic materials. It possesses 90,000 monographs, 2,400 periodical titles, 20,000 manuscripts, and 6,000 audio-visual material (as of 1993). In addition to the Central Library, the Centre established in 1987 a Children's Library. In 1985, the Library chose the MINISIS retrieval system to handle its functions. It has developed many databases, including the Islamic Countries Database, the Saudi Authors and Publishers Database, King Faisal's Life Database, and the Islamic Manuscripts Database.

King Abdulaziz Research Centre

This centre was founded in memory of the late King Abdulaziz Ibn Saud. Its Library collects any materials that relate to the King, so that it now possesses very good historical, geographical, and cultural collections. The Library is not yet automated, but plans to automate its processing in the near future.

King Abdulaziz City for Science and Technology (KACST)

KACST was set up in 1977 as the Saudi Arabia National Centre for Science and Technology (SANCST). The modern Library, which is one of Saudi Arabia’s finest, is planned to support KACST's various goals. It offers on-line searching, CD-ROM, and microfiche facilities to its patrons. “The Library's collections centre on science and technology, and are particularly strong in science policies, research management, solar energy, nuclear energy, information technology, and other related fields” (Al-Tasan, 1992:
The Library contains 10,400 monographs, 322 periodical titles, and over 363,000 audio-visual material (as of 1993). It currently employs an in-house retrieval system. "KACST library has developed the following databases to promote resource sharing in the Kingdom: 1) union list of periodicals database; 2) union list of Arabic periodicals; and 3) current awareness databases" (Al-Tasan, 1992: 493 f.).

1.2.4 Public Libraries

Currently, there are three public library bodies providing services in Riyadh City. Their descriptions follow.

The Department of Public Libraries in the Ministry of Education

This government department finances and supports many public libraries throughout Saudi Arabia. The libraries administrated by the Department of Public Libraries provide basic services such as manual cataloguing and classification. Processing is central within the Department, after which books and catalogue cards are distributed to the public libraries in different regions of the country. "Unfortunately, this centralized processing frequently results in the materials' being aimlessly acquired without regard for the needs of the users. Another problem is the small number of public libraries in some of the big cities of the country" (Al-Nahari, 1987: 70).

The British Council Public Library

The British Council Library provides only collections in English. The Library contains 9,860 monographs, 57 journals, and 100 items of audio-visual material (as of 1993). "It was founded in 1970 and has two branches: in Jeddah and Dammam" (World of learning, 1995: 1320). The Library makes an annual charge to its patrons for use of the
facilities. Its services are greatly appreciated by the public and it has recently introduced a new service: lending audio-cassettes. Moreover, this Library offers access, through the British Library, to a wide range of computerized on-line databases.

King Abdulaziz Public Library

This Library was founded in 1985 and officially opened to the public in 1988. It is financed and supported by the Saudi Crown Prince, Abdullah Ibn Abdulaziz, and has built up good collections for public use. It provides many services to its users, such as an on-line catalogue, CD-ROM facilities, copying, and large reading rooms.

The principle objectives of the library are:
1. To acquire material of all fields.
2. To enable the public to obtain benefits from the library collections and services.
3. To organize its collections using the newest technology which will help provide better information processing and services.
4. To help preserve the national heritage and information sources.
5. To cooperate with other national and international libraries and organizations.
6. To provide information services for the purposes of scientific research and development of knowledge (King Abdulaziz Public Library, 1990: 2-4).

The Library collects Arabic, English, and French books and periodicals, government documents, and audio-visual materials. It has the special collections of King Abdulaziz Ibn Saud. The Library was computerized in 1988 and utilizes the MINISIS system. It holds 110,000 monographs, 1,400 current journals, 1,142 manuscripts, and 2,074 items of audio-visual material (as of 1993). Presently, the Library is building up a Children's Library alongside the main library. The new Library is expected to be successful on account of the evident public need for such a Library with modern Children's Library facilities.

1.2.5 School Libraries

School libraries in Saudi Arabia are supervised and administered by the Department of School Libraries in the Ministry of Education, General Presidency for Girl's Education,
the religious institutes, and the Ministry of Defence. The remit of these bodies is to supervise, manage, and establish school libraries, as well as to take responsibility for acquiring all school library books and furniture. Al-Nahari (1987: 72) noted that the establishment of a library in any particular school would be up to the responsibility of the particular school's principal. Some principals feel that a school library is an important element of the school's education provision and would make the effort to open one, depending on the availability of space. Some school principals, however, prefer only to open classrooms in order to accommodate the increasing enrolment, while others try to compromise between classrooms and libraries in assigning space. In fact, Khalifa (1981: 105) noted that most Saudi schools have no libraries at all and the existing ones are not real libraries in the true sense of the word; in most instances they are merely a small collection of books, of around 500 volumes, placed in a small cupboard. The school libraries of Riyadh are unable to provide any effective services because of the lack of qualified librarians and of the poverty of collections. However, in 1992, the Ministry of Education began hiring librarians to teach and also work as librarians in school libraries, a move which may well reduce one aspect of library problems in Saudi Arabia.
References


CHAPTER TWO
THE STUDY

2.1 Statement of the problem

Riyadh libraries are facing several problems at the present time. Firstly, lack of computerization and standardization in technical processing is considered major problems by many, if not all, Riyadh library staffs. Secondly, although the national library was officially established in 1990, it has still not carried out all the functions planned for it. For instance, there is still a lack of information sources such as a union catalogue of monographs, union list of serials, national bibliography, indexes, and abstracts compiled by the library's staff. In addition, there is a lack of library legislation and national information policy. Finally, although communication and telecommunication systems and services have improved recently in Saudi Arabia, they are still under-used by Riyadh libraries to communicate with each other or with international databases.

These problems have affected co-operative activities among Riyadh libraries. Establishing a bibliographic network among Riyadh libraries could be one important way to improve library services and activities in the city. An investigation of the feasibility of establishing this network is the aim of the present study. Therefore, this proposal is an attempt to investigate and describe the technical (rather than human) aspects of establishing such a network.

2.2 The need for the study

At the present time there are many libraries in Riyadh City. Most of these libraries may be considered to be well equipped, well staffed, and well structured. However, there is
a lack of co-operation and co-ordination in the libraries' activities. Some studies have already been made of attitudinal problems affecting the establishment of any co-operative activities among libraries in Saudi Arabia. However, few attempts have been made to examine the technical problems in Riyadh libraries. Consequently, a scholarly study is needed to investigate the existence of such problems among Riyadh libraries.

2.3 Statement of purposes

The objectives of this study are to investigate the desirability and possibility of establishing an on-line bibliographic network among the libraries of Riyadh City in Saudi Arabia, the technical problems which might prevent the linkage of libraries in Riyadh, the possible benefits that Riyadh's libraries may expect to derive from networking, what the libraries of Riyadh themselves see as benefits of networking, and to develop a management plan for the proposed network.

2.4 Research Questions

The following question is the basis for our detailed investigation: 'Is the proposed network technically feasible?'

This primary question entails the following more detailed questions:

1. How many libraries are there in Riyadh City?
2. What types of library are these, e.g. academic, public, or special?
3. What are the existing library materials?
4. What is the current status of computerization in Riyadh's libraries?
5. What kinds of computer hardware do they use?
6. What software retrieval systems are currently employed in Riyadh's libraries?

7. What kinds of operating system do Riyadh's libraries use?

8. Do Riyadh's libraries utilize any communication or telecommunication networks in their activities?

9. Do Riyadh's libraries employ national or international communication networks?

10. Do Riyadh's libraries utilize the Saudi packet telecommunication network, Alwaseet, for their communication needs?

11. Would it be possible to link different computer systems?

12. Is there a specific budget for information technology (IT) in Riyadh's libraries?

2.5 Limitations

This study is limited to the libraries in Riyadh City because Riyadh contains the largest number of libraries in Saudi Arabia as well as all types of libraries. Moreover, a number of these libraries are currently using some form of automation in their processing. However, schools and some special libraries have not been included because they are at a basic level of development and still in need of elementary library structuring so that presently they are frequently unable to satisfy their user's needs and cannot be compared in standard with the libraries included in the study in the area of resources and services.

2.6 Definitions of terms

1. Network: “An interconnected group of computers or terminals linked together for specific purposes, such as sharing bibliographic or data files” (Boss, 1985: 164).

2. Library co-operation: “A group of libraries which have come together to develop (often computer-based) services for the benefit of the member libraries” (Tedd, 1993: 300).
3. **On-line:** “Direct access from a terminal to a computer's CPU enabling virtually immediate processing of input” (Tedd, 1993: 302).

4. **Bibliographic record:** “A collection of data elements, organized in a logical way, which represents a bibliographic item; in machine system, a collection of fields describing one or more bibliographic units treated as an entity” (Gredley & Hopkinson, 1990: 295).

5. **Bibliographic network:** A network of linked computers intended “for co-operative creation, exchange and use of bibliographic records” (Gredley & Hopkinson, 1990: 304).

6. **Protocol:** “A set of rules formulated to control the exchange of data between two communicating parties” (Halshall, 1992: 758).

7. **Open System Interconnection (OSI):** “A framework for communications which facilitates the interworking of computer systems, both within an organization and between organizations, irrespective of the nature of the computer systems involved. This is achieved through a Basic Reference Model, which co-ordinates the development of existing and future standards for interconnection” (McLean, 1988: 1).

8. **Standards:** The “International Organization for Standardization (ISO) defines a standard as a technical specification or other document available to the public, drawn up with the cooperation and consensus or general approval of all interests affected by it based on the consolidated results of science, technology and experience aimed at the promotion of optimum community benefits and approved by a body recognized on the national, regional or international level” (Horsnell, 1988: 117).

9. **Telecommunication:** “The long-distance transmission of signals over communication links or channels” (Young, 1983: 225).
2.7 Methodology and procedures

The method utilized in conducting this study is the descriptive survey research method, which provides the best means of collecting original data, determining the present situation, and searching for contemporary data relating to the activities and developments of Riyadh City libraries. Line (1967: 11) identified the library survey as a systematic collection of data concerning libraries, their activities, operations, staffing, use, and users at a given time or over a given period. The survey research method is thus an exploratory tool. Busha and Harter (1980: 54) pointed out that survey research is useful in obtaining empirical knowledge of a contemporary nature and added that this technique can save time and money without sacrificing efficiency, accuracy, or information necessary to the research process.

The survey method has been used extensively in the library community to collect factual information and to measure attitudes. It is a measure which “allows investigators to gather information about target populations without undertaking a complete enumeration” (Busha and Harter, 1980: 54). It was suggested by Line (1967: 17) that survey research can be used to bring complex situations under control, to provide information, to satisfy curiosity, and to motivate individual libraries by the perceived need for improvement.

Earlier studies on networking in Saudi Arabia (written by Al-Swydan, 1988; Al-Tunisi, 1988; Al-Ghamidi, 1988; Hafez, 1989; and Al-Salem, 1994) have employed survey research techniques to gather factual information and to measure Saudi libraries' attitudes towards networking. Their success confirms that the best method to investigate the present situation of Riyadh City libraries is through survey research using both questionnaires and interviews.
Answers to the research questions involved in this study were obtained by using questionnaires, interviews, and analysis of relevant literature.

2.7.1 The questionnaire

A basic questionnaire was designed in order to gather information about the present status of Riyadh City libraries (see Appendix A). The questionnaire contained questions regarding libraries' names, types, collections, computerization, computer types, operating systems, software retrieval systems, computer storage capacities, telecommunication networks, and information technology (IT) budgets.

The questionnaire was written in English and then translated into Arabic (see Appendix B). The researcher travelled to Riyadh City during the months of March and April 1993, when he distributed the questionnaire and collected data for the present study from the libraries in the city. In order to ensure a high percentage of returned questionnaires, all questionnaires were collected within three to four days of their being handed out.

2.7.2 Population and sampling technique

The population included in the present study consisted of the heads of the forty-six libraries of all types in Riyadh City. In some of these libraries the heads referred the questionnaire to the librarian(s) in charge of the technical processing department. A list of libraries included in the survey will be found in Appendix C. The selection of libraries was according to the criteria stated in the parameters of the study. Forty-two questionnaires (91.3 per cent) were returned to the researcher within three to four days. Follow-up telephone calls and personal visits were made to encourage the staff of the four
unresponding libraries to return the questionnaires. At the end of April 1993, which was the
deadline for data collection, second telephone calls were made in an effort to obtain the
completed questionnaires, but these proved to be without avail.

Thus, a total number of forty-two questionnaires was analysed providing the results
presented in Chapter Six.

2.7.3 The interviews

The researcher travelled to, visited, and interviewed twelve carefully selected sample
libraries in Riyadh City (54.14 per cent) out of the total number of twenty-one libraries of
different kinds, (national, university, public, special) which the study survey showed were
currently using automation in their processing in order to obtain more specific information.
A list of the interviewed libraries will be found in Appendix D. A structured interview (see
Appendix E) was prepared in English and then translated into Arabic (see Appendix F).
The researcher travelled to Riyadh and was present there from the 11th January to the 9th
February 1996 for the purpose of collecting current data and additional information for the
scope of the present study. In particular, the researcher wanted to obtain a view of the
interviewed libraries' manpower resources, especially the proportion of their professionally
qualified staff in relation to the workload in their current acquisition work, processing, and
accessing. This was all intended to help better assess the potential benefits that these
libraries might derive from networking. The researcher also wished to invite libraries to
give their own perceptions of the possible benefits of networking.

In the interviews, the following questions were posed:
1. For what purposes is the computer used in the library?
2. Does the library maintain its catalogue in Arabic or Roman scripts, or both?
3. How many materials does the library purchase every month?
4. How many current serials does the library subscribe to?
5. How many materials are waiting for technical processing every month?
6. How many staff does the library employ?
7. What benefits would the Riyadh libraries gain from establishing a bibliographic network among them?

The analysis of the data obtained from the interviews will be found in Chapter Six.

2.7.4 Statistical analysis

Data obtained from the questionnaires and interviews was tabulated and coded, using a manual statistical methodology because of the small amount of data collected. The statistical analysis included means, frequencies, and percentages for the data gathered via the questionnaires and interviews.

2.7.5 The literature survey

This study employed the questionnaire and interview techniques to gather information, but in addition a comprehensive search of the literature was made in order to examine and analyse, as far as possible, the present status of library network activities in the West, especially in the United Kingdom and the United States of America. Particular attention was paid to the services and facilities provided, and the benefits that the libraries in the West gain by joining such networks.
Additionally, the literature about the different computer protocol suites was examined and analysed for the purpose of this study. The literature search drew in both published and unpublished materials.
Reference


CHAPTER THREE

REVIEW OF PREVIOUS RELATED RESEARCH

This review of related literature is divided into two sections, dealing respectively with previous related research on co-operation or networking in Saudi Arabia, and current networking activities in Saudi Arabia. It refers to both published and unpublished materials.

3.1 Previous related research

Some few tentative studies have discussed library co-operation and networking in the Kingdom of Saudi Arabia. These studies contain their writers' opinions and suggestions regarding some of the co-operative and networking activities among the libraries of Saudi Arabia, such as co-operative acquisitions, inter-library loans, bibliographical services, standardization, networking, and library automation. In the following pages, these related researches will be discussed.

Dohyan (1981) studied the feasibility of establishing an Islamic resource-sharing network among the university libraries of Saudi Arabia and the Republic of Turkey as representative Islamic countries. His survey was designed to gather data about university libraries in the areas of: collections, communication technology, microforms, and bibliographic control tools. His aim was to discover whether there was any library co-operation among Saudi Arabia and Turkey. The study focused on network concepts and management, bibliographic control, technology, communication forms, the requirements and responsibility of the proposed networks, and the obstructions in the way of the proposed network. Dohyan found that co-operation among universities in both countries was limited to specific topics, universities, and information services. He also found that both countries
were individually engaged in co-operative schemes with other countries, such as the USA, Britain, and other European countries.

In the area of building library collections, Saati (1987) discussed library co-operation activities in collection development. He noted that co-operative acquisition has been discussed for many years by library deans at annual meetings in Saudi Arabia but that they have achieved only limited co-operative activities. He further pointed out that Saudi Arabia university libraries compete with each other in buying manuscripts and gathering dissertations, which causes duplication in acquisitions and processing, and, consequently, the expending of much money on the purchasing and technical processing of these items in each library. Saati proposed that instead Saudi university libraries should establish a centre for collecting dissertations under one library administration to serve the whole country.

In another study on the same topic, Saati (1988) further stressed that the need for co-operation among university libraries had become even more urgent in view of the continued weakness of the relationship among universities in sharing materials and the serious cut-back in purchasing foreign materials, especially serials. Saati therefore proposed a number of desiderata that need to be achieved before the establishment of a co-operative programme among Saudi libraries:

1. The establishing of an office or association to co-ordinate co-operative programmes among Saudi libraries with a special budget contributed to by all participating libraries and information centres.

2. The evaluation of each library collection and assessment of users' satisfaction with these collections, in order to discover whether these collections meet the user's needs or not.
3. The setting-up of an official body which would be responsible for following-up Saudi library problems in collection development.

4. Saati pointed out that self-sufficiency in libraries is no longer a possibility because of the information explosion in every field, so that if Saudi libraries continue their present procedures they will fall behind in the coverage of scientific research.

Ekrish (1988) studied the problem of co-operative serials acquisition among Saudi libraries. He discussed the financial problems that Saudi libraries are facing as a result of purchasing materials, especially serials subscriptions, individually. He suggested that Saudi libraries should co-ordinate their activities in purchasing the most important serials instead of duplicating some subscriptions and consequently being forced to cancel subscriptions to some other important serials. Ekrish raised a number of questions related to his posed co-operative acquisition scheme among Saudi libraries. These were questions which he felt the libraries should respond to in order to establish a means of co-operative acquisition.

1. Should the co-operative serials-acquisition programme cover all Saudi libraries or, initially, only some of them?

2. How can Saudi libraries communicate with each other: directly or through a co-ordinating medium?

3. Should the Saudi Post Office play any role in the proposed co-operative programme?

4. Are there are procedures or standards that may be workable among participating libraries?
Ekrish further pointed out that the success of a co-operative serials-subscriptions scheme depends upon the availability of good communications between the participating libraries, and, a serials union list, since they must know what each library subscribes to.

Tashkandy (1988) made a special study of co-operation among Saudi libraries in the area of inter-library loan services. He pointed out that the inter-library loans issue had been raised and discussed since 1980 and that a programme of inter-library loans had been formed by the Regional Arab Bureau of Education and yet had failed to deliver what was expected of it. Tashkandy further noted that Saudi Arabia has established many useful libraries in many cities with specific aims and objectives that could not be accomplished unless Saudi libraries encouraged and improved information services and co-operation among themselves. Tashkandy asked why the British Library, for example, had succeeded in its co-operative photocopying programmes internationally, while Saudi libraries failed to co-operate locally. He believed the answer to this question was that Saudi libraries were only too willing to discuss the problems of practising co-operation without actually starting to co-operate.

The Institute of Public Administration (1993) called for a further meeting to discuss in earnest the inter-library lending system among Saudi libraries. The Institute at first invited the main libraries and information centres in Riyadh, including King Fahd National Library, King Saud University Library, Imam University Library, King Abdulaziz Public Library, the Institute of Public Administration Library, KACST Library, the Ministry of Planning Library, and the National centre for Economic and Financial Information Library. Librarians from these institutions assembled for three series of meetings to discuss procedures for inter-library loan programmes and they agreed that King Fahd National
Library should co-ordinate the inter-lending services among all libraries. Notwithstanding, this programme has still not attained actuality.

In a useful study Al-Swydan (1988) has discussed the possibility of linking Saudi libraries' computers and the benefits that the libraries would gain from computerized cataloguing such as savings in time and effort, reduction in the rate of cost increases, the provision of better library services, and increased co-operation with other libraries. Al-Swydan expressed the belief that because the libraries in Saudi Arabia do not work together and share their bibliographic records by utilizing computer communications technology, they incur many problems such as the following:

1. The current cataloguing procedures are duplicated efforts whereby libraries hire many cataloguers to create original catalogue records for the same title, while libraries might have benefited from these librarians being set free to perform other services in the libraries.
2. The current library technical procedures do not provide good services for users because newly acquired materials wait a long time to be classified and catalogued.
3. Currently, Saudi libraries' technical procedures do not help in the creation of union catalogues.
4. Present procedures in Saudi libraries do not facilitate inter-library loan services.

Al-Swydan found that 90% of sampled libraries (10 libraries) utilize AACR2 (Anglo-American cataloguing rules, 2nd ed.), 80% of libraries use DDC (Dewey Decimal Classification), and 50% use King Saud University Subject Headings. Additionally, Al-Swydan found that the 10 libraries investigated, 9 of them being located in Riyadh City,
employed 40 cataloguers, i.e. an average of 4 cataloguers per library. Even so, this number of employees was not able to help in cataloguing the large workload waiting for technical processing. Consequently, Al-Swydan suggested that it was important to link the Riyadh libraries. At least two or three libraries should start to share their bibliographic records online and progressively enlarge the network until it covers all libraries and information centres in Saudi Arabia.

Al-Abduikreem (1988) pointed out that Saudi libraries must standardize their technical processing and their computer retrieval systems. He noted that most Saudi libraries use different computer retrieval systems. Therefore, he commented, establishing a centralized online bibliographic network is the only solution to these libraries' technical processing problems. He listed the benefits of such network as follows:

1. Information on where to find a specific document.
2. The possibility of doing centralized cataloguing and providing bibliographic information for any document.
3. Provision of inter-library loans and delivery systems in all its forms

Finally, Al-Abduikreem recommended the following

a) Standardizing the computer retrieval systems used by Saudi libraries and information centres.

b) Producing a Saudi national bibliography.

c) Establishing a centralized bibliographic database and library network.

d) Establishing a library association in Saudi Arabia, which could engage in every aspect of library work and bibliographical activity in the country.
Al-Ghamidi (1988) has attempted to investigate the existing status of Saudi university libraries and examine the attitudes and opinions prevalent in university libraries and among some university officials regarding the establishment of a university library network in Saudi Arabia. Co-operation among libraries was found primarily in the areas of inter-library lending, gifts and exchanges, and photocopying. The major impediments to establishing a network were found to be human factors, witnessed in lack of: co-operative planning, bibliographic control, standards, institutional leadership, and communication. Additionally, Al-Ghamidi expressed the belief that, from a technological point of view, university libraries were found to be capable of becoming involved in an automated co-operative network.

Al-Atram (1988) pointed out that Saudi libraries, especially university libraries, have operated and used computer technology since the early 1980s. Therefore, they have benefited from libraries' experience in America, where computer technology began to be used in the early 1960s. Yet Saudi libraries have chosen their computer software and hardware individually without any kind of arrangement or co-ordination between them. He therefore suggested one or the other of the following solutions to the problem that this policy has produced:

a) Saudi libraries should take OCLC as an international bibliographic network model and implement a similar programme.

b) Library bibliographic records should be exchanged in CD-ROM format and each library should keep its presently existing system.

c) An integrated library system on software for use in PCs should be used to handle all library functions.
Al-Atram suggested that any of the above solutions should be organized in a centralized site such as King Abdulaziz City for Science and Technology, or King Fahd National Library.

Al-Tunisi (1988) has investigated the status of co-operative programmes and activities currently existing in Saudi university and special libraries. His study identified the barriers and problems encountered in establishing a national information network in Saudi Arabia and his dissertation focuses on the attitudinal factors of motivation and willingness to act, personal ego, and negative feelings towards sharing library resources. Al-Tunisi finds that the co-operative activities among investigated libraries were ineffective and needed to be formally and scientifically planned. Additionally, his findings point to the existence of many problems including lack of an adequate role for the national library, a professional library association, library legislation and information policy, and government support. The negative attitudinal problems that he found included competition for the purchase of materials, fear of exchanging familiar processes as a result of utilizing new information technology, and fear of losing materials.

Hafez (1989) sought to investigate and analyse the condition of the present systems in the university libraries of Saudi Arabia, to determine the attitudes towards collaboration of the librarians in the seven universities, and to design a prescriptive model for resource sharing and an information system among Saudi university libraries. The findings of his study revealed that the problems of Saudi university libraries stem from a lack of co-ordination, an absence of national planning, and the present state of shrinking budgets. The majority of respondent libraries expressed the desirability of a co-operative system and felt that it is currently possible to establish such a system. Hafez has designed a model for
establishing a network system among Saudi university libraries. The model is described as a multi-functional distributed network.

Al-Dosary and Ekrish (1991) have studied the state of automation in selected libraries and information centres in Saudi Arabia. Their study's focus was on the capital city of Riyadh, where major automation projects take place. They found that ten different software packages are currently implemented by Riyadh libraries, and that DOBIS-LIBIS and MINISIS are the most widely used software packages. They also found a positive attitude towards automation, the great majority of their informants agreeing that automation increases library effectiveness. Furthermore, Al-Dosary and Ekrish reported that co-ordination of effort seems to be an absolute necessity. The development of in-house systems may be unjustified, since there are presently commercially available software packages, but the lack of co-ordination among the surveyed institutions seems to have deepened the differences, for each institution has created its own standards and adhered to them. Al-Dosary and Ekrish observed that continuing the practice will inhibit future co-operation.

Al-Salem (1994) sought to investigate the possibility of establishing a co-operative programme among libraries and information centres with KACST in Saudi Arabia in the area of information services. This work was financed and supervised by KACST because this institution believed that such an important issue among the county's libraries should be part of its own responsibilities and duties. Data were gathered for this study through a questionnaire survey and interviews with representatives of twenty-three libraries in Saudi Arabia. Al-Salem found that the investigated libraries varied in their technical processing practices, especially in cataloguing, classification, subject headings, and authority control
for entry of Arabic authors' names. He discovered in addition that these libraries also varied greatly in their usage of computer hardware and software. The study revealed that some of the investigated libraries possessed some of the tools that ease co-ordination and co-operation among them, such as union catalogues of holdings, guides, bibliographies, indexes, and abstracts. The majority of libraries expressed positively their wish to co-operate with KACST and, similarly, the majority agreed that KACST should be responsible for the proposed co-operation project on account of its proven success in establishing and managing two networks (Gulfnet and KACSTNET), which gave it the experience necessary for starting the proposed co-operative programme among Saudi libraries. Finally, Al-Salem noted that his study revealed that a number of problems still confront co-operation among Saudi libraries, including matters of technical, financial, human, and administrative relevance. He suggested that Saudi libraries should solve these problem quickly before they began to practise any kind of co-operation among themselves. He further suggested that it was necessary to improve awareness of the importance of library co-operation among librarians and decision-makers in the country so that in future libraries and librarians might work together in a united strategy.

According to Hamade (1995), Saudi Arabia was the first country in the Middle East to build its database, KACSTNET, and make it available to organizations in the country through an on-line searching system. Hamade also noted that Saudi libraries had benefited from the long experience of libraries in North America and Western Europe in implementing computer technology to automate their functions. He observed further that the computer services in Saudi libraries have a number of shortcomings that can be summarized as stemming from manpower shortage, language barriers, and lack of co-operation. He expressed the belief that these problems should be addressed in depth in order
to find suitable solutions and fulfil the information needs of end-users. Thus, manpower shortage may be solved by speeding the Saudization process through extensive training of Saudi nationals and by training candidates for employment to a level of high competence in the English language. Hamade stressed that co-operation among Saudi libraries and information centres should be encouraged not only at the automation level, but also at other levels such as circulation, cataloguing, classification, and inter-library loans. These functions should also be based on a clearly defined policy formulated with the goal of meeting the information needs of their end-users rather than according to personal relationships.

In an article "Saudi Arabian national databases and use of Gulfnet/BITNET at KFUPM Library, Dhahran", Qureshy (1995) observed that Saudi university libraries still suffer from a lack of co-ordination with one another, an absence of national planning, and an insufficient number of professionals. He expressed the belief that these problems require urgent attention, especially in the areas of resource sharing and technical co-operation and he suggested further that there was a need to enhance the utilization of networking.

In a report for the King Faisal Centre entitled Proposal for the establishment of a communication centre among ten main libraries in Saudi Arabia with King Faisal centre for Research and Islamic Studies Library as a central node and co-ordinator, Al-Khairigi (1995) suggested that the ten libraries referred to should begin to communicate with each other on-line and benefit from their current use of computer technology. His proposal encompassed the following libraries:

1. King Faisal Centre for Research and Islamic Studies Library in Riyadh
2. King Saud University Library in Riyadh
3. Imam University Library in Riyadh
4. KACST Library,
5. Gulfnet Academic network
6. King Abdulaziz University Library in Jeddah
7. The Institute of Public Administration Library in Riyadh
8. King Fahd National Library in Riyadh
9. King Fahd University of Petroleum and Minerals in Dhahran
10. King Abdulaziz Public Library in Riyadh

Al-Khairigi stated that the network should allow King Faisal Centre Library staff and users to link and benefit from the proposed libraries' databases and also make them accessible for educational and research purposes. The aims of Al-Khairigi's proposed network are: to serve researchers, to help researchers learn what is available in other libraries, to serve acquisition purposes, and to satisfy any member's needs with regard to specific data.

King Fahd National Library (KFNL) (1995) conducted research into the matter of establishing a national union catalogue of Saudi libraries based on CD-ROM technology. This research is not yet concluded and published, but KFNL has produced a written report containing a questionnaire survey, which it has been sent to most libraries throughout the country. In the report it was stated that Saudi libraries are presently unable to communicate with each other and share each other's resources because of technical, administrative, and financial problems which cannot be solved at the present time. Therefore, the library suggested the use of CD-ROM technology to make a union catalogue of Saudi libraries'
holdings and stated its willingness to finance and support this project with the help of Saudi librarians in technical matters only. This project therefore aims to:

1. Compile the Saudi libraries' union catalogue in CD-ROM format and then distribute it to the libraries, organizations, and researchers who may subscribe to it;
2. Help co-operation and co-ordination among Saudi libraries in the areas of acquisitions, cataloguing, information services, and inter-library loans;
3. Ease the retrieval of Saudi libraries' holdings and gain knowledge of how to access them for information services and technical purposes;
4. Save money and make the best use of the resources.

KFNL pointed out that this project would be the first step toward establishing a bibliographic database in the library for Saudi libraries. After collecting all the CD-ROMs from the participating libraries, KFNL will save them onto its own bibliographic database, after which Saudi libraries may then link and access the KFNL bibliographic database online. The report suggests that, after completing this project, Saudi libraries can then standardize their technical processing and KFNL can produce the national union catalogue in CD-ROM format.

In addition, KFNL plans to offer to Saudi libraries the CD-ROM at a projected cost of about £350-600 per annum in order to encourage small libraries throughout the country to subscribe to and purchase the Saudi libraries' union catalogue.

In furtherance of this project, KFNL sent to libraries in Saudi Arabia a questionnaire survey containing questions regarding libraries' names, collections subjects, types and
percentages of materials, numbers of bibliographic records, level of cataloguing followed, cataloguing, classification, subject headings used, name authority used, name of retrieval system used, description of the system, whether or not MARC format was used, and information for grading Saudi libraries according to best practice in creating bibliographic records. The results of this questionnaire have not yet been published as they are still under investigation by KFNL administrative staff.

It will be seen that the studies reviewed above vary in their coverage of co-operation and co-ordination between Saudi libraries. For instance, Saati (1987), Al-Ghamidi (1988), and Hafez (1989) limited their studies to include only Saudi university libraries, while Al-Tunisi (1988) expanded the boundaries of his study to include academic and special libraries. Ekrish (1988), Al-Swydan (1988), Al-Dosary and Ekrish (1991), Al-Salem (1994), and KFNL (1995) further expanded the bounds of their studies to cover nearly all types of library in the Kingdom.

All these studies looked at the same problem of the possibility of establishing a co-operative programme among Saudi libraries and they agreed on the following points:

1. Lack of standardization in present technical processing practices (cataloguing and classification).

2. The need for an officially designated co-ordinator to manage and help libraries to establish a co-operative programme.

3. The obvious weaknesses of current co-operative programmes in Saudi libraries and the need for scientific plans to begin to establish such a programme.
4. Recognition that Saudi libraries are presently facing many problems including shortage of qualified librarians, and lack of library legislation and information policy.

5. Recognition that librarians in the country actually wish that Saudi libraries were linked in a co-operative network in order to satisfy libraries' and users' needs.

The above review of the literature pertinent to the present study indicates the existence of many current problems among Saudi libraries. Establishing the proposed network could be a helpful means of overcoming some of these problems.

3.2 Networking activities in Saudi Arabia

Despite the current problems described above that Saudi libraries face in matters of co-ordination and co-operation, Saudi Arabia has nevertheless managed to establish and coordinate Alwaseet network, Gulfnet, and KACSTNET. These achievements will be described below.

3.2.1 Alwaseet

Saudi Telecom has recognized that establishing a packet switching network is very important for today's telecommunications, so that the Saudi Communications Centre at the PTT Ministry started a packet switching system called Alwaseet as a gateway service to interested libraries and institutions.

Al-Dosary (1991: 85) pointed out that many countries have set up data communications, called packet switching systems, and that Saudi Arabia is one of these countries, as in 1989 it established a packet switching network names Alwaseet. This packet switching technology uses the following means to offer the benefits mentioned:
- High speeds and multiplexing, which cut line costs and allow new computer applications.

- The use of international standards, particularly CCITT [the Consultative Committee for Telegraphy and Telephone] Recommendations X.25 and X.28, which ensures that connecting users' equipment is a straightforward task.

- Error checking protocols along with constant surveillance by the Alwaseet Network Management Centre, which form the basis for reliable and error-free data transmission.

- As a public network, Alwaseet can be accessed by a very large number of users who effectively share and reduce costs to the benefit of all (Saudi Telecom, 1993a: 2).

Alwaseet operates in line with international recommendations and standards. Saudi Telecom is a member of CCITT, ATU (the Arab Telecommunications Union), and ISO (the International Standard Organization) (Saudi Telecom, 1992: 8). Moreover, Alwaseet provides the most requested speeds offered in both national and international markets, and access to over forty countries (Saudi Telecom, 1993b: 6 f.). It may, furthermore, be accessed in several ways, using a range of hardware from PCs and teletypes to mainframes, and the backbone of Alwaseet is a network of three exchange nodes in the cities of Riyadh, Jeddah, and Dammam, linked by high-speed data lines (Saudi Telecom, 1993a: 7). Publicity for the service describes Alwaseet as a remarkably economical and cost effective facility when compared with a number of private data lines (Saudi Telecom, 1992: 5).

Alwaseet offers the following services and applications to its users: information retrieval, time-sharing, electronic messaging, file transfer, software development, credit authorization, reservation systems, and the 'Add-On' network. Additionally,
Alwaseet Dial-up-Service offers the personal computer user many valuable features and benefits to improve his worldwide communication including: database access on hundreds of subjects in over 35 countries; electronic mail throughout the world; minimum equipment; low cost; reliable and accurate; full compatibility; and wide speed range supports from 300 bps up to 2400 bps (Saudi Telecom, 1994).

3.2.2 Gulfnet and KACSTNET

King Abdulaziz City for Science and Technology manages and co-ordinates two networks in Saudi Arabia and the Gulf States. In fact, KACST performs a fine role in co-ordinating communication networks in the region. KACST has also established many databases and made them available for Gulfnet and KACST member institutions free of change. Qureshy (1995: 252 f.) lists these databases as follows:

1. Science and Technology Bibliographic database (English)
2. Arabic Science and Technology Bibliographic database
3. Manpower database
4. Union List of Serials database
5. Current Awareness database
6. Science and technology Terminology database (BASM)
7. On-line Library Catalogue
8. Research Project database
9. Project Review database

Hamade (1995: 33) mentions that in 1993 KACST started its own network of CD-ROM facilities, which was easily accessed by other members of KACSTNET and Gulfnet.
KACST operates Gulfnet Academic network, which was established in 1985. Al-Tasan (1992: 494) stated the Gulfnet is the first computer network in the Arab world designed for the academic and research institutions, in this case those lining the western shores of the Persian Gulf. "The main objective of Gulfnet is to promote co-operation in the academic and research community for facilitating and exchange of information between users at different nodes who share common backgrounds and interests" (KACST, 1992: 3).

Gulfnet provides the following services:

Electronic communication
File transfer
Electronic mail
Users' directory
Access to KACST databases
Teleconferencing
Answering mail
Electronic bulletin boards

In fact, Gulfnet members can access library catalogues and search their OPACs. Gulfnet also helps researchers to learn what is available in the members' libraries. Furthermore, Hamade (1995: 33) pointed out that Gulfnet also provides members with free access to all KACST databases and to international networks such as BITNET in the USA and EARN in Western Europe.
Additionally, KACST has established within the city itself a network called King Abdulaziz City for Science and Technology Network (KACSTNET). "The network is connecting more than 60 members' institutions throughout the Kingdom with each other. Member institutions can retrieve information stored in the bilingual national retrieval systems through this network" (KACST, 1990: 26).

It is thus clear that KACST has accomplished many useful services for Saudi libraries and researchers, making all KACST databases, Gulfnet, KACSTNET, KACST CD-ROM network, and their facilities and services available to its users with no charges at present. A number of writers, including Al-Ghamidi (1988), Al-Tunisi (1988), and Al-Salem (1994), have suggested and recommended that KACST should co-ordinate any co-operative programme among Saudi libraries.
References


CHAPTER FOUR
EXISTING LIBRARY NETWORKS

The purpose of the literature search in this chapter is to examine and provide an overview of the current status of library co-operation and/or networking activities and practices in the West, with particular emphasis on the United Kingdom and the United States of America. Particular attention is paid to the services and facilities which the libraries obtain by joining such networks. This literature survey is presented according to the following categories: development of library networks in the UK; library network activities in the USA; library networks in other selected countries; and the key benefits and the major problems of library networking.

4.1 Development of library networks in the United Kingdom

The UK has developed a number of important networks, so that BLAISE, BLCMP, LASER, SLS, CURL, JANET and SuperJANET are all now providing fine services and facilities to their members. These different networks will be described in the following pages.

4.1.1 BLAISE

"The British Library Automated Information Service (BLAISE) became operational in early 1977 and has since established itself as one of the world’s largest services" (Hunter, 1987: 177). BLAISE is part of the British Library National Bibliographic Service (BLNBS), which is based in and operated from Boston Spa in West Yorkshire. Currently, BLAISE provides three on-line services: BLAISE-LINK, BLAISE-LINE, and BLAISE-RECORDS. Hunter and Bakewell (1991: 214 f.) describe these services as follows:
Firstly, BLAISE-LINK is operated in collaboration with the National Library of Medicine and offers access to its databases. Secondly, BLAISE-LINE is the British Library's own online service offering bibliographic data in all subject areas. Thirdly, BLAISE-RECORDS offers record supply facilities from the BLAISE-LINE database backed up by OCLC.

BLAISE-LINE is now offered through the British Library's Medical Information Centre. The British Library is responsible for the UK input to MEDLINE, which is the world's most widely used database for medical information. The software package known as Grateful Med makes it easy for people to search the databases with the minimum of training (BL, 1994). Hunter and Bakewell (1991: 214) point out that BLAISE-LINK offers access to the biomedical and toxicological information on major databases such as MEDLINE. Lee (1991: 16), moreover, mentions that the BLAISE-RECORD service launched in January 1988 offers MARC record supply facilities from BLAISE-LINE databases and, in addition under a Joint Service Agreement signed in 1988, OCLC records are made available to subscribers of the service. According to Rowley (1993: 295), BLAISE-RECORDS manages record-supply facilities, via downloading or on magnetic tape, from the various BLAISE-LINE databases. Additionally,

BLAISE-RECORDS offers libraries bibliographic records for downloading into local systems. Selection of records can be on-line from the BLAISE files or from the catalogue bridge Service. Records can be supplied on a variety of media including IBM mainframe tape, DAT and other popular PC tape devices. Current cataloguing and retrospective services are available (BL, 1994).

"BLAISE-LINE, which was established in 1977, is an interactive on-line retrieval system accessing the British Library's database of MARC records" (Roberts and Price, 1990: 299 f.). BLAISE-LINE is available to all types of libraries and provides useful aids to assist libraries; functions such as cataloguing, classification, and inter-library loans. Thus, the British Library points out in its publication, *BLAISE-LINE: key into a wealth of knowledge*, that BLAISE-LINE services are aimed at the following:
- Reference librarians, researchers, or publishers for subject enquiry work, tracing authors and compiling bibliography.
- Acquisition librarians or booksellers for checking publication details, prices and availability.
- Cataloguers to assign subject classification numbers and indexing terms.
- Inter-library loans librarians to check whether items are in stock at the Document Supply Centre and order them on-line without leaving the BLAISE-LINE system.
- Anyone who needs accurate up-to-date details about world-wide publications (BL, 1995a: 2).

BLAISE-LINE databases currently (1995) offer the following:


"BLAISE-LINE is accessed over BT's PSS or DIALPLUS facilities or over networks such as JANET and the Internet" (BL, 1995b). The availability of BLAISE-LINE via JANET (the Joint Academic Network) and the USA's global Internet makes it cheaper and more convenient for use by the academic community.

4.1.2 BLCMP

"BLCMP Library Services Ltd. was established in 1969 as the Birmingham Libraries Co-operative Mechanisation Project" (Hunter and Bakewell, 1991: 216). Hall and Watson (1990: 271) state that BLCMP was founded to explore the potential of shared use of the British National Bibliography and the Library of Congress machine-readable catalogue (MARC) records. BLCMP was the first bibliographic utility in the UK. It originally consisted of the libraries of Aston and Birmingham Universities, and Birmingham Public Library. Mitchell (1993: 17) points out that BLCMP's background parallels that of OCLC in that it was founded in the 1960s as a co-operative cataloguing project, between the public
and university libraries in Birmingham, to realize the benefits of a shared approach to library computing. Tedd (1993: 78) notes that from 1969 until 1975, BLCMP was supported financially by the British Library Research and Development Department (then known as OSTI). In 1977, it became a completely independent and autonomous organization known as BLCMP (Library Services) Ltd.

"The BLCMP's databases have grown from the 7.5 million records reported in 1986 to 10 million in 1991" (Lee, 1991: 17). "The BLCMP database now holds nearly 13 million records and is achieving hit rates for BLCMP cataloguers consistently above 90%" (BLCMP news, 1994: 1). "BLCMP databases include BLCMP Union Catalogue 43%, British National Bibliography (BNB) 1950-date 12%, Whitaker's Book in Print 12%, BLDSC 8%, British Catalogue of Music 1%, and HMSO 1%" (BLCMP, 1993). Moreover, while BLCMP membership in 1969 consisted of only three libraries, "currently, BLCMP provides services to 63 major British and Irish libraries authorities as follows: 20 public libraries; 10 college libraries, 31 university libraries; and 2 national/special libraries" (BLCMP news, 1994: 4).

**BLCMP Products and services**

BLCMP provides many facilities and services to its member libraries, such as shared cataloguing, retrospective conversion, stand-alone system, electronic data interchange (EDI), campus-wide information service (CWIS), acquisition, circulation control, and public access OPAC.

BLCMP was founded as a co-operative cataloguing project. Hunter and Bakewell (1991: 216) point out that BLCMP has designed and implemented a computer system which
utilizes the UK and US MARC databases, and also produces records locally in the MARC format. Rowley (1993: 296) notes that BLCMP maintains extensive MARC databases, which include records for books, audio-visual items, music, and serials. Records are of two types: general bibliographic records and local records containing information pertaining to a particular library. Furthermore, “BLCMP cataloguing systems allow library staff to search for, edit, and create records and also provide reader access through on-line inquiry terminals or via microfiche or printed output” (Hall and Watson, 1990: 275).

BLCMP's new Talis system for cataloguing has many features as follows:
- One step searching of both Talis and BLCMP databases.
- Fast creation of catalogue records using BLCMP's Database of 12 million records.
- Over 90% of items to be catalogued by BLCMP libraries are found on the database so that original cataloguing work is minimised.
- Records are transferred automatically from the BLCMP Database into Talis cataloguing for full on-screen editing.
- User friendly intuitive interface is provided for on-line cataloguing.
- Easy to enter details of individual copies or transfer details from acquisitions (BLCMP, 1993).

Lee (1991: 17) reports that a number of retrospective cataloguing projects have been carried out at several universities including Birmingham, East Anglia, Sheffield, and Warwick, as well as public libraries at Birmingham and Glasgow.

In recent years BLCMP has been putting more effort into stand-alone systems. According to Mitchell (1993: 17), BLCMP is the leading computer system supplier to public and academic libraries in the British Isles. Tedd (1993: 79) notes that in 1992 BLCMP released the Unix-based library management system, known as Talis, which will stand alongside BLS. “Talis is now running at 12 customer libraries and is being installed at a further 5 libraries” (BLCMP news, 1994: 1).
In addition, BLCMP’s member libraries can access and search Talis OPAC by author, title, keyword, subject, or classmark. Talis OPAC can be made available over local networks and via JANET.

Electronic data interchange (EDI) is a facility for BLCMP member libraries to trade electronically with suppliers.

25 BLCMP libraries are now using BLCMP’s EDI clearing house service and approximately 4000 transactions per week are being passed through the system, 18 major suppliers are already involved and specific efforts are being made to bring smaller supplier and overseas booksellers into the system (BLCMP news, 1994: 1).

The EDI service provides a number of advantages for BLCMP members such as use of the existing BLCMP network; referral to BLCMP as a clearing house; no cost to BLCMP customers; full integration with BLCMP’s BLS and Talis software; on-line, interactive transmission; and full security and audit checks (BLCMP, 1993).

The University of Birmingham and BLCMP have collaborated to produce a campus-wide information service (CWIS) to connect to remote user terminals. “CWIS from BLCMP has many features including: campus-wide information, community-wide information, Unix, client-server, standards-based, windowing-interface BLCMP support, and Gateway to external information sources” (BLCMP, 1993). Moreover, “the BLCMP CWIS is able to interwork with Gopher and allows information held within the CWIS to be presented to “Gopher-Space” as if it were from a Gopher server. Interworking with World Wide Web is the next stage” (BLCMP news, 1994: 1). BLCMP CWIS offers a number of useful information services for academic libraries, such as diary of events, name/telephone directory, library service, travel information, careers, newsletters, computing services, course information, and sporting information. BLCMP CWIS also provides information to
public libraries, including a diary of events, council services, library services, information on employment and training, newsletters, and health and sporting information.

4.1.3 LASER

LASER (London and South-Eastern Library Region) is another bibliographic service in the UK, the main aim of which is to provide bibliographic and inter-library lending support to all types of libraries. According to Hendrix (1992: 8), LASER is an independent company within the University of London, which supports bibliographic searching, inter-library lending (ILL), electronic messaging, and transportation of ILL materials.

LASER is the principal organization for library co-operation in London and the South-East of England and is the network host and central database of the national and international VISCO COUNT interlending and bibliographic records service (LASER, 1993).

LASER was established as the result of an amalgamation between the London Union Catalogue (LUC), established in 1929, and the South-Eastern Library System (SERLS), established in 1933 (Plaister, 1990: 291). This merger was proposed by the 1961/2 working party on Interlending Cooperation in England and Wales and took place in 1969. The original functions of these regional systems were to facilitate the inter-lending of books among libraries within an area and via the National Central Library, to act as centres of bibliographic information, and to main union catalogues (Hunter, 1987: 181). This, LASER started life with a focus on inter-lending and resource sharing, rather than on cataloguing (Rowley, 1993: 296).

According to Tedd (1993: 79), LASER converted its union catalogue into MARC format in the mid 1970s. This work was undertaken at the request of member libraries that
were eager to make use of these records retrospective catalogue conversion projects. At the request of the British Library, this became the official retrospective conversion of BNB back to 1950.

LASER network activities began in 1970 and had involvement not only with inter-lending but also with cataloguing and with other technology such as the viewdata system (Hunter, 1987: 181).

**LASER Services and Facilities**

LASER offers a range of services to its members including the following: a large bibliographic and inter-lending database known as VISCOUNT, a record supply service, a transport scheme, a specialist Indic language service, and retrospective conversion.

**VISCOUNT**

VISCOUNT is an inter-library communications network. “The original initiative for the creation of database and development came from LASER. LASER pioneered the automation of library holdings, or location, for direct interlending between libraries” (LASER, 1994a).

VISCOUNT began in August 1985 with the aim of providing a nationally co-ordinated interlending and bibliographical network. The VISCOUNT database and network has developed from the long established United Kingdom interlending infrastructure which comprises ten library regions and the British Library Document Supply Centre (BLDSC) (LASER, 1994b).

There are almost 4 million bibliographic records on VISCOUNT generated by a number of sources:
- The British Library UKMARC Database 1950-date
- BLDSC Current Serial Holdings
- Book stock of BLDSC 1980-date
- LASER Extra-MARC 1901-date
- CILLA database (catalogue of Indic language material).
- SEALS database of European fiction
- LCMARC and OCLC MARC - for titles held by VISCOUNT libraries.
- Whitaker records (partial file).
- LASER continuing process of producing machine readable records for material published pre-1901 (LASER, 1994a).

Bromley and Allot (1992: 30) state that access to VISCOUNT services can be achieved from viewdata terminals or IBM-compatible PCs. These not only allow preparation of inter-library loan requests and bibliographic checking, but also use of a store and forward electronic messaging system for sending and receiving requests to and from other VISCOUNT users. In fact, VISCOUNT also provides a range of services to its member libraries including on-line searching, locating and obtaining materials, the VISCOUNT database and network (used primarily for item and location identification), inter-library lending, and the union catalogue. LASER record supply services cover a range of sources including the British Library, OCLC, and in-house catalogued extra-MARC material. The collection of extra-MARC material dates back to before 1900 and provides cataloguers with full MARC-standard records for any item with no other machine-readable record (LASER, 1994c).

LASER is one of the participants of the ION (Interlending Open Systems Interconnection Network) project, which links the inter-lending systems of the UK, the Netherlands (Pica), and France (Sunist). Smith and Hendrix (1992) point out that LASER is the leading organization of the project and that BLDSC participates as a major document supplier and also through its involvement in the planning of the UK services available to Dutch and French libraries. “ION went fully operational in November 1993 and the UK has 12 public, 9 academic, and 1 special library using the international link” (Hendrix and
Patterson, 1994). Harries (1993: 130) notes that ION aims to demonstrate the capabilities of the Open System model for supporting inter-lending and, in particular, to gain experience of using the Inter-library Loan Protocol and the Search and Retrieve Protocol; and to create stronger links between the European national information infrastructures in doing so. Moreover, Hendrix and Patterson (1994) mention that the ION project has the following three objectives:

1. To achieve inter-connection between three computerized library networks in the UK, the Netherlands, and France in order to support and develop international inter-lending and service messaging.

2. To demonstrate the capabilities of the OSI environment for inter-lending services by the inter-connection of computerized networks with different technical characteristics.

3. To improve the efficiency of international inter-lending services.

4.1.4 SLS

SLS (Information System) Ltd. began in 1969 as SWALCAP (South-West Academic Libraries Co-operative Automation Project). "The founders of SWALCAP were four university libraries in the South-West of England and South Wales with the aid of a grant from OSTI (the Office for Scientific and Technical Information)" (Roberts and Price, 1990: 309).

According to Carter (1994), SLS was a pioneer in library automation in the UK, beginning with research into a co-operative circulation system in 1969. Since that time, SLS has successfully developed and implemented four different library systems: the original SWALCAP shared circulation system, two versions of the shared cataloguing system, and,
most recently, launched in 1986 (Roberts and Price, 1990: 310), the LIBERTAS stand-alone system. Gosling (1987: 14, 42) stated that the two main applications of SWALCAP were circulation and the sharing of cataloguing records. The cataloguing system enables libraries to create and maintain machine-readable files of bibliographic data and from these to generate catalogue output in a variety of forms. "SWALCAP's cataloguing service has been operational since 1978 and the system is MARC compatible" (Hunter, 1987: 181).

"Moreover, all members have on-line access to SLS's bibliographic database of over four million MARC records held in Bristol" (Carter, 1994). LIBERTAS also provides on-line access and transfer of records from the OCLC database of over twenty-five million MARC records. It is also possible to access a transfer records from any other LIBERTAS system. MARC records from other sources can be loaded from tape.

SLS database contains over 9 million records from a diversity of sources as follows:
- Library of Congress (monographs)...
- LIBERTAS UK Union Catalogue file...
- British National Bibliography...
- Library of Congress Serials...
- Whitaker (in print file) (under pilot status)...
- HMSO Publications (available early 1995).
- Government and official publications database (SLS, 1994a).

Hunter and Bakewell (1991: 219) note that SLS came from university roots and has grown into a leading developer and supplier of automated library systems.

SLS's main product is the LIBERTAS integrated library automation system, which is currently in wide use by many libraries of all types throughout selected European countries. "There are... over 60 LIBERTAS customers in the United Kingdom and Europe serving 100 university, public, national and special libraries" (Carter, 1994). LIBERTAS is
described as...[a] library management system providing a quality and cost-effective solution to all major housekeeping functions: cataloguing acquisitions and serial control, circulation, inter-library loans, report generation and management information, inter LIBERTAS access and transfer, OPAC and ENA (External Network Access) (SLS, 1994b).

Integrated on-line interface to the OCLC database is available to SLS's users. In fact, Mitchell (1993: 20) points out that SLS was the first European company to provide a fully integrated on-line link to OCLC. SLS is also available via JANET.

SLS's strategic deliverables are as follows: in 1994, 24 hour OPAC, Search and retrieve (ST) client, Wide Area Network gateway server, and EDIFACT pilot (EDIFACT is the United Nations Standard for electronic data interchange); in 1995, First EDIFACT transactions, and support for full text and mixed-media databases; in 1996 full EDIFACT on-line exchange, and full client/server capability (SLS, 1994c).

4.1.5 CURL

The Consortium of University Research Libraries (CURL) was formed in 1982 as an informal group of university libraries in the United Kingdom.

Membership currently comprises the Universities of Birmingham, Cambridge, Edinburgh, Glasgow, Leeds, London, Manchester, Sheffield, the Bodleian Library (Oxford), the London School of Economics, and Imperial College (London). The British Library and the National Libraries of Scotland and Wales are associate members of CURL and the School of Advanced legal Studies of the University of London is a co-operating member (BL, 1996: 2).

In 1987, CURL received funding from the University Grants Committee (UGC) and, later, from the new University Funding Committee (UFC), which is responsible for apportioning funding among the universities of the UK. The purpose of the initial funding was to establish a pilot project for resource sharing (Perry, 1988: 4). “By the end of 1989, a fully operational record sharing system had been established at the Manchester University Computer Centre (MCC)” (Lee, 1991: 19). Foskett and Perry (1993: 309) claim that the pilot phase of the project has been a great success, as several hundreds of records are supplied each week to CURL libraries. CURL's central database at the MCC contains copies
of all records held by member libraries (in the UK MARC, AACR2 format) (Huxley, 1992/3: 11). According to Foskett and Perry (1993: 309), CURL has now embarked on an expansion project funded by CURL members themselves, with the intention of both enriching the database and widening access to it.

Heaney (1989: 47) has described the main objectives of CURL as aiding patrons to learn what is available in the consortium's libraries as a whole, and the sharing and acceleration of the work of retrospective catalogue conversion. In addition, "CURL's purpose is to support and facilitate research, for the public benefit, in the higher education institutions of Great Britain and Ireland" (CURL, 1994: 7).

"The CURL database was established in 1987, and it contains currently eight million catalogue records, approximately 99% of which are for monographs and 1% for periodicals" (BL, 1996: 2). The CURL database is available to any academic library in the UK that can access the UK Joint Academic Network (JANET). CURL members can also connect to OCLC via JANET. "CURL sees the OCLC database as an extremely important secondary source of records for both current and retrospective cataloguing and concluded a reseller agreement with OCLC in October 1992" (Mitchell, 1993: 17). Perry (1993: 132) points out that the CURL OCLC service is based on the OCLC Electronic MARC Subscription Service (EMS). Libraries search Prism, the OCLC record supply service, directly, using OCLC's terminal emulation software to the OCLC computer. OCLC has a connection to JANET, so connecting to the OCLC computer simply involves calling the JANET address of this node. Additionally, "in 1993, all CURL libraries became members of the American research Libraries group (RLG)" (MCC, 1993).
Like other networks, CURL offers a number of services and facilities to its member institutions. Huxley (1992/3: 1–f. f.) listed the CURL service as follows:

- Catalogue record retrieval
  - Command-line driven for faster searching.
  - Efficient acronym-key searching, plus searching by keyword and author
  - Records available in a MARC tagged text format for downloading, or in exchange format.
  - Charge per record.

- Reference facility
  - Records displayed in a readable, non-MARC format.
  - Keyword searching with Boolean operations.
  - Free.

- Batch retrospective conversion
  - For upgrading short machine-readable records.
  - Charge by arrangement.

“CURL member libraries can utilize three ways to take records from the CURL database: 1) on-line downloading; 2) exchange format; 3) batch retrospective conversion facility” (Foskett and Perry, 1993: 308).

Recent years have witnessed a great deal of co-operation between the British Library and members of CURL, which together have formed a number of working parties into the issues of preservation, document supply, and the National Bibliographic Resource. The results of these working parties have been described as follows:
(1) In the field of preservation, the BL and CURL have agreed to establish the National Preservation Office to ensure the preservation and continued accessibility of library and archive material; (2) regrading document supply, the BL and CURL agreed the need to develop explicit statements of policy and practice to the wider academic community and involve other similar bodies; and (3) the National Bibliographic resource party explored the potential for co-ordinating developments in libraries to deliver a wider range of benefits that would be possible if these were pursued independently (BL, 1996: 1).

The above-mentioned bibliographic networks are those of particular attractiveness to librarians in UK libraries. In addition, the UK has developed other networks of relevance to the library community, including JANET and SuperJANET.

4.1.6 JANET and SuperJANET

JANET, the Joint Academic Network, was established in 1984 by the Computer Board for University and Research Councils. It is an important private network, which serves the British academic and research community. It is a wide-area network utilizing an X.25 packet-switched network. In fact, JANET usage is restricted to institutions and bodies that are related to research and educational purposes.

Stone (1993: 1) points out that JANET links its users to the facilities of over 200 registered computer services in more than two hundred institutions and far more worldwide. “JANET is connected to NSFNET (National Science Foundation Network) in the US, to other European national networks via EuropaNET and EBONE (European Backbone) and to international networks like EARN (European and Research Network)” (Dempsey, 1993: 3). In addition JANET users can access many commercial on-line resources and networks, and many library OPACs. JANET has been operated and managed by the Joint Network Team (the JNT) since 1984, but it is presently managed and operated by a new body called the UK Education and Research Networking Association (UKERNA). “UKERNA formally started on 1 April 1994. The Funding Councils have registered JANET, SuperJANET, and
UKERNA as trade marks, and have assigned them to the JNT Association which will trade as an generally use the name UKERNA” (UKERNA Report, 1994: 10). Stone (1993: 3) notes that the JANET User Group for Libraries (JUGL) looks after the particular needs of libraries. JUGL liaises with other interest groups and with service providers on the network, promotes training programmes, runs an annual conference, and publishes directories and JUGL Newsletter. Moreover, JUGL works closely with the UK Office for Library Networking (UKOLN), which merged with the Centre for Bibliographic Management on the 1st November 1992 to become the Office for Library and Information Networking.

JANET Services and Resources

There are a number of services and applications available to users of JANET, such as electronic mail, remote on-line services, and file transfer. Buxton (1989: 12) reports that JANET provides useful facilities for libraries, such as accessing library catalogues, which, coupled with the e-mail facility, is starting to revolutionize inter-library loan procedures. Pooling of catalogue records should lead to savings in cataloguing effort. Access to details of both extensive and specialized collections at different libraries for bibliographic work. The library mailing facility provides a rapid and efficient method of distributing news and expertise between libraries. The links to PSS and the British Library provide convenient and cost-effective alternatives to dialling up. “JANET has been successful because it provides a ubiquitous service to all higher education institutions and research council sites” (Jackson, 1994: 6).

Electronic Mail

JANET users can send and retrieve e-mail from one site to another within the UK academic community and, through gateways, to different networks in the world, such as the
Internet in the USA, EARN (the European Academic Research Network), and Gulfnet in Saudi Arabia. Buxton (1989: 8) notes that a major library application of the e-mail facility is in inter-library loan services; requests can be sent from one library to another and replies sent back. Scanlon (1991: 95) points out that many libraries' routines which are currently administered by mail, telephone, and direct human interaction, could be replaced by e-mail. These include inter-library loans requests, reference questions, and book requests and reservations. Furthermore, "electronic mail is being increasingly use in the academic library world. Clearly there is a considerable potential on JANET for personal communications, the sending of questionnaires, files of records, or any other kind of digitised information" (Lee, 1991: 83).

Remote On-line Services

Users can log on to services available over JANET, such as BLAISE, OCLC, libraries' OPACs and BUBL. Isaacs and MacColl (1991: 2-15) point out that this facility for interactive dialogue makes logging into a remote computer a powerful information-seeking tool, with particular options for many library situations, including such services as the bulletin boards, JANET.News, NISS, HUMBUL, BUBL, and libraries' OPACs. Scanlon (1991: 95) notes that the interactive dialogue between computers is an extremely powerful information technology tool, particularly for libraries. The services in this category available over JANET include OPACs, reference databases, source databases, and systems for information exchange and delivery.

JANET.News is a bulletin board maintained by the Joint Network Team (JNT) and offers such services as details of network operations, gateways, and news of recent development. "JANET.News information [is] stored on files, some grouped into sections,
and [is] displayed using a command system called view which is described when users log in" (JANET Starter Card, 1991: 6).

BUBL (the Bulletin Board for Libraries) is a library-oriented service available over JANET. Its main menus consists of many categories such as news, information networking, mailing lists, directories, current contents, and electronic journals.

NISS-BB (the National Information Service and Systems Bulletin Board) is another important service available to users of JANET. “The function of NISS-BB relates to the sharing, advantageous purchasing and optimal use of software and services by the UK higher education computing community” (Isaacs and MacColl, 1991: 3-6).

Other programs of interest are NISS and NISP (the Networked Information Service Project). “NISS provides menu-based gateway access to all on-line services in the UK and more worldwide, including software and dataset catalogues and archives, and commercial database hosts” (Stone, 1993: 7). NISS’s first screen contains a number of categories including NISS-BB (described above), NISSPAC (the Public Access Collections), and Bibliographic Services. Dempsey (1992a: 135) reports that the aim of NISP is to develop tools which will facilitate group communications among various interest groups on JANET.

On-line Public Access catalogues (OPACs) are usually available to JANET members’ institutions. “There are over 70 UK OPACs connected to JANET” (Stone, 1993: 5). Also, “connections to many overseas OPACs are available over the JANET network and access has been improved by the availability of the NISS Gateway and the development of the SABLIN software, which provides menu-driven access to the catalogues on a PC”
Rowley (1993: 297) indicates that JANET has been widely exploited by libraries for mutual access to libraries' OPACs, a list of which is available on JANET News, BUBL and NISS-BB. In fact, through JANET, users' libraries can access a range of bibliographic utilities such as BLAISE, OCLC, CURL, and SLS. Therefore, JANET provides a choice of bibliographic services that libraries can adapt to their cataloguing requirements. Dempsey (1992a: 134) notes that an interesting development has been exploitation of JANET by CURL to provide access to a central shared pool of catalogue records. Some libraries have utilized this service for downloading bibliographic records. Moreover, Breaks (1993: 83) notes that through the use of such services as OCLC and CURL databases, libraries can access and download catalogue records, as well as BNB MARC files subject to agreement.

**File Transfer**

JANET users can transfer files between their user systems and a remote computer.

"Small files of text can be copied from one computer to another using electronic mail. Large or library files need to be transferred using the file transfer network service" (JANET Starter card, 1991: 8). Scanlon (1991: 96) points out that within the library community the CURL project is a good example of the file transfer mechanism, in which catalogue records may be added to and extracted from the large database of such records held in the host computer in Manchester. Other examples include OCLC, SLS, and BLAISE.

**4.1.6.1 SuperJANET**

SuperJANET is not in fact a new network in the UK, but it is supplementary to JANET, which has served the UK academic and research community since 1984. "The SuperJANET initiative started in 1989, under the auspices of the Computer Board, with the
The aim of creating a foundation for development of a national broadband network to support UK higher education and research” (Cooper, 1992a: 2). “The Universities Funding Council (UFC) announced on the 10th of November 1992 the development of SuperJANET” (Walker and Herbert, 1992: 1). The UFC awarded the SuperJANET contract, worth £18 million over four years, to British Telecom (BT) (BT, 1992: 1).

SuperJANET is based on optical fibre technology, which is able to transmit voice, data, and images. Stone (1993: 1) notes that from 1993, the SuperJANET project will substantially increase capacity by applying BT's switched Multimegabit Data Service (SMDS) to many universities, initially at 10 Mbits/sec. Walker and Herbert (1992: 2) point out that SuperJANET can transmit up to 1,000 million bits of information per second, about 1,000 times faster than JANET. The first phase of SuperJANET was to connect six institutions; Cambridge, Edinburgh, and Manchester Universities; Imperial College of Science, Technology, and Medicine; University College London; and the Rutherford Appleton Laboratory (SERC). Cooper (1992c: 67) reports that the first phase of SuperJANET was intended to deploy a national backbone linking major sites in the university and research community. Subsequent phases will provide an expansion of the network to serve more sites and a substantial performance enhancement of the backbone. Clyne (1994: 9) notes that fourteen sites are at present taking part in the SuperJANET project involving ATM (Asynchronous Transfer Model) technology. He adds that this technology can support audio and video communications as well as traditional data.

SuperJANET applications initially available, as described by Cooper (1992b: 12-14) include teaching, computing (supercomputer data visualization and interaction, molecular modelling, oil reservoir studies, computational fluid dynamics [CFD], global atmospheric
modelling, heterogeneous distributed supercomputing facility), information services (library
document delivery, special datasets, electronic journal testbed), remote consultation
(pathology consultation network), access to remote facilities (brain imaging, remote sensing
data), group communication (Pandora, collaboration between physicists) and demonstration
of collaborative research and teaching).

Within the range of library and information services, SuperJANET provides three
applications: documents delivery, special datasets, and electronic journal testbed.

Document delivery

The major initial impact of SuperJANET on libraries and their users will be in the area of
document delivery, in taking an image and transferring it from one place to another.
SuperJANET will enable users to obtain the full text of journal articles in page image
format, together with associated images either directly to their workstations or via the
library (Breaks, 1993: 77).

Harries (1993: 195) notes that seven university libraries will co-operate in a resource-
sharing project on the delivery of journal articles in electronic format, with a much faster
response than normal inter-library loan methods, “The delivery of scanned images of journal
articles between libraries [will be] led by the University College London” (Breaks, 1994: 6).

Special datasets

“The aim of this project is to demonstrate the potential of remote access to special
locations, which requires very high image resolution” (Pullinger, 1993: 4). Breaks (1994: 6)
points out that the access to high-quality images of rare manuscripts is led by the John
Rylands University Library of Manchester. Cooper (1992b: 13) notes that the advantage of
this technique is to allow convenient and widespread access to rare or precious documents without the risk of damaging the originals.

Electronic journal testbed

Breaks (1994: 6) points out that the aim of this project is to replicate over SuperJANET the usability of current print-based journals, by providing high-quality images, attractively laid-out material, and the ability to both select and browse text, images, and possibly sound and video. Additionally, Cooper (1992b: 13) notes that it is proposed via this project to create an experimental electronic journal testbed on SuperJANET through the collaboration of a number of publishers, including learned societies, university publishers, and commercial publishers. Nine publishers are currently participating in the project: Blackwell Scientific Publications, Cambridge University Press, Institute of Physics Publishing, the Institution of Electrical Engineers, Nature (Macmillan Publishers), Oxford University Press, Pergamon Press, Rapid Communications of Oxford, and Sage Publications (Pullinger, 1993: 5).

4.2 Library network activities in the United States of America

According to Rowley (1993: 291), the USA leads the world in library networking. In the USA, many library networks are available, such as OCLC, RLIN, WLN, and the Internet, and these we will review in the following pages.

4.2.1 OCLC

The On-line Computer Library Centre (OCLC) was the first bibliographic network and is currently the largest and best-known bibliographic utility in the world. OCLC is a
non-profit organization, offering computer-based services to libraries, other educational and research institutions, and their patrons.

“When OCLC began in 1967, its staff consisted of Frederick G. Kilgour and a secretary” (Allan, 1979: 13).

Kilgour was the first chief executive officer of what was then called the Ohio College Library Centre. The principal academic objective of OCLC then was to increase the availability of library resources for use in educational and research programs in colleges and universities throughout Ohio. The other objective was to reduce the rate at which library costs were rising, and enable libraries to actively provide information to users when and where they wanted it (Smith, 1993: 8).

Saffady (1993: 25) noted that OCLC implemented an offline catalogue card production system in 1970, and an on-line system for shared cataloguing became operational in 1971 and was employed by fifty-four libraries by the end of that year. Smith (1993: 7) pointed out that OCLC pioneered the on-line revolution in libraries with the introduction in 1971 of its on-line shared cataloguing system. Since then OCLC has gone on to provide a wide range of computer-based products and services to libraries and to facilitate co-operation and resource-sharing among libraries on a global scale. “OCLC’s computerized cataloguing has moved the distribution of bibliographic information from paper to cards to magnetic tape to on-line” (OCLC, 1994a: 8). “Today, OCLC serves more than 18,000 libraries of all types in 52 countries and territories” (OCLC, 1994: 22).

OCLC’s current mission and objectives are stated in OCLC 1994b: 19 as follows: to establish, maintain, and operate a computerized library network and to promote the evolution of library use, of libraries themselves, and of librarianship, and to provide processes and products for the benefits of library users and libraries, including such objectives as increasing availability of library resources to individual library patrons and
reducing rate-of-rise of library per-unit costs, all for the fundamental public purpose of
furthering ease of access and use of the ever-expanding body of worldwide scientific,
literary, and educational knowledge and information. “OCLC’s governance structure
consists of general members, the Users Council, and the Board of Trustees” (OCLC, 1994a:
23).

Furthermore, OCLC president and chief-executive officer, K. Wayne Smith, stated
that from 1995 to 2000, OCLC’s vision will be to pursue two complementary strategies: (1)
an organized and orderly process of added selected enhancements to OCLC’s existing base
of products and services; and (2) an organized and orderly process of adding new, but
synergistic dimensions to OCLC’s existing base of products and services (Smith, 1993: 10).

OCLC Products and Services

OCLC offers a range of services to its members. OCLC designs and markets
computer systems and databases for libraries and other educational and research institutions.
OCLC’s services include: cataloguing, retrospective conversion, communications and
access, reference services, resource sharing, OCLC Forest Press, preservation resources, and
Information Dimensions, Inc. (IDI).

Cataloguing services

On-line Union catalogue (OLUC) is one of OCLC’s strengths, as it is the world’s
largest and most comprehensive bibliographic database. Member libraries can use OLUC
for retrieving bibliographic records and may benefit from them for their own acquisitions,
cataloguing, inter-library loan, and reference services, etc. “By cataloguing with OCLC,
libraries gain access to over 28 million items covering 8 formats in the OCLC On-line Union Catalog” (OCLC, 1994c: 3).

The “OCLC database grows by approximately 2 million bibliographic records each year. At the end of 1993, it held 26,994,330 records and listed 483 million location listings for those items” (OCLC, 1993: 6).

The world’s libraries and research institutions add not only their current cataloguing data to the OLUC, but also their older records as well. Major retrospective conversion projects in the 1990s are enriching the OLUC and information flows worldwide (OCLC, 1994a: 4).

For example, Saffady (1993: 28) pointed out that in 1992, OCLC announced an agreement with the Consortium of University Research Libraries (CURL) in the United Kingdom, to add more than 2.5 million cataloguing records to the OCLC database. In addition, OCLC has a similar agreement with other libraries and projects around the world, such as the British Library; the Chinese University of Hong Kong; and Harvard University Library.

“Since 1989, OCLC’s focus has been primarily on the implementation of a new telecommunication network, building a new reference system, and implementing a new on-line system for cataloguing and resource sharing” (OCLC, 1991: 12). PRISM on-line service was launched in November 1990. PRISM replaced the original on-line system, which had served OCLC on-line cataloguing since 1971. Dean and Learn (1990: 17) stated that the first PRISM release is designed primarily to increase productivity in cataloguing. Its features include improved search capabilities, expanded editing, record quality validation, ability to export records, and user-friendly commands. Additionally, “the PRISM services reduce cataloguing costs, provide full-screen editing, and high hit rate, access to authority records and electronic export capabilities” (OCLC, 1994a: 8).
Another on-line cataloguing support system is PrompCat. “PrompCat links order fulfilment by a vendor to holdings settings and delivery of a MARC record to the library by OCLC” (OCLC, 1994b: 3). “The OCLC Selection and Ordering System will automate the selection and acquisitions function, speeding what is now a labour-intensive process for libraries” (OCLC, 1994a: 9).

OLUC has supported a number of national program projects, including “Linked System Project (LSP), United States Newspaper Program, Conser (Cooperative On-line Serials) program, and Major Microforms Project” (OCLC, 1994a: 24).

Retrospective conversion services

OCLC offers retrospective conversion services for the libraries that want to make planning decisions such as when to do retrospective conversion and which records are appropriate for conversion. Saffady (1993: 48) pointed out that OCLC offers a retrospective conversion service, a microcomputer-based retrospective conversion program, a service that converts non-MARC records to the full format, and a turnkey CD-ROM cataloguing system.

Retrospective conversion offers options for converting catalog cards to full MARC record from fully customized (PETROCON) to batch processing for tape-to-tape (TAPECON and FULLMARC) and diskette-to-tape (MICROCON) conversion; or do your on-line in-house conversion at reduced per-second charges (OCLC, 1994c: 5).

Communication and access

In the early 1990s, OCLC replaced its original dedicated synchronous network with a new X.25-based network. “This packet-switched network supports the Open System Interconnection Standard and will enable OCLC to link more easily with other networks in
the education and scientific communities" (OCLC, 1991: 12). "OCLC also provides Internet access to the PRISM device for cataloguing and resource sharing and to OCLC reference service. Connections to the OCLC network and to the Internet are available around the world" (OCLC, 1994a: 15). Saffady (1993: 30 f.) noted that dial-access is possible in four ways: (1) through a local or long-distance telephone call for libraries in close proximity to OCLC headquarters, or those equipped with outward-WATS service; (2) via a local call for libraries in close proximity to one of OCLC's network hubs; (3) through a value-added network, such as CompuServe; or (4) through an inward-WATS call. Additionally, for libraries with a local telecommunication network, "OCLC's Telecommunications Linking Program (TLP) and Gateway software enable libraries to extend access to OCLC services while leveraging their investments in computer hardware, local area networks, and local systems" (OCLC, 1994a: 15).

Reference service

Smith (1993: 17) notes how the OCLC system first revolutionized cataloguing, then it revolutionized inter-library loans, and now it is looking at revolutionizing reference services. OCLC provides on-line reference services and CD-ROM database which are used by libraries to find information for their users. "OCLC reference services provide abstracts, citations, and full text of information used by researchers, students, faculty, scholars, professional librarians and other information seekers" (OCLC, 1994d: 9). Olszewski, 395 expressed the belief that the OCLC Authority File is the most powerful tool for answering reference questions. Similarly, in his letter to members, OCLC president, K. Wayne Smith stated, "We began the largest authority control project in OCLC's history by applying automated software programs to the 27 million records in the OCLC On-line Union Catalog" (OCLC, 1993: 2). According to Olszewski (1994: 395).
OCLC authority control service provides the benefits of no-cost searching, access to a wealth of bibliographical and geographical information on-line, increased staff productivity by reducing research time, multiple cross-reference access-points, and documenting sources used to verify the information.

OCLC's new reference services are the EPIC, FirstSearch, and Electronic Journals On-line.

EPIC

"In January 1990, OCLC introduced the EPIC service, an on-line reference system that provides subject, keyword, and Boolean searching" (OCLC, 1991: 13). "The EPIC service helps information professionals meet information demands efficiently and affordably by tapping over 43 databases, includes library holdings data and is accessible via the Internet, OCLC multidrop line, and dial access" (OCLC, 1994b: 2).

FirstSearch

Introduced on October 1st, 1991, the FirstSearch Catalog "is a low-cost easy to use reference system that library patrons can use to search OCLC On-line Union Catalog, and a variety of reference databases" ("FirstSearch", 1991: 18 f.). Also,

The FirstSearch gives patrons an easy-to-use interface and access to the most needed databases with easy-to-budget pricing. [It] provides access to more than 40 databases, including ArticleFirst, MEDLINE, WorldCAT (the OCLC On-line Union Catalog), and Worldscope Global. For added convenience, FirstSearch offers the FastDoc service, full-text document ordering and delivery access to documentation files through the Internet (OCLC, 1994b: 1).

"FastDoc, a full image service of FirstSearch, offers automated delivery of articles by fax in one hour or less" (OCLC, 1994a: 6). "FirstSearch offers a flexible range of access options. Stand-alone or networked PCs can access FirstSearch via national academic networks, such
as JANET or WIN; public data networks; directly via the Internet; or via distributor provided dedicated lines” (OCLC, 1994d: 5).

Electronic Journals On-line (EJO)

This is OCLC's newest reference service available to members. "EJO offers information to subscribers in electronic full-text format with optimal searching capabilities. Subscribers access the journals through Guidon software, via the Internet and dial-access telecommunications networks" (OCLC, 1994b: 2). “The Guidon interface presents the full text of a journal, including figures, tables, and equations, in a presentation that rivals the typeset page” (OCLC, 1994e: 3). Noble (1994: 2) mentions that the growing EJO program represents one component of OCLC's efforts in changing the nature of scholarly activity for researchers, publishers, and librarians. EJO currently contains a number of electronic journals, including Immunology Today On-line, Applied Physics Letters On-line, The Online Journal of Knowledge Synthesis for Nursing, and Current Opinions Series (Medicine-Biology).

Resource sharing

"In December 1992, OCLC installed the PRISM inter-library loan (ILL) system in a "hot cutover" - a seamless, immediate migration of ILL from the first system” (Smith, 1993: 12). “Through PRISM ILL libraries arrange 7 million electronic interlibrary loans a year to fill their patrons' information quickly and efficiently” (OCLC, 1994a: 11). Moreover, “PRISM Interlibrary loan expands the reach of OCLC's member libraries by enabling them to borrow and lend library materials through OCLC's electronic network of 5,500 libraries” (OCLC, 1994b: 4).
OCLC International

The OCLC member libraries have grown since 1971 from 54 libraries to over 18,000 libraries in 1994. Presently, OCLC provides its services and products to many libraries around the world, although most activities are concentrated in Europe and Asia.

4.2.1.1 OCLC Europe

OCLC Europe was opened in 1981, based in Birmingham, England. It provides OCLC services and products to libraries in Europe, Africa, and the Middle East.

OCLC Europe serves libraries in 30 countries directly and in association with 14 partners: Auroc (France), the British Library (UK, Ireland), BLCMP (UK), Bibliotekstjanst (Scandinavia), Chest (UK), CURL (UK), Dawson (Europe), Doc6 (Spain), Doc and Co. (France and Francophone), Franklins (Israel), IF (Italy, Austria, Switzerland), ITS (Eastern Europe, Turkey), LASER (UK) and SLS (UK, Spain and Sweden) (OCLC, 1994c: 2).

Buckle (1993: 15) noted that OCLC Europe is the largest bibliographic utility in the region, with the greatest number of individual users. It serves 12 national libraries, more than 100 academic and research libraries, many state, regional, and city libraries, and a multitude of college and special libraries.

“OCLC Europe acts as a node in the OCLC network, and is connected to the network centre in the USA by a private link” (Dempsey, 1992b: 99). Buckle (1991: 26) noted that the OCLC telecommunication network in Europe is an X.25 network, as is OCLC's new telecommunication network in the USA. Also, “OCLC Europe is connected to the corporate headquarters in Dublin, Ohio, by 64K Transatlantic Fiber Optic Cable” (OCLC, 1994: 15).

In July 1990, OCLC installed a dedicated link to the United Kingdom's Joint Academic network (JANET). And in April 1991, OCLC concluded an agreement enabling access through JANET to the International X.25 Infrastructure (IXI) network, which provides a backbone service connecting private research networks and public data networks in Europe (Buckle, 1991: 26).
OCLC Europe services

"The European libraries use the same array of products and services that are listed in
the products catalogues of most OCLC affiliated regional networks in North America" (Buckle, 1993: 15). Saffady (1993: 27) pointed out that OCLC participation in European
libraries ranges from full membership to applications involving a single OCLC service, such
as retrospective conversion or inter-library loans.

"Approximately 225 libraries access OCLC's PRISM service via European public
and academic networks to undertake on-line cataloguing and interlibrary lending" (OCLC, 1994c: 2). "More than 35 French libraries use OCLC's on-line system for cataloguing and
resource sharing. The Association of OCLC Network users in France (AUROC) provides
training and support" (Saffady, 1993: 28). Dean (1991a: 28) mentioned that the National
Library of Turkey, located in Ankara, became OCLC's first Turkish member, in July 1991.
The library uses the On-line System for cataloguing, particularly in respect of foreign-
language materials.

"Dutch libraries who are members of PICA can also access the OCLC database and
utilize it as a secondary resource for retrospective conversion under an agreement to
exchange bibliographic records signed in 1987 between PICA and OCLC” (Mitchell, 1990:
288).

"European libraries contribute significantly to the enrichment of the OCLC
database, particularly in projects such as: loading the database of CURL, and loading the
British National Bibliography (UKMARC) file from 1950-70 with more than 400,000 files, and the ongoing loading of UKMARC" (OCLC, 1994c: 2).

Rawson (1993: 22) noted that OCLC's RETROCON, MICROCON, and TAPECON retrospective conversion services form an important part of the services currently offered by the OCLC Europe office to libraries in the United Kingdom, Ireland, and Continental Europe. In addition, Buckle (1993: 15) pointed out that retrospective conversion services, particularly contract RETROCON services, which currently generate nearly half of OCLC Europe's total revenues, enrich the OLUC through their contribution of original data and holdings. In fact,

OCLC Europe has undertaken a number of important retrospective conversion projects for UK libraries including: National Library of Wales; National Library of Scotland; University of Oxford; Kings College, Cranfield Institute of Technology; London School of Economics; and University of London Senate House, etc. (Lee, 1991: 21).

"OCLC has converted 7 million titles for European libraries in the last decade" (OCLC, 1994c: 2).

OCLC reference services are available to the European libraries. For instance,

OCLC's EPIC and FirstSearch have been available 23 hours per day since August 1993. European reference databases and document suppliers available on OCLC reference services include the British Library, PaperFirst, ProceedingsFirst, INSPEC, and Book Data (OCLC, 1994c: 2).

"The British Library is one of several organizations supplying documents to users through FirstSearch. Others include UMI Article Clearhouse, Dynamic Information Individual Inc., and ISI's The Genuine Article" (OCLC, 1994d: 6).
4.2.1.2 OCLC Asia Pacific Services

“The OCLC Asia Pacific Services office - located in Dublin, Ohio - was opened in 1986. It covers libraries in Asia, the Pacific region, and Latin America” (Saffady, 1993: 28).

“OCLC has cooperative record exchange agreements with the National Library of Australia, the National Library of China, the National Library of Singapore, and the National Central Library (Taiwan)” (OCLC, 1994c: 2). Furthermore,

Waseda University, Tokyo, Japan, has been an on-line user's cataloguing and reference services centre since January 1989, and in late 1993 OCLC will start a major retrospective conversion project for this institution. More than 40 libraries in six Asia Pacific countries and territories use OCLC's on-line services (OCLC, 1993: 10).

Saffady (1993: 28) noted that OCLC is used for on-line cataloguing by more than 25 Japanese libraries.

Dean (1991b: 25) stated that in Asia and the Pacific region, OCLC products and services are available through organizations contracted to act as marketing representatives. An organization may provide one product or several, and may represent OCLC in one country or many.

4.2.2 RLIN

RLIN (the Research Libraries Information Network) is an integrated automated information network, which was established by the RLG (Research Libraries Group, Inc.) “The research Libraries Information Network (RLIN) is the name adopted in 1978 for the library automation program previously know as BALLOTS (Bibliographic Automation of Large Library Operations using a Time Sharing System), which was developed by Stanford University, California in the late 1960s” (Saffady, 1989: 234). According to Saffady (1993: 49), BALLOTS had the greatest potential for meeting RLG's requirements for automated
bibliographic control. Hunter (1987: 171) described some of BALLOTS's features including its subject capability, pointing out that searches can be made using classification numbers and subject headings.

"RLG was founded in 1974 by Harvard, Columbia, and Yale Universities, and the New York Public Library as a resource-sharing consortium" (Saffady, 1993: 49). It had become by 1994 "a not-for-profit corporation of 143 universities, independent research libraries, archives, historical societies, museums, and other institutions devoted to improving access to information that supports research and learning" (Michalko and Haeger, 1994: 7). Saffady (1993: 50) points out that RLG members are the most visible and important group of RLIN users.

"In 1994, the RLIN bibliographic files grew to almost 70 million records in more than 365 languages, contributed by more than 200 libraries and archival institutions around the world" (RLG, 1995: 6). RLG constantly attracts new member institutions, so that, for instance, CERL (the Consortium of European Research Libraries) recently joined. In addition, RLG also obtained its first member in Italy - the American Academy in Rome - in addition to the member libraries of CURL (the Consortium of University Research Libraries) in the UK and the Republic of Ireland (RLG, 1994: 3).

RLG loads millions of machine-readable records from external agencies, such as the Library of Congress's MARC Distribution Service, the National Library of Medicine, GPO (the Government Printing Office), CONSER, the British Library, the Centre of Research Libraries, and the United Nations (Yoshimura, 1994: 10).
“The RLIN database contains non-Roman in addition to Roman scripts. In fact, RLG undertook a series of projects to add major non-Roman scripts to its automated bibliographic system” (Aliprand, 1992: 59). Saffady (1993: 52) noted that RLIN introduced CJK (Chinese, Japanese, and Korean-script) cataloguing capability in 1983, making it the first bibliographic utility to support the cataloguing of bibliographic records in these vernacular scripts. Additionally, RLIN added Cyrillic (Russian, Belorussian, Bulgarian, Macedonian, Serbian, and Ukranian languages) capabilities in 1986, followed by Hebrew in 1988, and Arabic in 1991.

Arabic script is the most recent addition to the scripts available on RLIN. Bibliographic control and retrieval using the authentic writing system are available for titles in Arabic, Persian (Farsi), Urdu, Ottoman Turkish, and other languages written with Arabic scripts (Aliprand, 1992: 59).

RLIN is, in fact, the world's largest bibliographic database for Middle Eastern language materials (ibid.).

Saffady (1993: 54 f.) notes that RLIN divides its bibliographic network files into eight types of library materials recognized by US MARC formats:

1. The Book file
2. The serials file
3. The scores file
4. The recordings file
5. The visual materials file
6. The maps file
7. The machine-readable data file
8. The archival and manuscripts control file.

Moreover, "RLIN bibliographic files include a set of authority files (LC name authority file, LC subject authority file, and the Getty Art History Information Program's Art and Architecture Thesaurus file), an interlibrary loan file and special databases" (Yoshimura, 1994: 10).

RLG Services and Facilities

Like other bibliographic utilities, RLG provides a number of services and facilities to its users, including on-line catalogues, automated acquisition, and inter-library loan, Eureka, Zephyr services, and the CitaDel service. According to Crawford (1994: 17), the Eureka search service provides easy, powerful, flexible access to the 23 million unique titles in RLG's bibliographic database and over 9 million titles in article-citation databases. Michalko and Haeger (1994: 15) note that RLG implemented Eureka in 1993, as a patron-oriented interface to RLIN data resources that can be accessed by every user of a campus-wide information system. Along with the introduction of Zephyr, RLG's Z39.50 information retrieval server, this facility makes it possible for an institution to supplement its local information resources with easy, integrated access to the enormous international resources represented in RLG's databases. RLG launched its article-citation and document-delivery service Citadel with ten files (Gould, 1994: 14), for the purpose of (1) making it feasible for campuses to open up the files to the entire campus, and (2) making document delivery an integral part of the service.

Additionally, RLG offers JACKPHY for the non-Roman scripts: Japanese, Arabic, Chinese, Korean, Persian (Farsi), Hebrew, and Yiddish. Yoshimura (1994: 25) notes that the
successful implementation in RLIN of the JACKPHY and Cyrillic scripts (termed JACKPHY Plus) has created about 1.4 million RLIN records including one or more of these scripts - a resource that facilitates both shared cataloguing and reference.

In 1995, RLG was planning to pursue means of achieving the following:

- New ways to being RLIN data to local systems for public service and technical processing,
- new data resources available for more hours of the day and night,
- new flexibility and economy to cataloguing in RLIN,
- new ways to share resources and deliver documents (RLG, 1995: 11).

4.2.3 WLN

WLN (The Western Library Network) was originally known as Washington Library Network since, when it was established in 1967, it was under the authority of Washington State Library (WSL). “When the network’s on-line system became operational in 1977, it initially served ten Washington libraries, but its computer services quickly became available to libraries outside the state and it speedily attracted subscribers elsewhere in the Pacific North-West of the USA. Consequently, the service changed its name (but not its logo) to Western Library Network in 1985” (Saffady, 1993: 81; 1989, 239).

WLN is a multi-service bibliographic network, offering principally on-line cataloguing supports to its member libraries and related facilities. Working together, WSL and WLN began to design a project to provide the following services to member libraries:

1. An enhanced user-friendly interface to the Internet through WLN.
3. A training programme in using both the Internet and the Forum.
4. A period of free access for participating libraries in using both the Internet and the Forum (WLN 1992: 5).

WLN continued to enhance the bibliographic database, adding keyword subject searching in the spring of 1994 (Miller, 1995: 2). Additionally, in 1994, WLN continued the improvement of its products and services by (1) adding new search features to the WLN online system, (2) launching reference database services, (3) providing access to the Internet for many new customers, and (4) introducing a Windows version of the LaserCat CD-ROM catalogue (Miller, 1995: 2).

"Since one of WLN's original goals was the production of a union catalogue of participants' holdings in order to promote and facilitate resource sharing, it introduced in 1987 the LaserCat system in a CD-ROM implementation of the WLN database" (Saffady, 1993: 91), "containing more than 4 million bibliographic records" (WLN, 1994: 4). According to Saffady (1993: 83), the WLN database, including the bibliographic and working files, contained (by 1993) 8 million bibliographic records, 8.2 million authority records, and 17.4 million holdings statements. By 1994, the cataloguing records registered on the LaserCat CD-ROM represented more than 500 libraries and provided a hit-rate of 95% or better for cataloguing and for retrospective conversion (Stallcup, 1994: 6). Miller (1995: 3) described some of the LaserCat for Windows features, including an integrated MARC record editor and improved keyword and Boolean searching. Other features of LaserCat include MARC record downloading to local systems, catalogue card, label, bibliographic printing, keyword and browse author, title and subject searches, and excellent facilities for original cataloguing and retrospective conversion (WLN, 1993: 12).
Moreover, WLN offers a MARC record authority control service (MARS) to its members. WLN authority control and database preparation service has completed several projects for libraries and consortia, and has begun a number of others (Smith, 1994: 12). Miller (1995: 3) states that all WLN products and services are known outside the Pacific North-West and that two in particular have become especially popular throughout North America: the WLN MARC Record Service (MARS) and WLN Collection Assessment Service. In addition, WLN provides access to the Internet.

The WLN on-line system through the Internet was introduced in August 1992 and was based in Lacey, Washington, where connection is made to the Internet (WLN, 1992: 1). “All WLN Internet accounts have full access to mail, Telnet FTP, and the WLN Gopher and Usenet newsgroups” (Wakefield, 1994: 1). WLN Internet services grew at a tremendous rate during 1994, so that they now include access to the WLN bibliographic database and reference databases through WLN Easy Access (Miller, 1995: 2). Internet accounts for organizations and individuals, and dial-up and leased connections to the Internet for libraries and other organizations.

WLN supports technical processing and reference activities, and the WLN bibliographic database includes records for subscription as well as cataloguing contributed by members; it is about one-third as large as the OCLC on-line Union Catalogue (Saffady, 1993: 93).

Many regional bibliographic networked have also been developed in the USA and these support cataloguing and other library activities.

“ILLINET (the Illinois Library and Information Network) began in 1980. It provides on-line catalogue access to the holdings of Illinois libraries” (Sloan, 1992: 81). Dempsey
(1992a: 166) has pointed out that Illinois (IO) is now one of the largest automated library systems in the world.

“OLIS (the Ohio Library and Information System) began in 1991 and aims to become fully operational in five years” (Dempsey, 1992a: 171). “The initial 17 library members will be linked so that their resources appear as a single collection to the users” (Rowley, 1993: 294). Dempsey (1992a: 171) states that OLIS provides three service components: local library services; OLIS Central, a central facility with union catalogue and other functions; and controlled access to national and other networked resources.

“MELVYL, the on-line catalogue of the University of California, began in the late seventies” (Dempsey, 1992: 173) and since then it has evolved into a large system with over 100 linked libraries (Rowley, 1993: 294).

Other examples of regional networks in the USA are CARL (Colorado Alliance of Research Libraries), INCOLSA (the Indiana Cooperative Library Services Authority), AMIGOS (the Amigos Bibliographic Council), SOLNET (the Southern-Eastern Library and Information Network), CLASS (The Cooperative Library Agency for Systems and Services), and DALNET (the Detroit Library Network).

Furthermore, the USA has set up the famous network of networks, the Internet, which is again more precisely, a general communications network rather than a specifically library network.
4.2.4 The Internet

The Internet development started in 1969 as a project network called ARPANET (Advanced Research Projects Agency Network), which was sponsored by the United States Department of Defense. ARPANET was an experimental network designed to support military research. Laquey and Ryer (1993: 4) point out that access to ARPANET in the early years was limited to the military, defence contractors, and universities engaged in defence research.

Although the Internet is a co-operative effort and decentralized in nature, its services and activities are co-ordinated by many organizations, which are listed by Gilster (1993: 33-37) as follows: the Internet Society, the Internet Architecture Board (IAB), the Internet Engineering Task Force (IETF), the Internet Assigned Numbers Authority (IANA), the Federation of American Research Networks (FANET), the Clearinghouse for Networked Council, Les Réseaux Associés pour la Recherche Européenne (RARE), and the Coordinating Committee for Intercontinental Research Networks (CCIRN).

Unlike the library networks, the Internet's users range from librarians, teachers, students, government agencies, researchers, business people, professional scientists, and even individuals who have an interest in networking. Veljkov and Hartnell (1994b: 1) note that people use the Internet to retrieve free software, find and retrieve important documents, access library catalogues, carry on long-distance relationships and conversations with other users, conduct research, connect to supercomputers, and to engage in many other activities. In fact, the Internet is today utilized by millions of people in every continent to access and exchange information. Gilster (1993: 13) discusses the Internet's growth and notes that, by 1985, it was made up of approximately one hundred networks. By 1989, that number had
risen to five hundred. Furthermore, the Network Information Centre of the Defense Data Network Information Centre found 2,218 networks connected as of January 1990. By June 1991, the National Science Foundation Network Information Centre pegged it as close to four thousand. Basing his projection on this data, Gilster (1993: 13) anticipated that the Internet would reach forty million people by 1995 and one hundred million by 1998. Brett (1994: 74) similarly point out that the Internet and its resources are growing in size at an approximate rate of 10 to 20 per cent per month. Many writers have described the Internet as a global or world-wide network of networks (see e.g. Gilster, 1993: 13; Hahn and Stout, 1994: 3; On Internet 94, 1994: vii; Tennant, Ober and Lipow, 1993: 92; Veljko and Hartnell, 1994: 1). “The Internet is the first global forum ad the first global library. Anyone can participate, at any time. It never closes” (Hahn and Stout, 1994: 3).

Notess (1992: 27) points out that the Internet is not just one computer network, but a vast interconnection of many national and international networks. He notes further that hundreds of on-line library catalogues can be reached via the Internet along with many other information sources.

The Internet offers libraries the tantalizing prospect of greatly reduced telecommunications costs, thereby freeing resources for other uses and easing some of the budgetary strain on collections and services. Thousands of libraries now communicate with each other via the Internet (OCLC, 1992: 371).

In a useful article, Merran (1993: 21) discusses some of the Internet’s advantages and notes that communication is only one half of what the Internet can provide. Information is the other half of what it has to offer and there is no larger source of data on any subject in the world than the Internet. Market research, economics, technical information, political situations are just a few of the areas covered. Using Archie, Gopher, or WAIS, hundreds of the world’s libraries are at the user’s fingertips.
In providing the many on-line resources, the Internet depends on the following four applications: mail service, remote log-in, FTP (File Transfer Protocol), and the General Client/Server facility (Hahn and Stout, 1994: 19-20). We may consider these applications separately.

First, "electronic mail services is the most widely used application in the Internet community" (Internet system handbook, 1993: 186). "Electronic mail is a core Internet application" (Gilster, 1993: 127). The Internet's users can send and receive messages from anyone else on the Internet or from any commercial on-line service that has connections with Internet, such as CompuServe, DELPHI, MCI Mail, and American On-line. Users can send and receive messages from one person or group of users in any place in the world. The messages are stored and arranged in the recipient's mailbox until they are used.

Second, remote log-in is utilized into other computers on the Internet. This tool allows the Internet's users to log into other computers - in the same room, in the same building, or in another country - and to manipulate them to retrieve information. The Internet's users run a special program, called Telnet, to connect or log into other remote computers.

Third, the File Transfer Protocol (FTP) application "allows Internet users to share files with other network users, retrieve informative documents for educational purposes, conduct research, and obtain software programs from archives all over the world" (Veljkov and Hartnell, 1994a: 11). Therefore, the FTP facility allows users to download and upload files from their computers to a remote computer, which is very useful for library purposes.
Finally, the General Client/Server facility allows the Internet's users to connect to another computer and ask for the help of a server software. For instance, Gopher contains two programs: Client and Server. Server stores the raw data and Client provides a user-friendly interface to the server's data. Milles (1993: 37-38) reports that different Client applications are written for different computers - DOS, Windows, Unix, VAX/VMS, and so on. Server applications may be written for a variety of different computers. As long as all of these applications conform to the protocol, they can communicate with each other. Thus, the Macintosh Gopher Client may look completely different from a DOS or Unix Gopher Client, even when both clients are connected to the same Gopher server.

Internet On-line Information Resources

The Internet provides many information resources to its users and new ones are frequently being added and made available on a daily basis. Dern (1993: 5) notes that the Internet gives its users access to a mind-boggling universe of information resources and services, from the library of Congress holdings database and real-satellite weather photographs to software updates for Macintosh and Windows users, and pre-releases for the US White House. Hahn and Stout (1994: 29) have listed some of the Internet's on-line resources as follows: Electronic mail, Remote log-in, Finger service, Usenet, Anonymous FTP, Archie servers, Talk facility, Internet Relay Chat, Gopher, Veronica and Jughead, WAIS servers, World-Wide Web, White Pages directories, electronic magazines, mailing lists, Internet Bulletin Board Systems (BSSs), games, and MUD. In the following pages, some of the Internet's utilities will be discussed in brief.
On-line Library Catalogues

Several hundreds of library OPACs are available over the Internet. Internet’s users can connect to any OPAC and review bibliographic records. Furthermore, there are many library databases available to Internet’s users around the world, such as Colorado Alliance of Research Libraries (CARL), Eureke, MELVYL, CATALIST, OCLC, Library of Congress, and University of Maryland Information Database. Lane and Summerhill (1993: 128-130) note that there are a number of software retrieval systems that ease the task of connecting to the above library databases, including Internet Gopher, LIBS, Hytelnet, and LIBTEL.

Internet Gopher

“Gopher is an Internet searching utility that offers a helpful and friendly interface to a vast array of different types of information, from library catalogues to campus information services to government databases” (On the Internet 94, 1994: xxi). “Gopher was born in 1991 at the University of Minnesota in an effort to provide the UM students and staff with a flexible Campus-Wide Information System (CWIS) for disseminating news, announcements, and other kinds of information to the university community” (University of Illinois, 1992: 1). Notess (1993: 100) observes that the beauty of Gopher lies in the simple interface that allows the network traveller a sort of one-step shopping trip, using Telnet, FTP, Archie, and even e-mail, all under the watchful of Gopher. Dillon (1993: 57) believes that Gopher represents the state-of-the-art for librarianship in the Internet today. He also discusses (1993: 65-66) Gopher’s advantages for libraries and observes that it is perceived as free to its users, it is distributed all over the world, it has universal collection, it has automated tools for locating, it is managed by volunteers, and it is non-systematic. In fact, Gopher has been adopted by hundreds of sites across the Internet, including the University
College London (UCL) Gopher Server. UCL (1994: 1) points out that through its Gopher server the following information is available: UCL Central Computer Service (providing local news for users of central systems), UCL Library (providing Telnet access to the Libertas system), UCL Phone Directory (providing access to the UCL X-500 directory), and access to UK and world-wide Gopher servers. Therefore Internet’s users can access and use their own local Gopher server, if there is one, or use Telnet to access a remote Gopher server.

LIBS

“The LIBS program, developed by Mark Resmer of Sonoma State University, gives VAX/VMS’ users a menu of on-line services, including libraries, campus-wide information systems, and miscellaneous databases” (Lane and Summerhill, 1993: 128). Like Gopher server, LIBS provides a menu-driven gateway and, through a hierarchy of menus, users can choose a remote system they wish to connect to.

Hytelnet

“Hytelnet computer program is designed to assist in reaching all of the Internet-accessible libraries, Freenets, CWISs, library BBSs, and other information sites by Telnet” (Tennant, Ober and Lipow, 1993: 91). The Hytelnet program is available for IBM-compatible personal computers as well as Macintosh, UNIX, and VMS systems.

Archie

“Archie is an Internet utility designed to help users locate specific file and their associated host sites on the Internet” (Valjkov and Hartnell, 1994b: 11). “Archie was originally developed as a project by students and volunteer staff at the McGill University, School of Computer Science in Montreal, Canada” (Hahn and Stout, 1994: 333). Archie can
be accessed through a local Archie client, Telnet, to log in as a user I.D. of Archie, or to mail a request to any Archie server.

**Bulletin Board Systems (BBSs)**

There are a number of BBSs in the world. Internet contains many BBSs that can be accessed through Telnet. Most BBSs provide a menu of services. For example, the UK’s Bulletin Board for Libraries (BUBL) offers many on-line services to Internet users.

UK BUBL presents its information in three main ways in its Gopher service.
- a) Files which stand-alone.
- b) Links to other services and resources.
- c) The BUBL subject tree which presents materials; primarily links to other resources in Universal Decimal Classification order. Furthermore, there are three main types of links encountered on BUBL: Gopher links; Telnet links; and WAIS links (*Beginners to BUBL, 1994: 1*).

**Wide-Area Information Servers (WAIS)**

WAIS, pronounced ‘wayz’, is able to access any of a large number of Internet databases. Kellem (1991: 1) reports that WAIS is a set of programs (or, more specifically, a protocol) that allows users to search and access different types of information from a single interface. Additionally, Gilster (1993: 308) points out that the idea of WAIS is to let the user search for a combination of keywords by sending search strings to the appropriate WAIS server machine. Like Gopher, WAIS allows the Internet users to access information regardless of where it is stored. “WAIS databases (some 500 at last count) are organized under the ANSI information transfer standard known as Z39.50” (Veljkov and Hartnell 1994b: 47).
World-Wide Web (WWW, or W3, or Web)

Web originated at Cern, the European high-energy physics laboratory in Geneva. Like Gopher and WAIS, the Web program allows users to access Internet information and services. Web is a hypertext system in which documents contain links to related materials. Hahn and Stout (1994: 496) noted that in the world of hypertext, we use the word ‘hypermedia’ to refer to documents that might contain a variety of data types and not just plain text. “Growth of the World-Wide Web has been phenomenal over the last year, due in large part to the release of Mosaic, a graphical interface browser from the National Centre for Supercomputing Applications (NCSA), in early 1993” (Keith, 1994: 20). The Web introductory screen contains a general overview and there are two ways to log in when looking for information: by subject [1] or by type [2]. Therefore, each category of Webs consists of subject and numbers in brackets. Internet users can access the information by entering the number in question.

4.3 Library networks in other selected countries

There have also been a number of library networks developed outside the UK and the USA.

In Canada, UTLAS International, originally known as the University of Toronto Library Automation System, provides a number of bibliographic services and products to all types of library. “UTLAS commenced in 1973, and operates in both French and English” (Rowley, 1993: 293). Saffady (1993: 68) pointed out that UTLAS is a for-profit company. It has contacts with more than 600 institutions representing more than 2,500 libraries. About 90% of UTLAS’s customers are Canadian libraries; 40% of these are located in Ontario and 19% are in Quebec. “UTLAS original system was aimed to be an on-line catalogue support
service (CATSS) and developed from work done with Toronto University Library on the use of MARC records" (Tedd, 1993: 81). In fact, UTLAS supports original cataloguing and cataloguing with copy obtained from source files or contributed by other UTLAS participants. Saffady (1989: 245) stated that the UTLAS database records are derived from a broader range of sources than those of other bibliographic utilities. It includes LCMARC, COMARC, CANMARC, and UKMARC cataloguing for books, audio-visual materials, serials, maps, and music.

In Latin America, there have also been bibliographic network developments. McGinn (1988) described three of these bibliographic databases, but noted that Latin America as a region has no bibliographic utility comparable in the size of its database to those operating in North America.

First, LIBRUNAM (the Library of the National Autonomous University of Mexico) began in 1970 to support cataloguing and acquisitions processing for over 168 libraries in Mexico. Secondly, Venezuela began its automated cataloguing in 1980. In 1982, the main library of Venezuela’s Central University began to share the NOTIs system. The database of the automated system of the National Library established the SAIBIN database. Finally, the National Library of Chile acquired the NOTIs software in 1984. It benefited from the Venezuelan experience. Then the other Chilean libraries joined the National Library system.

Spain has established many library networks, which have been described by Jimenez and Keefer (1993). Ruedo is a network currently consisting of seven university libraries. Its union catalogue is accessible using the DOBIS-LIBIS system and currently contains approximately 500,000 records. CSIC (the Network of the Superior Council of Scientific
Research) was begun in 1986 and there are currently 78 libraries participating in the network. Rebiun, the network of university libraries, is a consortium of 13 universities and one of their plans is the creation of a union catalogue. Finally, Spain established in 1992 a new network to link the OPACs of VTLS users for co-operative cataloguing and inter-library loans.

“In Sweden, LIBRIS (the Library Information System) began in 1972” (Dempsey, 1992b: 82). The LIBRIS system offers shared bibliographic services to research libraries in Sweden and it publishes a range of catalogues and bibliographies. “BUMs system is another library network in Sweden, operating in municipal public libraries. It has a union catalogue database” (Rowley, 1993: 298).

In summary, it may be stated as a fact that library co-operative networks have been set up in almost every continent. Some networks started off from academic roots while others began with national libraries, but many networks began as co-ordinating and co-operative arrangements among a small number of members and later expanded to include other libraries in the same country or indeed other countries. OCLC, SLS, CURL and UTLAS are some examples of library networks that have been established by academic libraries. Other examples of library networks started in the academic sector include NACSIS (the National Centre for Science Information System), which started in 1973 in the University of Tokyo; CERL (the Consortium of European Research Libraries), which started in 1985; PICA (the Project of Integrated Cataloguing Automation) which started in the Netherlands in 1969; and the Research Library Network, established in Malaysia in 1976. BLCMP and RLG/RLIN were each established jointly by university and public libraries, while LASER and WLN have multi-library roots. On the other hand, some library
networks have been established by national libraries, such as BLAISE in the UK and LIBRUNAM in Mexico. Other examples of national networks originated by national libraries include ABN (the Australian Bibliographic Network), which was established by the Royal Library of Sweden in 1972; SILAS (the Singapore Integrated Library Automation Service), which was inaugurated in 1987; and SABINET (the South African Bibliographic and Information Networks), started in 1983.

These library networks, originated in either the national or academic sectors of librarianship, have many things in common and are indeed offering fine services and facilities to their members, who obtain a whole range of benefits by joining the networks. These specific benefits of library networks will be discussed in the following section.

4.4 The key benefits and the major problems of library networking

It is a fact that a large number of major academic, public, and special libraries are today members of a network or co-operative venture, owing to the many services and facilities that library networks offer and the benefits that member libraries gain from accessing such networks. For example, as has been mentioned previously OCLC has currently more than 18,000 member libraries of all types all over the world. Hunter and Bakewell (1991:258) point out that membership of a network can bring with it considerable benefits, but add that it also poses certain problems with regard to local user needs and the services provided may not live up to local expectations. In the following pages, some of the actual library activities in which networking can be employed, e.g. selection/acquisitions, technical processing (cataloguing and classification), bibliographic searching/reference work, inter-library loans, and document delivery, will be discussed.
4.4.1 Selection and acquisition

Networking can provide the opportunity to view each member library’s catalogues and order files prior to making acquisition decisions. Before ordering a particular item, each library can check if there are holdings in other participant libraries which may allow it to avoid placing an order for the same time. This can, of course, lead to reduced purchasing of items and cost savings in many libraries. Also, networking assists libraries to speed up the selection and ordering processes, which are presently labour-intensive operations in many libraries. Some networks, in fact, offer their members on-line verification of orders against the union catalogue or other files, and on-line access to bookseller’s files, which allows the acquisition librarian to check publication details, prices, and availability, and then place an order for a specific item on-line.

4.4.2 Technical processing

Library networks provide on-line shared cataloguing facilities to member libraries. For example, they help cataloguers to assign subject headings, classification schedules, and indexing terms. In addition, some networks actually offer on-line authority files, so that member libraries may, for instance, assign personal names, corporate names, geographic name, and series titles. Chan (1994: 419) noted that joining a library network and performing on-line the processes of cataloguing or classification has proved to be helpful to librarians in terms of reducing the time between a request for an order’s being made and appearances of the purchased item on the shelves. Performing a process on-line reduced unnecessary duplication and greatly reduces the need for local, professional, original cataloging activity, and the previously manual catalogue maintenance. Currently, most of the existing library networks employ various means to produce and exchange bibliographic records between member libraries, such as cards, fiches, tapes, micro downloading, file
transfer, and CD-ROM. This sharing and exchanging of bibliographic records enables libraries to pool their cataloguing effort and to achieve significant savings, as well as speed up technical processing. Besides sharing the work of cataloguing, networking participants maintain a union catalogue of members’ holdings. Union catalogue creation is often a by-product of any co-operative network. Member libraries may utilize an on-line union catalogue for retrieving bibliographic records and may obtain further benefits from them for their own ordering and acquisitions, cataloguing, inter-library loans, reference services, etc.

4.4.3 Bibliographic searching/reference work

Machovec (1995: 11) has pointed out that as no library can physically hold all the materials on some topic or in some format and no library can locally load or maintain all databases, the networking of library and information systems provide the opportunity for libraries to enhance access to information in local, regional, national, and international systems. Through networking, librarians and users learn what is available in the member libraries taken together and, indeed, through some networks, participants can obtain access to other networks beyond, for instance for reference purposes. So, for example, JANET members can connect to CURL libraries and search their databases; the facility may, of course, also operate in the opposite direction. Furthermore, accessing special files of on-line hosts in different libraries is valuable for member libraries and for bibliographic searching. Via the networks, reference librarians or patrons can consult in connection with their work in compiling bibliographies, answering subject enquiries, and tracing authors. Currently, many of the networks offer on-line reference services to their participants, e.g. abstracts, citations, and full text of information used by students, teaching staff, researchers, and other information seekers via the on-line union catalogue or databases established by the network itself for reference purposes. Recent years have in fact witnessed a great deal in the
development of electronic full-text databases containing books and journal articles. For instance, OCLC, SuperJANET, and the Internet all offer this kind of service to their member institutions.

4.4.4 Inter-library loans/document delivery

Through networking, librarians gain easier handling of inter-library loan requests so that they can, for example, trace and request wanted items on-line. Allan (1993: 4) pointed out that the use of networked systems allows librarians to make rapid decisions about whether a particular library has a required document in stock and which library they should first approach with an inter-lending request. "OCLC Inter-library loan enables libraries to select holdings information electronically from On-line Union Catalogue to send request for materials to other libraries via the On-line system" (OCLC, 1991: 21). The British Library Document Supply Centre (BLDSC) offers extensive inter-library loan services for libraries in the UK. When specific titles are requested by users, librarians are able to check whether these items are in stock at BLDSC and to order them on-line. Networking makes the delivery of items requested by librarians faster than the traditional method of delivery system, i.e. mail and transportation. Allan (1993: 4) has described the on-line file transfer as having no limits and has argued that remote access of this nature could extend to electronic journals, traditional journals scanned and stored electronically, or to full-text databases of any kind. Communication networks such as the Internet and SuperJANET do indeed offer fast delivery, e.g. by taking an image and transferring it from one place to another.

Additionally, libraries today are able to profit greatly from the spread of communication networks around the world, e.g. the Internet, JANET and SuperJANET. By joining and accessing such networks, libraries obtain the following benefits among others:
(1) electronic mail services; (2) remote on-line services, e.g. bulletin board services and libraries' OPACs; (3) file transfer; (4) fast document delivery; (5) reduction in telecommunication costs; and (6) intercommunication between hundreds of libraries via the Internet or JANET.

By carrying out the above library activities via networking facilities, libraries and users benefit greatly from information technology so that, for example, the cost of processing materials will be significantly reduced. Chan (1994: 419) noted that the availability of on-line processing of catalogue records has proved to be extremely helpful in terms of cataloguing cost savings. Library networks also help libraries to increase processing efficiently and they provide better control. Hunter and Bakewell (1991: 256) stress that greater efficiency should be achieved by joining a library network, since it offers the prospect of economies of shared facilities, including files which require a reduced input from individual libraries. Networking also helps libraries to reduce the time taken in processing materials, which, in turn, frees staff's time so that they may engage in other activities in their libraries. It also helps to reduce the time that a user must wait before new materials are made available for use. This, in turn, leads to increased productivity. By performing the above library networking activities, end-users' satisfaction will be increased owing to faster ordering and acquisition, faster technical processing, new reference facilities and on-line document delivery system, and general increase in efficiency in libraries. Most end-users do not in fact pay for their use of networking facilities in their parent organizations' libraries and obtain instant results from the computer without constraints on location or time.
Counterbalancing to some extent the many benefits accruing from library networking activities, one must nevertheless bear in mind that networking may bring a number of pitfalls, which may be divided into problems of the psychological environment and technical problems.

The major psychological problems that face networking activities include: (1) a certain loss of local autonomy; (2) potential dissatisfaction by large participant libraries who make the major efforts in establishing and maintaining the network operation, and investing large amounts of money in the network, while smaller libraries obtain equal benefits and services without equal input; (3) the lack of control by many members of library networks over the system they use; and (4) the fact that "accepting shared cataloguing without regard to local needs, local terminology, local emphasis and local users may, in the long run, result in a much higher expenditure of time by users" (Hunter and Bakewell, 1991: 257).

Equally, there are some technical problems involved in networking. These include: (1) lack of standardization of computer protocols; (2) different kinds of computer hardware; (3) different kinds of software used, e.g. for operating systems and library retrieval systems (involving many different users and protocols); (4) occasional breakdown of the system, e.g. when telecommunication connections are temporarily interrupted or fail; and (5) the need for member libraries to adhere to the co-operative network standards, such as MARC format and AACR2 in order to be able to exchange bibliographic records.
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CHAPTER FIVE
STANDARDS AND COMPUTER PROTOCOLS

One of the purposes of the present study is to examine and describe the technical aspects of establishing a bibliographic network system among the libraries of Riyadh City. In order to achieve this goal, this chapter will focus on standards and the most widely utilized of the various protocol suites.

5.1 Standards

Standards are very important for exchanging bibliographic records. "Whenever there is a need for communication or co-operation, like it or not, standards are a basic necessity" (Hornsell, 1988: 16). Pope (1992: 22) points out that standards are critical in various aspects of the information industry. In the electronic environment, they facilitate the exchange of information as users combine data, as libraries migrate between systems, and as records are shared for building catalogues. In print formats, they provide consistency and identify those elements that are most critical.

Standards are followed in many areas of the information industry, as in the MARC and telecommunication standards. Durance (1988: 20) states that the ability alone to connect systems will not achieve useful results; in addition, it is necessary for the data content and format transmitted to be in standard form for intercommunication to take place. Campbell (1992: 17) stresses that standards are the basis for making many exciting and empowering things happen - like connecting one system to another, producing files on one system that can be transferred to another, and saving users' money when a different manufacturer's less
expensive component can be connected to one's system. Grosch (1995: 178) further notes that automated library systems benefit from increased standardization, both in data processing and in application. With standardization, it becomes practical for system developers to produce products with more acceptance and broader appeal. For the library, it also means that investments in information technology (IT) will be made where there are common and accepted parameters. “One of the management issues which had to be resolved as bibliographic and citation databases evolved was standards (MARC on the library side and OSI on the telecommunication side)” (Mitchell and Saunders, 1991: 118). Michael and Hinnebusch (1995: 15) also comment that the only way for information to be shared adequately, fairly, and uniformly is with standards. Publishers, academic institutions, government agencies, and libraries exist primarily to share and provide information. This sharing requires a series of standards that make access easy and ubiquitous for the beginner who is uninitiated into technology.

The following two organizations have been responsible for most of the major developments towards international standards:

1. The International Organization for Standardization, which is usually known as the International Standards Organization (ISO). “IOS pioneered the Open System Interconnection (OSI) Reference Model, which is a description of layered communication protocol for computer-to-computer networking” (Grosch, 1995: 172).

2. The International Telephone and Telegraph Consultative Committee (CCITT), which is a division of the International Telecommunications Union (ITU). “In 1976 CCITT introduced the X.25 standard for the interface between terminal and host computer in a packet switched data network” (Tedd, 1993: 68).
Our concern in the present study is with the computer protocol standards.

5.2 Computer Protocols

At present, there is a wide variety of computer protocols, or in other words computer network architectures, available for use on computer networks. This includes local area networks (LAN), wide area networks (WAN), and the software that runs them. Dempsey (1992b: 10) reports that the growth of computer power and its distribution have promoted greater concentration on interconnection, which requires protocols, i.e. agreed procedures, for communication. Furthermore, Cleveland (1991: 17) stresses that computer protocols will specify both the broad terms of what services one computer system can expect to be available from another and minutiae of what kinds of data may be exchanged, together with its order and syntax. Unfortunately, computer protocols develop their own objectives, but they have in common a similar set of high-level objectives, which, as listed by Martin et al. (1992: 28), include connectivity, modularity, ease of implementation, ease of use, reliability, availability, and ease of modification.

At present networking protocols fall into two main groups:
1. those emanating from or supported by national and international standards making bodies, which are more 'open' in nature with published specifications;
2. those emerging as proprietary standards from major computer manufacturers, which are 'closed' by virtue of their confidential specification and non-participative development (Harries, 1993: 16).

The key elements of a communication protocol are: 1) syntax; the structure of the information communicated, such as the data format, coding; 2) semantics; the meaning of the signals and binary code words exchange; 3) timings; the time at which data should be transmitted, the sequencing of the messages and the bit transmission rate (Heap, 1993: 17 f.).

Most computer protocols are layered structures, e.g. OSI and TCP/IP. "Layered protocol aims to analyse the overall communications process into well-defined and semi-autonomous functional modules" (Harries, 1993: 16). layers are divided into two classes.
Dempsey (1992a: 3) points out that lower or network-oriented layers are concerned with delivery mechanisms of networking, while upper or application-oriented layers allow applications on different machines to communicate in order to perform shared tasks.

In the following pages we will briefly describe and discuss the most widely employed of the various computer protocols. Naugle (1994: 11 f.) lists most of these computer protocols. He also points out that protocols are less than twenty-five years old and that most are in fact no more than twelve years old. Examples include the Apple Talk protocol, Digital Network Architecture (DNA), IBM Systems Network Architecture (SNA), Novell Network, and Xerox Network Standards (XNS).

5.2.1 Properties Protocols

5.2.1.1 Apple Talk

This is a proprietary networking software employed to link Apple Macintoshes. 'It was introduced by Apple Macintosh computer in 1983. Apple Talk protocols are arranged in layers, with each layer providing a service to another layer or to an application' (Naugle, 1994: 341 f.). 'Apple Talk Phase II is the latest version and the one that is in widest use today' (Dickie, 1994: 211).

5.2.1.2 DECnet

This is another proprietary suite of networking protocols. 'Digital Equipment Corporation announced its Distributed Network Architecture (DNA) in 1975' (Meijer and Peeters, 1982: 144). 'Currently DECnet is about to enter its fifth Phase, known as DECnet Phase V. This will be the DECnet that will incorporate Open Systems Interconnection (OSI) into the architecture' (Naugle, 1994: 411). 'The ISO standards were chosen as the basis for
the Phase V implementation using the OSI Reference Model, as the underlying layers of this architecture' (Dickie, 1994: 130). Cleveland (1991: 25) mentions that there are a number of very large networks based on DECnet, such as HEPnet. Furthermore, Dempsey (1992b: 21) states that the library vendors DRA in the USA and SLS in the UK use DECnet products and that DECnet is quite widely used by government agencies and in the scientific community.

5.2.1.3 SNA

"Systems Network Architecture (SNA) was introduced by IBM in 1974. Its layers are generally similar to the layers of OSI reference Model' (Meijer and Peeters, 1982: 83, 133). Its seven layers are: "physical control, data link control, path control, transmission control, data flow control, presentation services, and transaction services" (Mayne, 1986: 422). Dempsey (1992b: 21) notes that IBM now offers an OSI communication subsystem, which permits the connection of IBM and non-IBM machines using OSI protocol.

5.2.1.4 Novell NetWare

Naugle (1994: 182) points out that Novell NetWare is a LAN workgroup network operating system that permits workstations and their servers to communicate. Advanced NetWare 3.11 is the latest version of NetWare. Dickie (1994: 167) mentions that Novell NetWare employs a proprietary protocol stack in order to provide its intended client-server communication.
5.2.1.5 XNS

Xerox Network Services (XNS) is a proprietary protocol developed by Xerox Corporation. "This protocol was implemented by multiple vendors at the start of the network revolution in the early 1980s" (Naugle, 1994: 115).

In addition to the above proprietary suites, there are a number of other proprietary protocols which are employed to support connectivity among computer systems. They include, for example, MAP/TOP, i.e. Manufacturing Automation Protocol (MAP) and the Technical Office Protocol (TOP); Sydney UNIX network; Local Area Transport Protocol (LAT); Network Computing Architecture (NCA); and Program Support Communication Network (PCSN).

However, proprietary protocols have been established by particular manufacturers for their own products; they may or may not work with anything else and do what the consumer may want to do (Michael and Hinnebusch, 1995: 12). Therefore, a number of networks are switching their old, closed or proprietary protocol to open systems protocols, in order to be able to communicate with other networks using open protocol suites. OCLC network, for instance, replaced in the early 1990s its original proprietary dedicated-network protocol by an open system protocol which incorporates packet switching technology. According to Rose (1990: 4), an open protocol suite was required to achieve information mobility. To ensure that all computers belonging to an organization could communicate with each other (regardless of their manufacture), there had to be an open protocol suite so that no one vendor would have an unfair competitive advantage in the market. Moreover, as Rowley (1988: 62) has pointed out, manufacturer-supplied computer protocol architecture has tended to be incompatible with architecture from other manufacturers.
Latham (1993: 76) lists the following factors that have led libraries to move away from proprietary standards in recent years:

1. Users have sometimes found themselves locked into proprietary environments, making it difficult for them to pursue an evolutionary approach to systems developments;
2. Customizing and developing proprietary systems can be complex, expensive, and time consuming;
3. Strategic support decisions can leave libraries without affordable upgrade paths; and
4. Proprietary environments have traditionally offered limited scope for interconnection with diverse systems for purposes such as exchange of bibliographic records and searching remote catalogues.

Consequently, standards protocols have been developed in terms of an open system by national and international bodies in order to attempt to resolve this situation. Two major open protocol suites have emerged; these are Transmission Control Protocol/Internet protocol (TCP/IP) and Open System Interconnection (OSI).

5.2.2 Open Protocols Suite

5.2.2.1 TCP/IP

"TCP/IP is a system of protocols commonly used for wide area networking; its success has made the Internet possible. These powerful protocols were developed in 1974 by Robert Kahn" (Gilster, 1993: 14). Hahn and Stout (1994: 3) point out that TCP/IP is a common name for a collection of over 100 protocols that are used to connect computers and networks, the actual name being derived from the two most important protocols, as noted
above. In fact, IP transmits the data from place to place, while TCP makes sure it all works correctly. Naugle (1994: 243) states that TCP/IP developed into an architecture that would allow the computers to communicate without grossly modifying the operating system or the hardware architecture of the machine. TCP/IP runs as an application of those systems. TCP/IP is one of today's most widely used networking protocols (Cleveland, 1991: 24; Gray, 1991: 104; Dempsey, 1992a: 3; Naugle, 1994: 241).

Harries (1993: 77) describes the reason that makes TCP/IP capable of wide use in both wide area and local area networks, including mention of its widespread availability and comparatively straightforward approach; absence of requirement for new applications to go through a formal process of approval as OSI equivalents, so that the time scales between development and installation are much reduced; and the well-tested and well-understood applications of TCP/IP. Additionally, Cleveland (1991: 24) notes that TCP/IP has been incorporated into a version of UNIX and, by this means, has become readily available to the academic and scientific communities, who were the largest users of the UNIX system. Furthermore, he points out, TCP/IP is the basis of the largest world-wide network: the Internet. "TCP/IP is a layered protocol suite. It has four primary layers: the Network Interconnection layer, the addressing layer (IP), the Data Transport layer (TCP/UDP), and the Process/Application layer" (Lane and Summerhill, 1993: 45 f.). Furthermore, Naugle (1994: 247-9) divides the TCP/IP protocol suites into the following three phases:

1. The network layer, which contains: Internet Protocol (IP), Internet Control Message Protocol (ICMP), and Address Resolution protocol (ARP).

3. Applications, which contain: Telnet, File Transfer protocol (FTP), Simple Mail Transfer Protocol (SMTP), and Domain Name Service (DNS).

5.2.2.2 OSI

Open System Interconnection protocol suites is a joint venture between the International Organization for Standardization (ISO) and the International Telegraph and Telephone Consultative Committee (CCITT). Both are United Nations agencies, based in Geneva. 'In the late 1970s and the early 1980s, the first OSI standard were developed under Technical Committee 97 (TC 97), Information Processing, of the ISO' (Piscitello and Chapin, 1993: 13). ISO has many members all over the world, such as the British Standards Institution (BSI) and the American National Standards Institute (ANSI). 'OSI is not strictly the work of a single organization, but that of hundreds of national institutions and companies, co-ordinated by international umbrella bodies' (Henshall, 1992: 21) as shown in Figure 1.

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![Hierarchy of standards making](image-url)

**Figure 1: Hierarchy of standards making**
The CCITT and ISO are largely parallel organizations, the former receiving its input from the PTTs (postal telephone and telegraph organizations) of each member country. ISO receives its input from the standard organization of member countries, e.g. the BSI, and BSI in turn receives input and comment from the Institute of Electrical and Electronic Engineers (IEEE) *(ibid.)*.

'OSI is the result of more than ten years of discussion, debate, and documentation in national and international standards committees' *(Mackinnon et al., 1990: 13).* 'OSI aims to develop a framework for the development and approval of computer networking standards that provides communication-based user services which support inter-working with computer systems from different manufacturers, in different geographical locations' *(Harries, 1993: 68).* Additionally, Learn *(1988: 42)* mentions that the intent of OSI is to provide the facilities that allow application processes to communicate without regard to differences of hardware, operating systems, or representations. Furthermore, Bawden and Blakeman *(1990: 27)* stress that, as there are many different protocols for LANs and WLNs, communication between two different systems can be difficult, if not impossible. They also state that ISO has attempted, with some success, to solve the problem by the introduction of OSI.

OSI utilizes a seven-layer architecture, known as the OSI Reference Model, as shown in Figure 2.
"Each layer performs a different set of functions, and the intent is to make each layer as independent as possible from all the others" (Martin et al., 1992: 62). Each layer is briefly described by McCrum (1988: 28 f.) as follows:

The Physical layer provides for digital data to be transferred across physical media. Data link layer provides for error free transmission over the path between the terminal and the network. Network layer provides routing and switching functions necessary to set up source-sink paths for information exchange. While Transport layer provides reliable, cost-effective data transfer, flow controlled end-to-end as required on a individual basis. Session layer provides the functionality to establish and manage a dialogue between communication and systems. Presentation layer delivers application processes in recognisable format. Application layer provides services to the OSI users of OSI. This layer contains many protocols (e.g. File Transfer, Access and Management (FTAM)).

5.3 TCP/IP versus OSI

TCP/IP and OSI have many similarities and also many differences. Both were developed in the 1970s and employ layered architecture. They have the same general aims: interoperation and intercommunication across different manufacturers' architecture. Washburn and Evans (1993: 145 f.) describe OSI protocols as having more layers than
TCP/IP, but the bottom four layers are comparable. They also state that major differences occur at the application layer of TCP/IP. At this level, the OSI model separates into three layers, adding, most importantly, the presentation layer. Piscitello and Chapin (1993: 13) point out that the communities who develop standards for OSI and TCP/IP share common practices. For example, both advance technology through a committee and consensus process, using some form of parliamentary procedure. Both have a hierarchical infrastructure to co-ordinate work and enforce written or unwritten rules of conduct. Participation in both is international. Michael and Hinnebusch (1995: 23) state that TCP/IP and OSI have gone along their own development paths and that neither the replacement of one with the other nor the merging of the two is likely to occur any time soon. Also, the development of OSI has been costly and slow, and represents a very small part of information access and retrieval. On the other hand, they state, the use of TCP/IP for global information access and retrieval has no equal (ibid.: 24). Naugle (1994: 241) mentions that TCP/IP not only gave the network world the groundwork for future protocols (OSI); it allowed open access so that users may choose this network operating system without having to choose a single vendor along with it, and TCP/IP allowed for open communication to exist and also allowed for the proliferation of LAN to LAN to WLN connectivity between multiple operating environments. According to Gilster (1993: 15), TCP/IP is not the only protocol for connecting a variety of differing networks. The Internet is becoming a multi-protocol network, integrating other standards such as OSI. OSI implementation became available in the early 1990s.

Harries (1993: 79) stresses that OSI protocol is often judged a more comprehensive and long-term approach, capable of handling a large number of interlinked systems with seamless access to all points, as well as providing better security, back-up, and recovery
mechanisms. Furthermore, Dempsey (1992a: 3 f.) notes that OSI is strongly supported by the European Union and by governments generally because it is seen as an important component of an open market and as creating a level playing-ground for vendor activity. Dempsey (1992b: 30) also points to three main motivating factors in the drive of an OSI environment: political, commercial, and technological. Politically, OSI has received support from the US government, and the European Community is also interest in buying OSI standards. Commercially, many organizations and companies, e.g. British Telecom, have replaced their old networks by OSI. Technological benefits flow from the openness of systems. Moreover, Washburn and Evans (1993: 455) point out that OSI was designed with a world-wide Internet in mind, that OSI does not have some of the limitations of TCP/IP, and that OSI has had extensive (more extensive than TCP/IP) security and management features incorporated into the architecture. Latham (1993: 78) lists many disagreements among parties involved in defining OSI: there are areas where standards have not been developed, there are few commercial OSI applications available, and the technical demands and costs of OSI development are currently beyond the means of many libraries.

5.4 The Library Community and OSI

There are many systems which have been developed within the library community to support library activities, using standard protocols within the OSI framework. The early projects were carried out in the USA, Canada, Norway, the UK, and the Netherlands. Lathams (1993: 78) states that OSI in libraries offers the potential for interconnecting diverse systems for resource sharing, remote information retrieval, service delivery, and an open and competitive market for library IT products. Harries (1993: 113) points out that the OSI open systems model demonstrates the need for data and format standards, as well as common approaches to telecommunication protocols, in order to support effective sharing
and exchange of information. In addition, Horsnell (1988: 122) has stressed that the exchange of information requires agreed standards among the participants. The use of computers and electronic means of communication has further strengthened the need for standards. Latham (1993: 77) identified the following standards that interest libraries: the X.25 standard for Wide Area Networks; X.400, which is a message-handling standard; X.500, which is a standard for developing directories; Search and Retrieve (SR) and Z39.50 for information retrieval over distributed systems.

5.4.1 X.25 Standard

This standard protocol was established by CCITT for packet switching over a wide area network. It is being used for public telecommunications and by some private networks such as Telenet and Tymnet. Gray (1991: 108) describes the way that this type of network operates as follows. Packet switched networks carry data in units with a fixed maximum size, called packets. Using packets prevents a particular message monopolizing part of the network, as large messages are broken up into packets and the reconstructed at their destination.

5.4.2 X.400 Standard

This is another CCITT recommendation protocol. X.400 is for message-handling sections. "This standard has been jointly developed by both CCITT and ISO. X.400 is the CCITT name for it, while the ISO version sometimes goes under the name of Message Oriented Text Interchange System (MOTIS)" (Feeny and Martyn, 1990: 83). Dempsey (1992b: 39) states that the X.400 recommendation is for the standardization and interconnection of messaging systems and that its goal is a universal mail system, embracing public services as well as the vendor-supplied private mail systems.
5.4.3 X.500 Standard

X.500 standard is another CCITT recommendation for dictionary services. Latham (1993: 77) states that X.500 is a standard for developing directories, such as directories of the users of a national network. Dempsey (1992b: 44) states that X.500's initial uses will be to provide information to human users, in look-up mode. This is broadly analogous to telephone directory functionality and, for this reason, such services are known as white pages directories.

5.4.4 Search and Retrieve Protocol

This protocol has been developed as an international standard within ISO 10162/3. "The purpose of SR standard is to provide a set of application layer communication-related services which can be used to perform search activities in an OSI environment" (ISO, 1993: v). Dempsey (1992b: 77 f.) lists the potential uses of SR as follows:

- to allow workstation clients to query database services over LAN and beyond;
- to interface local systems to the utilities, allowing the direct transfer of records without cumbersome downloading and other intermediate steps;
- to enable searching of disparate remote systems with a consistent command language;
- to support interface between library system modules; and
- to support interface between distributed library systems modules.

5.4.5 Z39.50 Standard

This is another application layer protocol under development in the library environment. "Z39.50 (IR) is an ANSI./NISO standard and is formally ANSI Z39.50; Information Retrieval Service and Protocol. American National Standard Retrieval
Application Service Definition and protocol Specification for Open Systems Interconnection” (Michael and Hinnebusch, 1995: 16). Harries (1993: 118) points out that Z39.50 has been developed for the exchange of bibliographic information within the USA by the National Information Standards Organization (NISO) and that it is accredited by the American National Standards Institute (ANSI). Dempsey (1992a: 5) mentions that Z39.50 is a superset of SR and uses SR/Z39.50 to refer to both protocols. Michael and Hinnesbusch (1995: 16) state that Z39.50 is referred to as an information retrieval (IR) protocol because it allows users to access and retrieve network information and merely data.

Z.39.50 has two components, which define different aspects of the interaction between the client and the server:
1. Support for computer-to-computer interactive searching and the return of appropriate records; and
2. a generic search format in which searches may be expressed (Dempsey, 1992a: 5).

Examples of standard protocols' being employed within the OSI model in the library environment include the Linked Systems Project (LSP); iNet (Intelligent Network); and Interlending Open Systems Interconnection Network (ION), which was fully discussed in Chapter Four in connection with the LASER network. In addition, OCLC switched to the OSI standard in the early 1990s, as was also noted in Chapter Four, and the Joint Academic Network (JANET) is currently utilizing the OSI environment to link its network to the other networks.

5.4.6 The Linked Systems Project

The Linked Systems project (LSP) is about sharing catalogue records between the Library of Congress, OCLC and the Research Libraries Group (RLG). Tuck (1990: 47) mentions that the LSP project was complex because the separate systems at each end of the three sites were very different from each other, coming from different manufacturers.
Dempsey (1992b: 52) reports that LSP developed Linked System protocols, which were based on OSI. Two main applications are in use: record transfer (RT) and information retrieval (IR). The LSP suite of protocols is known as Standard Network Interconnection (SNI).

The first LSP application was the Authorities Implementation, which was introduced in 1981 as the name Authority File Service (NAFS) and became the Name Authority Co-operative (NACO) in 1984. Within NACO, the LC, RLIN and OCLC contribute records to and receive records from the national authority file using the Standard Network Interconnection (SNI) (Rowley, 1993: 292).

5.4.7 iNet (Intelligent Network)

This is another OSI library environment project, which was set up in Canada. Clayton and Batt (1992: 112) mention that the National Library of Canada initiated a Bibliographic and Communications Network Pilot Project to determine if the OSI model could be used to achieve a decentralized, nation-wide, voluntary library and information network as a vehicle to facilitate resource sharing. Moreover, Harries (1993: 122) notes that iNet was intended as a means of facilitating information-gathering across different fields and contained a measure of intelligence in that individual users could be recognized by the network through a previously formulated profile.

Although iNet was found to be only one of several configurations which could be used to interconnect incompatible systems, standards protocol to enable the transfer of records between different systems were developed, as was a protocol to support the creation, dispatch, receipt and storage of standardized interlibrary loan messages using microcomputers as well as a standard electronic mail system (Clayton and Batt, 1992: 12).

5.5 Multiprotocol Usage

Tuck (1994: 20 f.) stresses that multiprotocol, in which the application layer protocol is supported by a range of different underlying network protocols, will become more common, and the awareness of the need for multiprotocol working will remain an
important factor for the foreseeable future. He also notes that inter-working between a mixture of protocols and across administrative domains can be very effective. An example of a multiprotocol is the Joint Academic Network (JANET).

JANET is using Internet Protocols (TCP/IP, increasingly popular for information services based on World-Wide-Web, Gopher and Z39.50. many users and some services (such as library OPACs) however still use X.25/Coloured Book Standards, and relay on local and national gateway services to reach the wider world (JANET, 1995).

However, multiprotocol implementations have a number of drawbacks, which Piscitello and Chapin (1993: 512) enumerate as follows:

1. The multiprotocol approach is expensive because it requires two, or indeed many, network management’s, software, protocol overhead, operation, software and equipment updates, etc.
2. It affects all systems. Hosts, in particular, must have two (or many) of everything.
3. It affects performance.
4. It is difficult to achieve transparency.
5. Unless all systems have multistacks, there will not be complete interoperability.

Summary

This chapter has surveyed and analysed the most widely employed of the various computer protocol standards for the purpose of this study. Findings and recommendations drawn from the gathered information will be the subject of the final chapter.
References


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CHAPTER SIX
ANALYSIS AND PRESENTATION OF INFORMATION

This chapter is composed of the analysis and presentation of data collected by the questionnaire survey and the interviews regarding the purpose of the study. It contains a series of tables with some comments in order to present the data gathered through both questionnaires distributed to sample libraries in Riyadh City and the interviews which were also conducted there. The questionnaire includes questions regarding Riyadh's libraries, specifically: name, type, collections, computerization, usage, type of computers employed, hardware, software, computer system storage capacity, telecommunication usage, and IT budget.

The aim of asking these questions may be stated as follows. First, it is important to examine the participating libraries; current collections because any new network needs a good basis of collections, or in other words records, to start to build up a database. Second, because the present study tries to discover the possibility of linking Riyadh’s libraries' computer systems on-line, it is essential to examine the status of computerization (automation), the equipment and standards used, and the IT budget of these libraries.

6.1 The Questionnaire survey presentation and analysis

The questionnaire (see Appendix A) was handed out to the heads of forty-six libraries of Riyadh City, forty-two (91.3%) of whom returned them after completing them. Their institutions comprised thirty special libraries, six academic libraries, five public libraries, and, of course, one national library, as shown in Table 1. Ten questions were asked concerning the libraries of Riyadh City.
6.1.1 Library name

The following is a list of the libraries in Riyadh City, from which the questionnaire survey was returned, arranged alphabetically according to type

**National**

1. King Fahd National Library.

**Public**

1. Al-Mather Public Library.
2. Al-Nassim Area Public Library.
4. King Abdulaziz Public Library.
5. King Faisal Street Library.

**Special**

Libraries of the following institutions

2. Arab Security Study and Training Centre.
4. Gulf Co-operation Countries.
5. Institute of Public Administration.
6. King Abdulaziz City for Science and Technology.
7. King Abdulaziz Research Centre.
8. King Fahd Hospital.
9. King Faisal Centre for Research and Islamic Studies.
10. Ministry of Labour and Social Affairs.
12. Ministry of Education.
15. Regional Arab Bureau of Education.
17. Saudi Arabian Basic Industrial Company.
20. Ministry of Information.
22. Ministry of Higher Education.
27. Ministry of Agriculture and Water.
28. Institute of Diplomatic Studies.
29. National Centre for Economic and Financial Information.
Academic

1. Imam Muhammad Ibn Saud Islamic University.
2. King Abdulaziz Academy College.
5. King Khalid Academy College.
6. King Saud University.

6.1.2 Library Type

The grand total of libraries in Riyadh from which the questionnaire was returned was 42. Table 1 presents their distribution and numerical percentages. As is shown by the table, there is 1 national library, 5 public libraries (11.91 per cent), 30 special libraries (71.34 per cent), and 6 academic libraries (14.29 per cent). The majority of libraries in Riyadh City are special libraries, constituting as they do 71.43 per cent of the grand total of Riyadh's libraries.

<table>
<thead>
<tr>
<th>Library type</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>1</td>
<td>2.38</td>
</tr>
<tr>
<td>Public</td>
<td>5</td>
<td>11.91</td>
</tr>
<tr>
<td>Special</td>
<td>30</td>
<td>71.43</td>
</tr>
<tr>
<td>Academic</td>
<td>6</td>
<td>14.29</td>
</tr>
<tr>
<td>Totals</td>
<td>42</td>
<td>100.00</td>
</tr>
</tbody>
</table>

School libraries and some special libraries have been omitted from the survey because they have negligible collections, and are generally badly arranged and poorly equipped.
6.1.3 Library Collections

This section will discuss two items: library materials including monographs, serials, manuscripts, and audio-visual (A/V) materials; and the numbers of items in such collections.

Table 2 indicates that 19 libraries in Riyadh (45.24 per cent) hold less than 10,000 monographs, 14 libraries (33.33 per cent) hold between 10,000 and 50,000 monographs, 4 libraries (9.52 per cent) have between 50,000 and 100,000 monographs, and 5 libraries (11.91 per cent) hold more than 100,000 monographs.

Table 2 also shows that 40 libraries (95.24 per cent) hold serials, while only 2 libraries (4.76 per cent) have no serials at all. Furthermore, Table 2 indicates that just 8 libraries (19.05 per cent) hold manuscripts, while 34 libraries (80.95 per cent) are without manuscript holdings. Also, 27 libraries (64.29 per cent) own A/V materials, while 15 libraries 35.71 per cent) do not have any AV materials.

Moreover, Table 2 shows that 38 libraries (95 per cent) hold less than 10,000 serials, 2 libraries (5 per cent) hold between 10,000 and 50,000 serials and none of them hold more than 50,000 serials.

In addition, 23 libraries (85.19 per cent) hold less than 10,000 A/V materials, 4 libraries (14.85 per cent) hold between 10,000 and 50,000 A/V materials, and no library holds more than 50,000 A/V materials.
Table 2: Library Holdings

<table>
<thead>
<tr>
<th>Number</th>
<th>Monographs</th>
<th></th>
<th>Serials</th>
<th></th>
<th>MSS</th>
<th></th>
<th>A/V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>A) &lt;10,000</td>
<td>19</td>
<td>45.24</td>
<td>38</td>
<td>95.00</td>
<td>6</td>
<td>75.00</td>
<td>23</td>
</tr>
<tr>
<td>B) 10,000-50,000</td>
<td>14</td>
<td>33.33</td>
<td>2</td>
<td>5.00</td>
<td>2</td>
<td>25.00</td>
<td>4</td>
</tr>
<tr>
<td>C) 50,000-100,000</td>
<td>4</td>
<td>9.52</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>D) 100,000+</td>
<td>5</td>
<td>11.91</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>42</td>
<td>100.00</td>
<td>40</td>
<td>100.00</td>
<td>8</td>
<td>100.00</td>
<td>27</td>
</tr>
</tbody>
</table>

Table 3 presents the size and total number of library collections by type of library. An analysis of the materials held by the responding libraries indicates that the largest proportion of materials is housed by the special libraries. Their material constitutes 40.05 per cent of the grand total of holdings. The special libraries also hold the majority of monographs (39.56 per cent), serials (83.72 per cent), MSS (78.57 per cent), and A/V (98.31 per cent).

The academic libraries in Riyadh City hold extensive collections, as Table 3 shows. Their materials amount to 1,460,410 items (37.76 per cent) out of the grand total of holdings. These materials comprise 38.11 per cent, 9.05 per cent, 13.41 per cent, and 0.53 per cent of all the monographs, serials, MSS, and A/V materials respectively. By comparison, the public libraries contain 19.39 per cent of the grand total of holdings, consisting of 744,860 monographs (19.54 per cent), 1,592 serials (6.23 per cent), 1,292 MSS (4.95 per cent), and 2,172 A/V materials (0.72 per cent). The National Library holds the least items of all (2.82 per cent). This is no doubt primarily because it is relatively, a newly established library, so that it has still not built up very significant collections.
Table 3: Collections by Library Type

<table>
<thead>
<tr>
<th>Type of Library</th>
<th>Monographs</th>
<th></th>
<th>Serials</th>
<th></th>
<th>MSS</th>
<th></th>
<th>A/V</th>
<th></th>
<th>Totals</th>
<th></th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic libraries</td>
<td>1,453,000</td>
<td>38.11</td>
<td>2,310</td>
<td>9.05</td>
<td>3,500</td>
<td>13.41</td>
<td>1,600</td>
<td>0.53</td>
<td>1,460,410</td>
<td>37.76</td>
<td></td>
</tr>
<tr>
<td>Special libraries</td>
<td>1,508,145</td>
<td>39.56</td>
<td>21,380</td>
<td>83.72</td>
<td>20,500</td>
<td>78.57</td>
<td>295,300</td>
<td>98.31</td>
<td>1,548,935</td>
<td>40.05</td>
<td></td>
</tr>
<tr>
<td>Public libraries</td>
<td>744,860</td>
<td>19.54</td>
<td>1,592</td>
<td>6.23</td>
<td>1,292</td>
<td>4.95</td>
<td>2,174</td>
<td>0.72</td>
<td>749,918</td>
<td>19.39</td>
<td></td>
</tr>
<tr>
<td>National library</td>
<td>106,444</td>
<td>2.79</td>
<td>256</td>
<td>1.00</td>
<td>800</td>
<td>3.07</td>
<td>1,316</td>
<td>0.44</td>
<td>108,816</td>
<td>2.81</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>3,812,449</td>
<td>100.00</td>
<td>25,538</td>
<td>100.00</td>
<td>26,092</td>
<td>100.00</td>
<td>300,390</td>
<td>100.00</td>
<td>3,868,079</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>
materials comprise 106,444 monographs (2.79 per cent), 256 serials (1 per cent), 800 MSS (3.07 per cent), and 1,316 A/V materials (0.44 per cent)

6.1.4 Use of Computers

Table 4 indicates that 21 libraries (50 per cent) were using computers in their processing, while 21 libraries (50 per cent) were not utilizing computers at the time of the survey. This means that half of Riyadh's libraries are currently engaged with automation.

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>21</td>
<td>50.00</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>50.00</td>
</tr>
<tr>
<td>Totals</td>
<td>42</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 5 shows that 16 special libraries (76.19 per cent) are currently engaged in automation in Riyadh, and that 3 (14.29 per cent) academic libraries are also automated, so that the prime user of computerization is the special libraries. The table also shows that the National Library is currently engaged with automation and that there is only one public library using computerization (in its processing).
Table 5: Automated Libraries by Type

<table>
<thead>
<tr>
<th>Library type</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special</td>
<td>16</td>
<td>76.19</td>
</tr>
<tr>
<td>Academic</td>
<td>3</td>
<td>14.29</td>
</tr>
<tr>
<td>National</td>
<td>1</td>
<td>4.76</td>
</tr>
<tr>
<td>Public</td>
<td>1</td>
<td>4.76</td>
</tr>
<tr>
<td>Totals</td>
<td>21</td>
<td>100.00</td>
</tr>
</tbody>
</table>

6.1.5 Planning for Automation

18 out of the 21 libraries that were not presently automated expressed a willingness and were indeed planning to become automated. In fact, some of these libraries have already bought their hardware and software equipment, which is ready for installation. Table 6 shows these libraries' responses.

Table 6: Planning to be Automated

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>18</td>
<td>85.71</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>14.29</td>
</tr>
<tr>
<td>Totals</td>
<td>21</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 4 shows that 50 per cent of the libraries are managing to operate an automatic system, and Table 6 reveals an 85.71 per cent positive response towards computerization. These figures indicate that half of Riyadh's libraries are currently automated, using computer processing in their operations. Furthermore, there was a positive answer concerning future automation from most of the libraries in Riyadh. This proves the need to
establish the proposed bibliographic network among Riyadh's libraries in order to foster their technical processing, to provide better services and facilities to their patrons, and to save money and effort.

6.1.6 Types of Computer Employed

As is shown by Table 7, 9 libraries (40.91 per cent) use mainframe computers, 8 libraries (36.36 per cent) use mini-computers, and the rest, which is 5 libraries (22.73 per cent), use micro-computers. It has been found that 1 library (the Gulf Co-operation Countries Library) uses both micro-computers and a mainframe. None of the libraries use super-computers.

<table>
<thead>
<tr>
<th>Types of Computer</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro-computer</td>
<td>5</td>
<td>22.73</td>
</tr>
<tr>
<td>Mini-computer</td>
<td>8</td>
<td>36.36</td>
</tr>
<tr>
<td>Mainframe</td>
<td>9</td>
<td>40.91</td>
</tr>
<tr>
<td>Super-computer</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Totals</td>
<td>22</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 8 shows the type of computer systems employed by Riyadh libraries. 8 libraries (38.10 per cent) in Riyadh are using IBM computers, and 5 libraries (23.81 per cent) employ HP computers. Two libraries (9.52 per cent) employ VAX computers, and there are also another two libraries utilizing Wang computers, the rest of the libraries are using various types of computer systems from different manufacturers.
Table 8 also represents the operating systems that are operated by Riyadh library computers. 6 libraries (28.57 per cent) are employing DOS, and 5 libraries (24.81 per cent) use Unix operating systems. While 4 libraries (19.05 per cent) in Riyadh are operating MPE systems and 2 libraries (9.52 per cent) are utilizing VMS, the rest of the libraries are operating different operating systems.

Table 8 presents data concerning the library software retrieval systems employed. As is shown in the table, there are 4 libraries (19.05 per cent) using the MINISIS retrieval system, 2 libraries (9.52 per cent) using the DOBIS/LIBIS retrieval system, and 1 library using the Virginia Library retrieval system (VTLS), while the others (16 libraries, or 76.19 per cent) use in-house systems.

Three of the libraries that are using MINISIS employ the MPE operating system and HP computers. Also, 5 libraries that are using in-house retrieval system use DOS operating systems.

Table 8 also reveals that the storage capacity of the computer systems used by Riyadh libraries is quite satisfactory at the present time, especially in the case of those which use mainframe and minicomputers. Their storage capacities range from 4 MB to 64 GB. It should also be noted that the majority of these libraries' computer centres and allocated storage capacities are one part of their organizations' computer centres, which generally operate to maintain the mainframe or minicomputer for the various departmental functions of the institutions such as the library and/or the information centre.
<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Library</th>
<th>Computer Kind</th>
<th>Type</th>
<th>Operating System</th>
<th>Software</th>
<th>Storage allocated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Saudi Arabian Org. For Specific.</td>
<td>Mini.</td>
<td>Digital VAX 6410</td>
<td>VMS</td>
<td>In-house</td>
<td>1.5 GB</td>
</tr>
<tr>
<td>2</td>
<td>Arab Sec. S&amp;T Cen.</td>
<td>Mainframe</td>
<td>UNISIS/700/51</td>
<td>Unix 5</td>
<td>MINISIS</td>
<td>2.4 GB</td>
</tr>
<tr>
<td>3</td>
<td>Gen. Stat. Dir.</td>
<td>Micro.</td>
<td>IBM</td>
<td>DOS</td>
<td>In-house</td>
<td>2 MB</td>
</tr>
<tr>
<td>4</td>
<td>Gulf Co-op Countries</td>
<td>Micro.</td>
<td>IBM/4361</td>
<td>DOS/VMS/CMS</td>
<td>In-house</td>
<td>8 MB, 1.5 GB</td>
</tr>
<tr>
<td>5</td>
<td>Imam Univ.</td>
<td>Mini.</td>
<td>HP 3000</td>
<td>Unix</td>
<td>In-house</td>
<td>1000 MB</td>
</tr>
<tr>
<td>6</td>
<td>Inst. of Pub. Admin.</td>
<td>Mainframe</td>
<td>IBM</td>
<td>MVS/XA</td>
<td>In-house Ibn Alnadeem</td>
<td>2.5 GB</td>
</tr>
<tr>
<td>7</td>
<td>KACST</td>
<td>Mainframe</td>
<td>IBM</td>
<td>VM/SP</td>
<td>In-house</td>
<td>1.2 GB</td>
</tr>
<tr>
<td>8</td>
<td>King Abdulaziz Academy College</td>
<td>Micro.</td>
<td>AUVA</td>
<td>DOS</td>
<td>In-house</td>
<td>2 MB</td>
</tr>
<tr>
<td>9</td>
<td>King Abdulaziz Pub.Lib.</td>
<td>Mainframe</td>
<td>HP 3000/52</td>
<td>MPEIX</td>
<td>MINISIS</td>
<td>1042 MB</td>
</tr>
<tr>
<td>10</td>
<td>King Fahd Hospital</td>
<td>Micro.</td>
<td>IBM</td>
<td>DOS</td>
<td>In-house</td>
<td>40 MB</td>
</tr>
<tr>
<td>11</td>
<td>King Fahd Nat.Lib.</td>
<td>Mini.</td>
<td>HP 3000/932</td>
<td>MPEIX</td>
<td>MINISIS</td>
<td>32 MB</td>
</tr>
<tr>
<td>12</td>
<td>King Faisal Centre</td>
<td>Mini.</td>
<td>HP 3000</td>
<td>MPE</td>
<td>MINISIS</td>
<td>1.5 GB</td>
</tr>
<tr>
<td>13</td>
<td>King Saud Univ.</td>
<td>Mainframe</td>
<td>AHMDAL 5885</td>
<td>MVS/XA CICS/VS</td>
<td>DOBIS/LIBIS</td>
<td>64 GB</td>
</tr>
<tr>
<td>14</td>
<td>Min. of Planning</td>
<td>Micro.</td>
<td>IBM/AT</td>
<td>DOS 3.1</td>
<td>DOBIS/LIBIS</td>
<td>40 MB</td>
</tr>
<tr>
<td>15</td>
<td>Nat.Com. f. Wildlife</td>
<td>Mainframe</td>
<td>IBM</td>
<td>Unix</td>
<td>In-house</td>
<td>2 GB</td>
</tr>
<tr>
<td>16</td>
<td>Reg. Arab Bureau</td>
<td>Mini.</td>
<td>VAX</td>
<td>VMS</td>
<td>In-house</td>
<td>456 MB</td>
</tr>
<tr>
<td>17</td>
<td>Riyadh Chamber of Commerce</td>
<td>Mini.</td>
<td>Wang Everex</td>
<td>VS</td>
<td>In-house</td>
<td>8 MB</td>
</tr>
<tr>
<td>18</td>
<td>Saudi Ind. Dev. Fund</td>
<td>Mainframe</td>
<td>Wang</td>
<td>DOS</td>
<td>In-house</td>
<td>5 MB</td>
</tr>
<tr>
<td>19</td>
<td>Saudi Arabian Basic Ind. Co.</td>
<td>Mainframe</td>
<td>IBM/DUMBA 9 Dell</td>
<td>Unix</td>
<td>In-house</td>
<td>40 MB</td>
</tr>
<tr>
<td>20</td>
<td>Inst. of Dip. Stud</td>
<td>Mini.</td>
<td>ALTRAK/220 R</td>
<td>Unix</td>
<td>In-house</td>
<td>4 MB</td>
</tr>
</tbody>
</table>
Considering the figures presented in Table 8, the following points may be made.

1. The majority (76.19 per cent of the total number) of Riyadh's libraries employ in-house software retrieval systems.
2. MINISIS and DOBIS/LIBIS retrieval systems were the most widely used ready-made software packages, i.e. in 28.57 per cent of the total number of institutions.
3. Riyadh's libraries employ different kinds of operating systems and software retrieval systems.
4. Riyadh's libraries use various kinds of computer systems from different manufacturers.
5. Co-ordination between Riyadh's libraries in choosing their automated systems seems to be rare.

Additionally, when the researcher visited the libraries of Riyadh for the purpose of the study interviews (between the 11th January and 9th February 1996), it was found that three libraries (2 special libraries and 1 academic library) are discussing to replace their existing automated systems with a newer library retrieval system names Horizon. These libraries were Imam University Library, the National Centre for Economic and Financial Information, and the Institute of Public Administration Library.

Imam University Library pointed out that library's existing in-house system was no longer satisfactory because it was old, slow, and was not used for Roman script materials. Therefore, it had been decided to look for a new, ready-made package computer system which could handle the library's various operations in both Arabic and Roman scripts, and also because a number of libraries in Saudi Arabia have recently been making complaints
about the MINISIS, DOBIS/LIBIS, and VTLS systems. They comment that they contain a range of pitfalls that make it hard to continue working with these ready-made software packages. For example, they observe that their existing systems are slow, old, very poor at handling Arabic script, and not very friendly in terms of user interface. Consequently, Imam University Library and two other libraries mentioned above have decided to discuss the replacement of their existing computer retrieval systems by the ready-made Horizon software system for handling current functions.

All these libraries have unanimously decided to discuss the use of their existing systems on account of the following considerations:

1. Horizon is faster than their old systems.
2. Horizon can handle both Arabic and Roman scripts.
3. The Horizon module can handle most of the libraries' housekeeping functions, providing facilities for public access catalogue (OPAC), cataloguing, circulation, serials, and acquisitions.
4. Horizon is a client/server system.

The researcher discovered that there was no kind of co-ordination or co-operation between these 3 libraries in choosing and evaluating the Horizon system, and that they still continue to work individually. The above points further indicate the need for increased co-ordination and co-operation among these libraries and for the establishment of the proposed network.
6.1.7 Use of Telecommunication Network

Table 9 indicates that 12 libraries (57.14 per cent) use a telecommunication network in their processing. 9 of these libraries have leased lines and 7 libraries (33 per cent) are members of King Abdulaziz City for Science and Technology Network (KACSTNET). Additionally, as is shown by Table 9, there are 5 members (23 per cent) of the Gulf Academic Network (Gulfnet) and these members could link to BITNET (Because It's Time Network), through which they could obtain services from EARN, Netnorth, Latin America, Australia, Africa, the Far East, and the Persian Gulf States (Gulfnet).

Table 9 shows that 4 libraries (19.05 per cent) use Alwaseet, the Packet Switched Public Data network (PSPDN), which gives its members national access throughout the Kingdom and international access to the world at large.

The above figures demonstrate that 12 libraries (57.14 per cent) have access to network services and facilities, so that it may be presumed these libraries already recognize the advantages of networking and that they will strongly support the proposed library network.

Another important point illustrated by Table 9 is that only 4 libraries (19.05 per cent) out of 21 automated libraries in Riyadh are presently using Alwaseet, the Saudi packet network, which offers many services and facilities to its users, as was discussed in Chapter Three. This number is evidently small and Riyadh's libraries ought to consider joining Alwaseet for their telecommunication needs.
Table 9: Telecommunication Networks Used

<table>
<thead>
<tr>
<th>Library Name</th>
<th>Telecom. network Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arab Security Study &amp; Training Centre</td>
<td>Cable &amp; Wireless/Bahrain Leased line/Gulfnet, KACSTNET</td>
</tr>
<tr>
<td>Gulf Co-operation Countries</td>
<td>Dedicated line/Gulfnet</td>
</tr>
<tr>
<td>KACST</td>
<td>Satellite link/BITNET EARN, Netnorth</td>
</tr>
<tr>
<td>King Fahd Hospital</td>
<td>Leased line/KACSTNET</td>
</tr>
<tr>
<td>King Faisal Centre</td>
<td>Alwaseet leased line/KACSTNET</td>
</tr>
<tr>
<td>King Saud University</td>
<td>Alwaseet dedicated line/Gulfnet</td>
</tr>
<tr>
<td>Ministry of Planning</td>
<td>Leased line/KACSTNET</td>
</tr>
<tr>
<td>National Commission for Wildlife</td>
<td>Alwaseet</td>
</tr>
<tr>
<td>Riyadh Chamber of Commerce</td>
<td>Alwaseet</td>
</tr>
<tr>
<td>Saudi Arabian basic Ind. Co.</td>
<td>Leased line/KACSTNET</td>
</tr>
<tr>
<td>Institute of Public Administration</td>
<td>Leased line/Gulfnet/KACSTNET</td>
</tr>
<tr>
<td>National Centre for Economic &amp; Financial Information</td>
<td>Leased line/KACSTNET</td>
</tr>
</tbody>
</table>

6.1.8 IT Budget

Very poor and unreliable data were provided in response to this part of the questionnaire. 39 libraries (92.86 per cent) reported nothing regarding the budget issue. This is because 21 libraries in Riyadh City (50 per cent) were in fact not engaged in any kind of computerization or communication networks as the study revealed in the previous tables, and the other libraries in Riyadh when they were asked why, some of them said that their budgets are a part of the computer centre budget and others said that they do not know their exact budgets but when they needed anything, such as hardware or software, they order them from the library dean or the person who is in charge of purchasing these items.
As table 10 indicates, 3 libraries (9.09 per cent) reported their current IT budget. The Institute of Public Administration indicated that its current IT budget is £183,486 (1 £ = 5.45 Saudi Riyals), while its 1993+ budget is £55,045, which means that the Institute will experience a major cut-back in funding.

Table 10: IT Budget

<table>
<thead>
<tr>
<th>Library Name</th>
<th>Current</th>
<th>1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Commission for Wildlife</td>
<td>£183,486</td>
<td>-</td>
</tr>
<tr>
<td>Institute of Public Administration</td>
<td>£183,486</td>
<td>£55,045</td>
</tr>
<tr>
<td>Nat. Cen. for Econ. &amp; Fin. Info.</td>
<td>£91,743</td>
<td>-</td>
</tr>
</tbody>
</table>

6.2 The Interviews: Presentation and Analysis

Having obtained from the present study survey a general picture of libraries in Riyadh and their state of computerization, the investigator decided to follow up by visiting a range of libraries which the survey revealed were actually involved in computerization, in order to obtain more detailed information.

A structured interview (see Appendix E) was prepared. The investigator carefully selected twelve sample libraries of different kinds (national, university, public, special) out of the 21 which the survey showed were engaged in automated activities, with a view to visiting them and interviewing their staff in order to obtain more specific information. Specifically, the researcher wanted to obtain a view of their manpower resources, especially of the proportion of their professionally qualified staff in relation to the workload involved in their current acquisition work, in the processing of new accessions, and in dealing with different scripts. The intention was to better assess the potential benefits that these libraries
might derive from networking, especially in the areas of computerized ordering, accessioning, serials control, and derived cataloguing data. Moreover, the investigator wanted to give the staff of these libraries the opportunity to say how they viewed the potential benefits of networking, so that he could compare their perceptions with his own views.

The interviews were conducted with the heads of each library, sometimes with the attendance of the librarian(s) responsible for the technical processing department. The staff in each library were each asked seven questions regarding the present study topic.

6.2.1 Purposes of using computers

The first question raised was, What is the library actually using computers for? This question was posed in order to discover what possible benefits the libraries would gain from the proposed library network.

Table 11 shows the existing usage of computer systems among the sample libraries of Riyadh. The responses from the twelve libraries revealed that the majority of them (10 out of 12, or 83.33 per cent) were using computers in technical services processing (cataloguing and classification). A total of 8 libraries (66.67 per cent) were currently using computer retrieval systems for on-line searching of both internal and external databases. 5 libraries (41.67 per cent) were employing computers for ordering and acquisitions, and for circulation control. 4 libraries (33.33 per cent) answered that they used computer systems for the indexing of journal articles. Only 3 libraries (25 per cent) were using computers for serials control, while 2 libraries (16.67 per cent) responded that they employed computers for providing current awareness services and statistics for library use. None of the 12 libraries used computer systems for inter-library loan services.
### Table 11: Libraries' Responses Regarding Computer Usage

<table>
<thead>
<tr>
<th>Type of Usage</th>
<th>Yes</th>
<th>N=12</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordering and acquisitions</td>
<td>5 (41.67)</td>
<td>7 (58.33)</td>
<td></td>
</tr>
<tr>
<td>Serials control</td>
<td>3 (25.00)</td>
<td>9 (75.00)</td>
<td></td>
</tr>
<tr>
<td>Cataloguing/processing</td>
<td>10 (83.33)</td>
<td>2 (16.67)</td>
<td></td>
</tr>
<tr>
<td>Circulation control</td>
<td>5 (41.67)</td>
<td>7 (58.33)</td>
<td></td>
</tr>
<tr>
<td>Inter-library loans</td>
<td>0</td>
<td>12 (100)</td>
<td></td>
</tr>
<tr>
<td>On-line searching of internal databases</td>
<td>8 (66.67)</td>
<td>4 (33.33)</td>
<td></td>
</tr>
<tr>
<td>On-line searching of external databases</td>
<td>8 (66.67)</td>
<td>4 (33.33)</td>
<td></td>
</tr>
<tr>
<td>Other uses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indexing of journal articles</td>
<td>4 (33.33)</td>
<td>8 (66.67)</td>
<td></td>
</tr>
<tr>
<td>Current awareness services</td>
<td>2 (16.67)</td>
<td>10 (83.33)</td>
<td></td>
</tr>
<tr>
<td>Preparing statistics</td>
<td>2 (16.67)</td>
<td>10 (83.33)</td>
<td></td>
</tr>
</tbody>
</table>

#### 6.2.2 Catalogue Scripts

The second question posed sought to discover what scripts were used in libraries' catalogues, whether they were maintained in Arabic or Roman scripts, or perhaps both. Table 12 presents the responses. It is clear from this that most of the libraries (9 out of 12, or 75 per cent) maintain their catalogues in both Arabic and Roman scripts, while 2 libraries (16.67 per cent) use only Roman script, and 1 library (8.33 per cent) maintains its catalogue in the Arabic script alone.
Table 12: Catalogue Scripts

<table>
<thead>
<tr>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabic script</td>
<td>1</td>
</tr>
<tr>
<td>Roman script</td>
<td>2</td>
</tr>
<tr>
<td>Both scripts</td>
<td>9</td>
</tr>
<tr>
<td>Totals</td>
<td>12</td>
</tr>
</tbody>
</table>

6.2.3 Numbers of materials purchased every month

The third question posed concerned the approximate number of materials purchased by the libraries every month. As can be seen in Table 13, 5 libraries (41.67 per cent) purchased more than 150 items every month, 4 libraries (33.33 per cent) purchased between 50 and 100 items, while 3 libraries (25 per cent) purchased less than 50 items every month. 5 of the responding libraries pointed out that they purchased a large number of books (more than 150 items) when there was a book fair in Saudi Arabia since the book fairs brought publishers and distributors from many countries to one place where they could view and purchase their products at favourable prices and often at discount.

Table 13: Items Purchased Every Month

<table>
<thead>
<tr>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) &lt;50</td>
<td>3</td>
</tr>
<tr>
<td>b) 50-100</td>
<td>4</td>
</tr>
<tr>
<td>c) 100-150</td>
<td>0</td>
</tr>
<tr>
<td>d) 150+</td>
<td>5</td>
</tr>
<tr>
<td>Totals</td>
<td>12</td>
</tr>
</tbody>
</table>
6.2.4 Numbers of current subscription to serials

Then, the researcher asked the fourth question, which was, How many current serials does the library subscribe to? Table 14 presents a clear picture of the numbers and percentages of current serials that the sample libraries subscribed to, starting with libraries with the fewest subscriptions and ending with the library with the largest number of subscriptions. It should be noted that each library subscribed to those journals that were in accordance with its stated aims and objectives. For instance, the largest quantity of current serials, 2,100 (28.15 per cent) was subscribed to by the King Faisal Centre for research and Islamic Studies. This is because this library supports studies and research in various fields such as the humanities and Islamology and the Centre as a whole is supported by the sons of King Faisal Ibn Abdulaziz. Another example is the National Centre for Economic and Financial Information, which currently subscribed to 1,350 serials (18.1 per cent), which is a significantly large amount of journals for such a specialist library if it is compared with Imam University, which subscribed to 1,000 (or 13.41 per cent) current serials, or King Fahd National Library, which subscribed to 787 (10.55 per cent) current serials. The average number of serials per library was 622, which seems a good number in view of the budget cuts that most libraries in Saudi Arabia have suffered during the last ten years, as indeed was pointed out by many of the interviewed librarians.
Table 14: Numbers of Current Subscriptions to Serials

<table>
<thead>
<tr>
<th>Library Name</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gulf Co-operation Countries</td>
<td>109</td>
<td>1.46</td>
</tr>
<tr>
<td>2. National Commission for Wildlife...</td>
<td>148</td>
<td>1.98</td>
</tr>
<tr>
<td>3. King Abdulaziz Public Library</td>
<td>200</td>
<td>2.68</td>
</tr>
<tr>
<td>4. Institute of Diplomatic Studies</td>
<td>250</td>
<td>3.35</td>
</tr>
<tr>
<td>5. Riyadh Chamber of Commerce...</td>
<td>300</td>
<td>4.02</td>
</tr>
<tr>
<td>6. Institute of Public Administration</td>
<td>316</td>
<td>4.24</td>
</tr>
<tr>
<td>7. King Abdulaziz City of Science...</td>
<td>400</td>
<td>5.36</td>
</tr>
<tr>
<td>8. Ministry of Planning</td>
<td>500</td>
<td>6.70</td>
</tr>
<tr>
<td>9. King Fahd national Library</td>
<td>787</td>
<td>10.55</td>
</tr>
<tr>
<td>10. Imam University</td>
<td>1,000</td>
<td>13.41</td>
</tr>
<tr>
<td>11. National Centre for Economic...</td>
<td>1,350</td>
<td>18.10</td>
</tr>
<tr>
<td>12. King Faisal Centre for Research...</td>
<td>2,100</td>
<td>28.15</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>7,460</td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

6.2.5 Numbers of items waiting for technical processing

Table 15 shows that 6 libraries (50 per cent) out of the total number had less than 50 items waiting for technical processing, principally cataloguing and classification, every month. This meant that these 6 libraries did not have much of a workload waiting for technical processing. On the other hand, there were also 6 libraries (50 per cent) which responded that they had more than 150 items waiting for technical processing every month.

Findings showed that it was the 3 libraries that purchased less than 50 items (see Table 13) that had less than 50 items, or between 50 and 100 items, waiting for technical processing every month. Moreover, the 5 libraries (as shown in Table 13) that purchased more than 150 items per month were precisely those libraries that had more than 150 items...
waiting for technical processing. So it is clear from Tables 13 and 15, as indeed one would expect, that there is a direct relationship between the number of items purchased each month and the workload waiting for technical processing each month.

Table 15: Numbers and Percentages of Items Waiting for Technical Processing Every Month

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) &lt;50</td>
<td>6</td>
<td>50.00</td>
</tr>
<tr>
<td>b) 50-100</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>c) 100-150</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>d) 150+</td>
<td>6</td>
<td>50.00</td>
</tr>
<tr>
<td>Totals</td>
<td>12</td>
<td>100.00</td>
</tr>
</tbody>
</table>

6.2.6 Manpower resources

The following question in the study interviews was about the total number of staff employed in each sample library, and whether they were qualified or unqualified. Table 16 shows that the existing library staff in the sample libraries consisted of 566 personnel. The average number of personnel per library was 46. There were 307 qualified librarians, making the average number of qualified staff per library 25. There were 259 unqualified librarians, making the average number of unqualified staff per library 21.

Many of the interviewed librarians complained about the shortage of qualified staff able to work with Roman-script materials, for example, in ordering and acquisitions, technical processing, and the inputting of data into the computer.
Table 16: Total and Percentage Figures for Personnel per Library

<table>
<thead>
<tr>
<th>Type of Personnel</th>
<th>Total</th>
<th>Average number per library (N=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualified</td>
<td>307</td>
<td>25</td>
</tr>
<tr>
<td>Unqualified</td>
<td>259</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>566</td>
<td>46</td>
</tr>
</tbody>
</table>

6.2.7 Networking benefits expected

In an attempt to discover the benefits that Riyadh’s libraries may derive from networking, the sample libraries were asked to list the benefits which they felt Riyadh's libraries would gain from establishing a bibliographic network among themselves. Table 17 indicates that Riyadh’s librarians were quite aware of the advantages of networking. They listed 18 benefits which they felt they would obtain by membership of such a library network. It is clear from Table 17 that most of Riyadh’s librarians expected the first 6 benefits listed in the interviews. In addition, they listed, at various rates, 12 more benefits of networking. As may be seen from the Table 12, all libraries (100 per cent) mentioned that networking would produce faster technical processing (cataloguing and classification) and 10 libraries noted that networking would save staff time. Additionally, 9 of the responding libraries (75 per cent) expected that joining a library network would reduce the rate of increase in costs, 11 libraries (19.67 per cent) point out that joining a library network would increase the libraries' productivity, and 8 libraries (66.67 per cent) expected that networking would increase library efficiency. 7 libraries (58.33 per cent) indicated their view that networking improves access to external services and helps to standardize technical processing, especially cataloguing and classification. Moreover, 5 libraries (41.67 per cent) answered that networking helps to reduce duplication of work and implies looking individually at other libraries' catalogues. Table 17 also shows that 4 libraries (33.33 per
cent) expected that networking would reduce the number of staff employed, especially in large libraries, and would also reduce the acquisition of materials (presumably by not duplicating resources elsewhere). Only 3 libraries (25 per cent) indicated their belief that library networks help to make a union catalogue, which implies looking in one place only, with various libraries' holdings indicated. 2 libraries (16.67 per cent) responded that library networking enables libraries to provide better services to their users, reduces subscriptions to current serials, and strengthens libraries; staff relationships. Finally, 1 library (8.33 per cent) noted that networking reduces the rate of telecommunication costs, facilitates inter-library loan requests and the exchange of materials among member libraries, and saves library staff's energies.
Table 17: Libraries’ Responses Regarding Networking Benefits

<table>
<thead>
<tr>
<th>Benefits expected</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Faster technical processing</td>
<td>12</td>
<td>100.00</td>
</tr>
<tr>
<td>2. Saving in staff time</td>
<td>10</td>
<td>83.33</td>
</tr>
<tr>
<td>3. Reduction in the rate of increase in costs</td>
<td>9</td>
<td>75.00</td>
</tr>
<tr>
<td>4. Productivity</td>
<td>11</td>
<td>91.67</td>
</tr>
<tr>
<td>5. Efficiency</td>
<td>8</td>
<td>66.67</td>
</tr>
<tr>
<td>6. Improved access to external services</td>
<td>7</td>
<td>58.33</td>
</tr>
<tr>
<td>7. Other Benefits:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standardization of technical processing</td>
<td>7</td>
<td>58.33</td>
</tr>
<tr>
<td>8. Reduced duplication of work</td>
<td>5</td>
<td>41.67</td>
</tr>
<tr>
<td>9. Looking individually at other library’s catalogues</td>
<td>5</td>
<td>41.67</td>
</tr>
<tr>
<td>10. Reduction in staff numbers, especially in large libraries</td>
<td>4</td>
<td>33.33</td>
</tr>
<tr>
<td>11. Reduction in acquisitions</td>
<td>4</td>
<td>33.33</td>
</tr>
<tr>
<td>12. Making a union catalogue</td>
<td>3</td>
<td>25.00</td>
</tr>
<tr>
<td>13. Provision of better services to users</td>
<td>2</td>
<td>16.67</td>
</tr>
<tr>
<td>14. Reduction in subscriptions to current serials</td>
<td>2</td>
<td>16.67</td>
</tr>
<tr>
<td>15. Strengthening of library staff relations</td>
<td>2</td>
<td>16.67</td>
</tr>
<tr>
<td>16. Reduction in rate of telecommunication costs</td>
<td>1</td>
<td>8.33</td>
</tr>
<tr>
<td>17. Facilitating of inter-library loan requests and exchange of materials</td>
<td>1</td>
<td>8.33</td>
</tr>
<tr>
<td>18. Saving in library staff energies</td>
<td>1</td>
<td>8.33</td>
</tr>
</tbody>
</table>

Summary

This chapter has described, analysed and presented the data gathered through the questionnaire survey and the interviews with librarians in Riyadh City’s libraries. Findings and recommendations derived from the collected data will be the subject of the final chapter.
CHAPTER SEVEN
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

7.1 Summary

Co-ordination and co-operation among today's libraries is recognized as essential, as self-sufficiency is no longer a realizable goal. Co-operative solutions among libraries have had to replace any ideal of a particular library system's self-sufficiency. This being the reality of the modern library world, the rationale of the present study derives from the fact that libraries in Riyadh City in Saudi Arabia are currently facing a number of problems which prevent their co-ordination and co-operation, such as a lack of computerization and standardization in technical processing; a lack of basic co-operative tools, e.g. national bibliography, union catalogue of monographs, union list of serials, indexes, and abstracts compiled by the libraries; and under-usage of the available communication and telecommunication technology.

The purpose of this study has been to investigate the desirability and possibility of establishing a bibliographic network among Riyadh's libraries, to examine the technical problems involved, and to assess the potential benefits of networking.

The methodology used was the survey research technique. Answers to the questions involved in the study were obtained by using the following techniques:

1. Preparing a basic questionnaire, which was distributed among the heads of the sample libraries.
2. Interviews, intended to obtain supplementary information from twelve carefully selected libraries.

3. Reviewing pertinent literature in order to survey the present networking activities in other countries, the importance of standards and standardization, and the different computer protocol suites.

The findings of the study are summarized in the following pages.

7.1.1 Summary of findings

The study revealed that Riyadh City contains forty-six libraries, forty-two of which responded to and returned the study's questionnaire survey. The responding libraries varied in their types and served different institutions. It was found that Riyadh City has thirty special libraries, six academic libraries, five public libraries, and, of course, one national library.

The libraries of Riyadh hold a wide variety of different types of material in varying quantities. Data showed that the largest amount of library materials is housed in the special libraries, followed by the academic libraries.

With regard to the use of automation by Riyadh's libraries, it was found that approximately half of the libraries (twenty-one of them) use some form of automation in their processing, while most of the remaining libraries (eighteen of them) were willing to become automated in the near future. Data also showed that sixteen special libraries were engaged with computerization and that three academic libraries were using computers in
this activities. One public library and the national library also use some degree of automation in their processing activities.

With regard to the computer hardware used by Riyadh's libraries, nine of them use mainframe, eight employ mini-computers, and five use microcomputers. Findings also revealed that the libraries use different types of computer systems supplied by different manufacturers and, furthermore, that various kinds of operations and software were in use to deal with retrieval systems.

With regard to the use of telecommunication networks by Riyadh’s libraries, it was found that twelve of them employed communication networks in their activities. Five of these libraries had leased lines for their telecommunication requirements, but only four in Riyadh were actually using Alwaseet network for their communication needs.

Data concerning the IT budgets of Riyadh's libraries proved to be very poor and unreliable. Thirty-nine libraries reported nothing concerning this budgetary issue.

The literature search showed that it is technically feasible to make computer systems from different manufacturers communicate with each other by using an open system protocol suite, for example, the OSI or TCP/IP standards.

7.2 Conclusions

In completion of the present study, we may list a number of conclusions that have a direct bearing on the study's questions and objectives.
1. Riyadh City has a sufficiently large range of different types of libraries - with varied collections and offering a wide range of services, e.g. on-line searching of internal and external databases - to make the proposed network desirable and feasible. It is likely that the total number of materials in Riyadh's libraries will continue to grow. Consequently, the present or future number of materials, or in other words records, will form a good basis on which to begin to establish an excellent library network for the whole country of Saudi Arabia. Recent library history has shown how many of the existing library networks in the West, such as OCLC, BLCMP, CURL and WLN, actually started with quite a small number of records and members but quickly grew by adding records and members from other cities and countries or by agreements with other similar networks like the agreements signed between OCLC and CURL or SLS, and between RLG/RLIN and CERL. A similar process could occur if the present study's proposals regarding a library network for Riyadh City were to expand to coverage of other libraries in other cities of Saudi Arabia or in the region, or indeed internationally. Moreover, there could be an agreement between the proposed network and Gulfnet, KACSTNET, or similar networks in the Arab world.

2. Most of the automated libraries in Riyadh have managed to maintain their catalogues on both Arabic and Roman scripts, which would enable them to obtain benefits from the Western networks mentioned in Chapter Four, in particular the RLG/RLIN network with the largest existing bibliographic database for Middle Eastern language materials. Riyadh's libraries, especially those which currently use automation in their processing and have access to networking facilities, ought to seriously discuss joining the RLG/RLIN network in order to obtain needed services such as bibliographic searching in both Arabic and Roman scripts for the purposes of ordering and acquisition, sharing and downloading bibliographic records, for speedier cataloguing of current accessions,
retrospective conversion of catalogue records, and for reference services. The libraries in Riyadh which maintain their catalogues in Roman script only could also obtain benefits and services from RLG/RLIN or from other Western networks that do not handle Arabic script, such as OCLC, BLAISE, SLS, and BLCMP. Riyadh's libraries could benefit from the famous network of networks, the Internet, when it is made available to libraries in Saudi Arabia. This would open up new possibilities for co-operation between distant libraries and institutions. The Internet provides many utilities, such as Gopher, which allows access to information world-wide and a vast wealth of knowledge. Connection to the Internet and access to its facilities will help Saudi libraries to overcome the problems that often arise because of lack of resources, information or insufficient knowledge. JANET and superJANET in the UK are also very valuable communication networks and Riyadh's libraries, particularly the large ones which serve academic and research communities, ought to discuss joining these networks in order to gain access to library data in the UK and obtain the full range of services provided by them (see Chapter Four).

3. Several authors of previous studies (see Chapter Three) have discussed the many problems that Saudi libraries have currently been facing owing to the lack of library co-ordination and co-operation, producing, for example lack of standardization in technical practices, excessive workload, financial problems regarding serials subscriptions and purchasing of new materials, duplication of work, and lack of a union catalogue. This study has yielded evidence that most of these problems would be reduced by the establishment of the proposed network in view of the fact that libraries today gain many benefits from networking (see Chapter 4, section 4). The most important of these, as the study has revealed, from which Riyadh's libraries would gain the greatest benefits are: faster technical
processing, freeing of staff for other activities (especially in large libraries), reduction in subscriptions to serials, and the production of a union catalogue of holdings.

4. As the data revealed, confirming the finding of Al-Swydan, a number of Riyadh's libraries do indeed have a workload waiting for technical processing. Thus, many of the staff in Riyadh's libraries are unable to follow up the processing of newly purchased items and to make them available to the end-users, especially materials in Roman Script. Indeed, many of the investigated libraries complained about the shortage of qualified staff able to work with Roman-script materials. Consequently, there is an unacceptable gap between the time when the items are purchased and their appearance on the shelves. Performing a co-operative acquisitions programme through the proposed network could be very helpful in terms of: (1) avoiding duplication in acquisitions and processing; (2) reducing the time between an order's being placed and the appearance of the purchased item on the shelves; and (3) increased productivity.

5. Data show that Riyadh's libraries have hired quite large numbers of qualified and unqualified staff to handle their various functions, but the staff in many libraries experience some difficulty in working with Roman-script items such a language barrier exists among these libraries' staff. This finding confirms Hamade's study and agrees with his suggestion to speed up the Saudization process by extensive training of Saudi nationals and by training staff to a high level of competence in English. Establishing the proposed network could prove helpful in overcoming this language barrier problem, since: (1) it could reduce the input from individual libraries; and (2) the large libraries with highly qualified staff could perform most of the technical processing and the input of data because these libraries purchase more items than the small libraries.
6. As the data show, Riyadh's libraries subscribe to quite a large range of journals and, in fact, some special libraries subscribe to more journals than the University Library. This study agrees with Ekrish that Saudi libraries out to establish a co-operative system of serials acquisition to avoid (1) the financial problems which usually occur by subscribing to many duplicated titles; and (2) the cancellation of important journals needed for research and student learning. This co-operation should be performed via the proposed network and include the production of an on-line serials union list through which researchers, librarians, and students may know the participating libraries serials holdings and place inter-library loan requests accordingly.

7. The data collected revealed that half of the libraries in Riyadh City were currently engaged with automation, most of the other half favoured computerization, and twelve libraries included in the study actually had access to networking facilities and services. Additionally, KFNL has started to fulfil some of its many aims and objectives. Thus, in 1995 (Chapter 3), it concluded a survey into the possibility of setting up a national union catalogue of the holdings of Saudi libraries. Further, Al-Salem (see Chapter 3) has found that some of these libraries investigated in his study possessed some of the tools that each co-ordination and co-operation among Saudi libraries, e.g. union catalogues, guides, bibliographies, indexes, and abstracts. KACST has also established within its library a union list of serials database. These findings are valuable, encouraging, and positive indicators of the feasibility of establishing the proposed network.

8. As the data showed, none of the libraries investigated is using computer systems for inter-library loan services, which confirms the findings of Tashkandy and the Institute of Public Administration (see Chapter 3) that inter-library loans among Riyadh's libraries have
failed to attain actuality. It is clear therefore that this issue needs to be formally addressed again by the staff of Saudi libraries, so that a concrete plan to facilitate this important service among Saudi libraries may be prepared for action. One way forward might be to establish the proposed network and facilitate inter-library loans service through it, like the LASER network in the UK. Such group sharing could extend to other libraries in Saudi Arabia, to the rest of the Arab world, and indeed across international networks as well.

9. With regard to the technical aspects of establishing the proposed network, the incompatibility of existing computer systems in Riyadh's libraries has been perceived by many writers as a major problem standing in the way of co-operation. Some e.g. Al-Abdulkreem and Al-Salem, have recommended that Saudi libraries standardize their computer hardware and software systems for the purpose of performing co-operative activities. This solution is possible but costly and it is impracticable since Riyadh's libraries currently employ a number of different systems, as has been revealed by previous studies. This study has also found that most of Riyadh's libraries have in fact installed different types of computers, software retrieval systems, and operating systems, so that the need for standards is now evident.

Since overcoming lack of standards is a vital component in communication for co-operative activities, it is proposed that, for the purpose of establishing a bibliographic network among these libraries and linking their computer on-line, an open system protocol suite is required to achieve information mobility and to ensure that all Riyadh's libraries' computers communicate with each, regardless of their manufacture and operating systems. Two major open protocol systems have emerged: the Transmission Control Protocol/Internet Protocol (TCP/IP) and the Open System Interconnection (OSI), both of
which share common practices. Regarding application to Riyadh's libraries, either of these protocol suites would be suitable, but the OSI protocol standard suite would be more feasible because it is developed and supported by two international organizations: ISO and CCITT. OSI is also strongly supported by the European Community and by governments generally because it is seen as an important component of an open market. OSI has been designed with a world-wide Internet in mind and has often been judged the more comprehensive and long-term approach, capable of handling a large number of interlinked systems with seamless access to all points as well as providing better security back-up and recovery mechanisms.

10. The desirability of a co-operative network among Saudi libraries was recognized by many libraries in the earlier studies and the present study's findings also underline the commonly felt desirability and indeed need to establish the proposed library network in order to overcome some of the problems that Riyadh's libraries are currently facing.

Although this study has attempted to investigate the feasibility of a co-operative network among Riyadh's libraries, it was not possible to search into all relevant factors. For instance, the questions posed to libraries concerning the actual investment in maintaining IT in Riyadh's libraries largely went unanswered. It is nevertheless hoped that this study and others that have discussed and investigated library co-operation and/or networking in Saudi Arabia will help to guide the decision-makers in the country to better assess the many aspects involved in library networking and to create a scientific plan for co-operative programmes among Saudi libraries. Some topics for future investigation are outlined below. In addition, the present study's findings and those of similar studies will be immediately
useful and of importance to people concerned about information services in general and about the national information system in particular.

7.3 Recommendations

This study has shown (a) that the libraries have the range of collections and services that would benefit from networking; and (b) that they are themselves beginning to be conscious of the benefits of engagement in such a network.

On the basis of the investigation and findings of the present study, the following recommendations and suggestions are offered to the decision-makers in Saudi Arabia who are responsible for establishing co-operative activities among Saudi libraries.

1. Alwaseet network in Saudi Arabia, which is a gateway communication service to interested libraries and institutions, was found to be used by only a small number of the investigated libraries. It is therefore recommended that all of Riyadh's libraries should use this service to fulfil their communication needs because it is a national communication network providing many services and facilities to its users, including, for example, world-wide communication and electronic mail, all at low cost (see Chapter 3).

2. Although this study has concentrated on the possibilities of networking principally between academic, special and government libraries, and the National Library, and has included only one public library within its scope, it should not be forgotten that public library provision is a very important element in today's society. Public libraries play a much-appreciated role in the societies of developed countries, some indeed offering networking services for use by the general public. It is therefore suggested that other
developed countries' public library systems should be assessed to obtain a clearer idea of what services are being provided by them, for example, in such countries as the UK and the USA.

3. For the proposed network, a management plan is recommended for Riyadh’s libraries, in the next chapter, which will include: framework; mission; objectives; organizational structure; legal agreement; functions and services; technical solutions; funding; timetable and an action plan.

7.4 Recommendations for Further Studies

The findings of the study indicate the advisability of further research projects being carried out in the following sections.

7.4.1 Preliminary studies

1. The present study has attempted to investigate the computer protocol standards. However, a further study should be conducted in order to explore the appropriate input format standards for Riyadh’s libraries. Do these libraries use a standard format for their computer input data? It is essential that bibliographic records follow a common standard format, such as the MARC format, in order to enable the exchange of records.

2. A study is needed to investigate Riyadh’s libraries’ current usage of technical practices, tools such as the Anglo-American Cataloguing Rules, and the Dewey Decimal Classification schedules. These tools should be adhered to in order to allow catalogue records to be shared between libraries. The success of this sharing depends upon how well the technical practices differences in the libraries can be bridged.
3. Why do most of Riyadh's libraries use in-house retrieval system to handle their various functions? Is it because the software packages that are used in the other libraries do not meet local needs, or do these libraries have special functions, or do they find their in-house systems cheaper than the package systems? A study is needed to investigate and survey these libraries' systems in order to answer these questions.

4. A study is essential to explore the MINISIS and DOBOS/LIBIS retrieval systems. Are they really meeting the needs of the libraries utilizing them? What are their advantages and disadvantages? Are there any alternatives? Comparison between the two software packages is required for the proposed study.

7.4.2 Wider implications of linking libraries in Riyadh to other libraries in Saudi Arabic and to the outside world

1. It is recommended that further study should be conducted in order to investigate the status of computerization in the libraries of other cities of Saudi Arabia such as Jeddah and Dammam, after which variations in findings need to be compared and explored. The present study has restricted its investigation to Riyadh's libraries because this city has the greatest concentration of information resources in Saudi Arabia, but it is hoped that the present study's findings and the possible implementation of a local network in Riyadh will form the basis for an eventual SaudiNET, with links to the Gulf states and to the outside world via Alwaseet, etc.
2. It is recommended that a feasibility study be conducted of Alwaseet network to discover whether it can act as host in Saudi Arabia of an on-line union catalogue and other library services such as OCLC in the USA and BLCMP and LASER in the UK.
CHAPTER EIGHT
A PROPOSED MANAGEMENT PLAN FOR RIYADH'S LIBRARIES NETWORK (RLNET)

8.1 Introduction

The investigation carried out clearly indicated the existence of several problems that Riyadh's libraries are facing currently due to the lack of co-ordination and co-operation among these libraries in terms of their existing services and activities. Evidence suggests that an immediate action plan should be taken to improve the existing situation of Riyadh's libraries by establishing an automated network which is based on co-operation and joint responsibility.

Riggs (1988: 59) stressed that library networking is no longer an option; it has become obligatory. Bearing this inescapable fact in mind, library leaders would be sensible to place a consideration of the benefits to be acquired from networking into their planning process.

It should be noted that this plan presented in this part of the study is based on the findings of the questionnaire survey, the interviews, field visits and the analysis of published and unpublished materials. Moreover, for the purpose of this plan, the researcher has since December 1996 travelled to visit and interview the following:

- Mr. Abdulrahman Al-Moamer, the Director of National Networking at King Abdulaziz City for Science and Technology (KACST).
- Mr. Ajlan Al-Ajlan, the Deputy Director General at King Fahd National Library (KFNL).
- Mr. Saad Al-Hamad, Assistance Director Data Network Services at the Ministry of Post, Telegraph and Telephone (P.T.T.).

Additionally, the following five vendors in Riyadh have been visited and questioned about the provision of connections and allowing access to different library services; and the costs expected to implement such a project among Riyadh’s libraries:

- Systems and Communications House Ltd.
- Saudi Business Machines Ltd.
- Atallah Systems Ltd.
- Jeraisy Tech.
- Arabian Advanced Systems.

The findings of these interviews will be put in the appropriate sections of the plan.

Some elements of the management plan have already been discussed in previous chapters. However, the plan should prescribe a logical arrangement of these elements, which might be considered by the bodies concerned and it is required in making the appropriate assessment and measures to improve the present situation and enhance the effectiveness of libraries and their services in the country.

Attempts have been made to search for similar existing co-operative library networks in the Arab world by consulting relevant literature and staff at KFNL and the School of Library and Information Science, Imam University. It has been found that no
such network exists, therefore it is not possible to evaluate its progress, services and facilities, and advantages and disadvantages. However, it is beneficial to look at, and evaluate, other nations’ experience in planning and implementing a co-operative library network and it is important that professional staff at Saudi Arabia libraries carefully assess the real present needs from such a network for the libraries themselves, and their requirements from the system, as well as consulting experienced academic staff in library, information, and networking, and referring to documents which deal with this topic.

The plan for Riyadh’s libraries network (RLNET) is proposed as a multi-type and multi-function co-operative network to meet with the needs of those libraries, as the present study and the previous studies revealed that Riyadh’s libraries need to co-operate and co-ordinate their activities in many service areas such as co-operative acquisition, interlibrary lending, sharing resources, technical processing, etc. Hamilton (1977: 3) pointed out that multi-type library co-operation is a means of mobilizing total library resources to meet the needs of the user without regard to the type of library involved and without classifying the user as public, school, academic or special library patron. The goal is to help all library users to make more effective use of all library resources and services. BLCMP, SLS, OCLC, WLN networks, discussed in Chapter Four, are some models of a multi-type and a multi-functions network where many functions and facilities are managed, co-ordinated and shared by network members.

The present plan for Riyadh’s libraries network (RLNET) is presented according to the following: framework; mission, objectives, organizational structure; legal agreement; functions and services; technical solutions; funding; timetable and action plan.
8.2 Framework

The future development of the library and information activities in Saudi Arabia should be planned at the national level. King Fahd National Library (KFNL) should play a major role in developing and planning the proposed library network of existing and future library services as stated in its functions (see Section 1.2.1). It must be made clear that planning is not only formulating intentions but also taking action for operations. RLNET should be formally set up as a means of interconnected systems for the purposes of co-operative library activities and sharing the responsibility to achieve certain objectives. The plan should be developed along with the planning, directing and co-ordinating of a science and information technology programme, which is a section of the science and technology, human resources development in Saudi Arabia’s Sixth National Development Plan (see Appendix G). Also, RLNET should be considered a part of the Kingdom of Saudi Arabia’s national information infrastructure.

8.3 RLNET mission

RLNET’s mission is to promote and improve library resources and services for use in the areas of research, education, and the public benefit. RLNET’s overall objectives are to establish, maintain and operate a formal computerized library co-operative network to solve the tasks faced in the collection development, processing, resource sharing, interlibrary loans, and document delivery of information and the provision of further access to the world’s information; and to help member libraries to accomplish and meet their own institutional objectives. These objectives would necessarily be related to the Saudi National Planning, Science and Technology, planning, directing and co-ordinating science and technology activities, with emphasis on the establishment of an adequate mechanism for proper co-ordination of science and technology activities (see Appendix G). A proposed
RLNET should have long range objectives to assist for the future continuation. RLNET should also be able to fit into the future Saudi National Network (SaudiNET). Evidence suggests that RLNET should contain the following objectives:

8.4 RLNET objectives:

1. Achieving inter-connection and access between Riyadh’s libraries computerized systems for co-operative activities.

2. Improving access to information via the Internet and other appropriate sources for members.

3. Improving the efficiency of participant libraries’ services.

4. Facilitating resource sharing programmes.

5. Improving the reduction of cost per item added to a library’s collection.

6. Providing advice and support in choosing or replacing an automated library system of members.

7. Improving the use of automation among libraries with linkage to RLNET.

8. Providing top management and/or librarians in charge of member libraries with advice and information about the advantages that they would gain by accessing and using RLNET and other networks.

9. Formalizing a collection development programme between members to reduce unnecessary duplication in purchasing items.

10. Formalizing a co-operative exchange of materials to improve member libraries stock.

11. Providing to member libraries’ staff and users access to RLNET different databases for bibliographic searching, answering subject enquiries, and accessing libraries’ OPACs, etc.
12. Considering the possible establishment of a full-text database of heavily-used journals for the benefit of member libraries to improve the effectiveness of network services.

13. Improving services and providing access to RLNET and a communication facility which would enable users to obtain instant results from their computers without constraints on location or time.

14. Establishing an authority file of authors and uniform titles.

15. Promoting among member libraries the importance of using standards in their technical processing.

16. Implementing an appropriate MARC format for in-putting bibliographic records.

17. Providing on-line access to a shared cataloguing system, which will help libraries reduce unnecessary duplication of technical processing (cataloguing and classification) by performing shared cataloguing libraries will exchange bibliographic records on-line, or in tapes, or CD-ROM format.

18. Maintaining an on-line union catalogue of member library holdings.

19. Developing a co-operative information service and increase access to resources to participant library users.

20. Developing a training programme for member libraries.


22. Promoting and encouraging research projects which would be useful for RLNET development.

23. Organizing formal agreements for the exchange of professional staff especially from large libraries to small libraries for a certain period of time to improve co-operation and services.
8.5 Organizational Structure

The quality of a co-operative network depends on a strong governance structure, which co-ordinates the efforts of the participating libraries and promotes network services. In the case of Riyadh's libraries co-operation and co-ordination, a number of co-operative activities have been suggested and discussed in several meetings and from many experts and writers, as mentioned in Chapter Three, but they have still not attained actuality, due to the lack of a strong governance co-ordinator such as a national library or/and a library association. However, the passing of the National Library Act in 1990 marked the beginning of a new era of integrated planning at the national level of documentation, archives, library and information services in the Kingdom of Saudi Arabia. At present, King Fahd National Library is in a position to act towards any library's activities which are useful and beneficial for libraries and their users in Saudi Arabia. KFNL was established to provide leadership, co-ordinate and promote co-operation among libraries in the country. Al-Ajlan (1997) pointed out that KFNL has already established many of its functions, and it is looking to achieve the rest of its stated functions and activities such as co-ordinating and establishing a co-operative network among Saudi libraries.

The library's movement towards fulfilling some of its many functions was in fact a really fast one. Up-to-date, KFNL has started and established many library services. In the following, the most important achievements will be discussed briefly:

1. Issued the Saudi National Bibliography in 1996. "Compilation of the national bibliography was divided into two phases: phase one relates to retrospective bibliography consisting of national publications published from 1881-1993; and phase
two relates to current bibliography. The retrospective bibliography was published in ten volumes during 1995-1996" (KFNL, 1996).

2. Published the national bibliography in CD-ROM format in 1996 as a pilot electronic edition containing more than 10,000 bibliographic records.


4. KFNL has acted as a national agency since 1993 for issuing the International Standard Book Number (ISBN) and the International Standard Serial Number (ISSN) for materials published in the country.

KFNL is recommended, therefore, to set up RLNET, which will form the basis for an eventual Saudi Network (SaudiNET), and establish a special department for cooperation and networking activities to fit into its existing organizational structure, to be recognised as the body nationally responsible for the proposed management and coordination of Riyadh's libraries network (RLNET) as shown in Figure 3.
Figure 3: The proposed General Department of Co-operation and Networking within KFNL organizational structure
The proposed general department of co-operation and networking would be divided further into seven departments as shown in Figure 4.

![Organizational chart of the proposed department]

Figure 4: Organizational chart of the proposed department
RLNET should be managed and co-ordinated by KFNRL with decentralized co-operative library services and activities as shown in Figure 5 (see list of abbreviations on page 13 for the full list of libraries).

Figure 5: RLNET proposed topology

A co-ordinated network organizational structure is the most suitable structure to meet the needs of the users within the existing infrastructure of libraries in Saudi Arabia. A co-ordinated network will allow libraries in Saudi Arabia to benefit greatly from the country’s national library services and facilities and to make libraries capable of communicating to each other directly without going through a third party. Decentralized
co-operative services gives member libraries equal responsibility and commitment towards a strong initiation of RLNET.

The network should be formally set up among Riyadh’s libraries under a KFNL umbrella, similar to the ones discussed in Chapter Four which have been initiated by the national libraries of a foreign country. Member libraries should agree upon services and activities, and recognise the fundamental importance of the proposed RLNET and of cooperation among national, academic, public, and special libraries; and it underlines the need for Riyadh’s libraries to work towards common standards for technical processing and other network services. Figure 6 presents the organizational structure of RLNET within the context of KFNL.
Figure 6: A proposed RLNET organizational structure within KFNL context
RLNET will be run by a board of executive directors, not more than eight members. They will be elected by member institutions every two years. Members of RLNET will consist of the general members, who participate in RLNET systems and perform their cataloguing on-line or by other means. General members will be allowed to participate in electing the RLNET’s board. Non-participant members will be allowed to use and benefit from RLNET’s different services by paying the required fee when applicable. The board should hold regular meetings, no less than five times a year. They should represent a mixture of experts: two computer specialists, two networking specialists, two librarianship specialists, and two managers who should be responsible for directing and reviewing RLNET policy. The executive directors should also assist KFNL in planning, and assessing the network overall progress. Wetherbee (1988: 34) listed the general categories of the boards’ responsibilities as follows:

- Clarify the organization’s mission.
- Interpret the mission statement to the public and enhance the organization’s public image.
- Approve goals and objectives/set long range plans.
- Establish policies and other guidelines.
- Assume legal responsibility for all aspects of the organization’s operations.
- Ensure financial stability and solvency.
- Evaluate the performance of the organizational and the board itself.

KFNL should appoint a co-ordinator to serve as the chief administrative and planning officer for RLNET activities. Walters (1987: 21) noted that top down planning can bring the ability to legislate policy, standards and procedures and the authority to
coerce acceptance standards. Unfortunately, KFNL is still at the development stage despite its many accomplishments, services and being involved with other priorities at present such as collection building, enforcing the depository law, and issuing the national bibliography. KFNL staff also lack in the experience needed to manage and implement the proposed network. Therefore, it is proposed that KFNL should share the responsibilities and co-operate with KACST in co-ordinating RLNET due to the long experience of KACST staff in managing and implementing systems as mentioned in Chapter Three. Thus, KACST should select a co-ordinator to work side by side with KFNLS appointed co-ordinator.

Al-Moamer (1997) stressed that KACST are willing and ready to support KFNL with technical information, staff, or any other aspects that might be needed in co-ordination and implementing RLNET.

The co-ordinators should be the linkage between the executive directors and the network committee, and are the ones who are responsible to the board. The network co-ordinators should tie together each level of the RLNET hierarchy and should perform at the heart of the network organization and their role will be vital to RLNET development and progress. RLNET co-ordinators should also perform the following duties:

1. To provide regular evaluation and reports of the network to the board.
2. To represent RLNET in any events which concern the network like at professional meetings and/or gatherings.
3. To follow the network policy and objectives for any programmes.
4. To arrange for technical meetings and workshops.
5. To act as an intermediate or a communication link between the board and the participating libraries.

6. To follow the international networking development and provide a report when necessary to the board.

7. To arrange visits and staff exchanges.

RLNET committees should be in charge of a regular meeting at least once a month to discuss the network's different tasks and activities and to provide necessary assessments and recommendations to improve or add services and/or programmes.

Evans (1983: 88) pointed out that committees can serve as an advisor/informational capacity (gathering material and making recommendations, promote co-ordination and co-operation especially among disparate areas), improve communication and make decisions. RLNET committees should represent all member libraries and be composed of head or the librarian in charge of each library with the attendance of the head of the technical services when necessary and needed. The network committees are the ones who follow the progress of the co-operative activities and make recommendations to the network co-ordinator who reports to the network board to make proper decisions for an action. RLNET committees should also handle their tasks with co-ordination when needed with some information and networking experts or consultants to enable them to perform their assigned jobs properly.

8.6 **Legal agreement:**

In order to assign responsibilities for a specific network activity and function, member libraries should agree and sign a formal written agreement that explains to all
members the network's framework, organizational structure, goals and objectives, functions expected from it, and the role of the network's staff. The agreement should also explain the importance of co-operation, benefits expected from it, and the need to follow a common procedure and a certain standard to make member libraries capable of being involved in co-operation. The agreement should include a list of the network activities to assist in clarifying services provided and who would be responsible for which activity.

Table 18 shows a proposed breakdown of activities and library or libraries in charged.

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Table 18: Proposed breakdown of responsibilities in RLNET.
The above breakdown of the network elements will make definite commitment whereby services and activities are improved for the country's library users, and the country's needs of information resources, services for research, educational and public benefits will be fulfilled. Moreover, RLNET agreements will codify future libraries practices and legal basis for improving libraries services and librarianship in the country.

8.7 RLNET functions and services

RLNET is seen as having a multi-function network to improve and strengthen the existing situations of Riyadh's libraries services to meet the information needs of patrons.

Functions proposed are those most needed by Riyadh's libraries as this study revealed. The proposed functions are in fact provided by many of the existing international bibliographic networks which are: co-operative development of resources; co-operative technical processing; resource sharing, interlibrary loan, and document delivery; reference services; communication and access; systems development and support; and manpower training. In the following pages, RLNET proposed functions will be described briefly:

8.7.1 Co-operative collection development of resources

Members of RLNET should agree and share the responsibility of acquiring materials co-operatively, by facilitating this programme especially in areas where they can avoid duplication but still have access to collections purchased by other members. Collection development committee should provide members with a good solution of the current problem of the unbalanced development of collection by member libraries, help libraries to increase resources as economically as possible, and to better fulfil their goals
and objectives. RLNET will be the mechanism to organize this programme among
libraries by establishing and providing on-line the following files:

1. Union list of manuscripts.
2. Union list of rare materials (early printed books, pre-1900).
3. Union list of monographs.
4. Union list of periodicals.
5. Union list of A/V materials.
6. Union list of dissertations.
7. Union list of exchange and gift items.
8. Union list of CD-ROM items.

The above facilities will help participant libraries to minimize duplication,
processing and consequently, the spending of much money on purchasing especially
manuscripts, rare items, CD-ROM, and foreign materials. The collection development
of resources committee would also assist that members who attempt to manage their
budget for periodical subscriptions, for instance, by not ordering some titles which are
already in other partner library’s holdings.

Furthermore, RLNET should provide the opportunity to view member library’s
catalogues and order files prior to making acquisition decisions and offer members’ on-
line verification of order against the union catalogue and other files. This function will
provide RLNET members the following benefits:

1. Better services and resources to members.
2. Acquisition of needed items only and other items will be shared and delivered from other RLNET members.

3. Saving money and spending it on other useful activities.

4. Enhancing the use of automation in libraries.

5. Establishing a better relationship with libraries’ staff.

8.7.2 Co-operative technical processing:

RLNET will have established union catalogues, as shown on the previous page, of member library’s holdings and make them available to all members. RLNET members should perform a shared cataloguing programme among themselves which will allow them to contribute to RLNET union catalogue in a controlled way. It should sustain three main on-line functions: a) searching the databases; b) creating new records and adding them to RLNET union catalogue file’ and c) production and exchange of bibliographic records by tapes, downloading and file transfer. Sharing and exchanging bibliographic records, enables RLNET participant libraries to pool their cataloguing effort and to achieve significant savings, as well as speed up technical processing.

Because standardization is essential for cataloguing and sharing bibliographic records, RLNET technical processing committee should produce a specific standard for cataloguing procedures to be followed by all members, and libraries should resort to a common format for records created after a given date. Through standardization, RLNET will be able to guarantee the quality of its cataloguing products to all its members and end-users as well. Therefore it is proposed that RLNET libraries should adopt the same cataloguing rules, classification scheme, and appropriate format for creating and exchanging bibliographic records (suggested: AACR2, DDC, and MARC tape). Using
the same standards and format would assist in the exchange and transfer of records, bibliographic searching, acquisition, and interlibrary loan services. The technical committee should address the standardization issue with enough details and produce a written agreement that describes standards and their importance for participating libraries and they should sign an agreement to follow specific standards for processing.

8.7.3 Co-operative resource sharing, ILL, and document delivery:

RLNET should enable member libraries and their users to access a wide range of collections and resources which are very useful to provide better and more effective information services to users. The resource sharing committee should try to combine searching, interlibrary loan, and document delivery into a single service for fast, effective, and low cost resource sharing. The committee should create an agreement for these functions to enable member libraries to utilize effectively the already available resources, improve library stock, and provide efficient library services. RLNET members should be able to have on-line access to member libraries holdings to trace an item then send a request for ILL via the on-line system. The committee should also address the possibility of using on-line file transfer service among member libraries instead of relying on the traditional delivery system as well as creating full text databases for faster document delivery.

8.7.4 Co-operative reference services:

This function should enable RLNET members to enhance access to information in local, regional, national and international systems. It is important that RLNET provide active reference services and guide member libraries patrons to access a wide range of
reference services. The reference committee should consider to offer the following reference facilities:

1. Accessing the Internet when it is available for the country’s libraries which in fact is being dealt with at the present by the government agencies interested and KACST in maintaining it and providing some of the Internet services and facilities available to users around the world. RLNET committee especially the reference services committee should have access to the whole Internet tools due to the users needs for such information services in Saudi Arabia.

2. Discussing and evaluating the cost benefits of joining RLG/RLIN Arabic database, and gaining access to a full range of services as discussed in Chapter Four, Section 4.2.2. The reference committee should also communicate with, “The Kuwait Foundation for the Advancement of Sciences, one of the two major users of RLIN in Kuwait; the other is the National Scientific and Technical Information Centre” (Hannon, 1993: 2), to have more specific information about RLIN Arabic databases and the benefits they gain by using it.

3. Joining the Gulfnet and KACSTNET to benefit from their available databases for the benefit of RLNET users.


5. Establishing also a CD-ROM network and linking it to KACST CD-ROM network for the benefit of RLNET users.

6. Creating abstracting and indexing services especially for Saudi published journals and report literature.
8.7.5 Co-operative communication and access:

All functions discussed will be accessed on-line which will require a heavy use of communication facilities. The communication and access committee should evaluate all communication means available for use in Saudi Arabia. They should choose the one(s) which satisfy RLNET needs and meet its specific goals and objectives.

The committee should consider:

- Dial-up access.
- Leased/private line.
- Satellite link via KACST.

Al-Hamad (1997) in the Saudi PTT, pointed out that Alwaseet X.25 and X.28 have been used by many customers in the country for many purposes such as KACSTNET described in Chapter Three, Saudi banks' credit authorization, the Saudi payment network (SPAN) for cashing machines links, and some other private and public users. Moreover, Al-Hamad noted that Alwaseet packet-switched X.25 network offers speed-up to 19,200 bps, and the X.28 network offers up to 9600 bps. Currently, the Saudi PTT is carrying out a big project with the American communication company AT&T to install and operate a fibre optic cable around Riyadh City to increase the quality and speed of existing communication services and this is expected to finish in the year 2002. The above findings are a positive indicators and encouraging for the communication committee to discuss when choosing the communication means suitable to RLNET.
The committee also has to consider maintaining on-line files to distribute information and interactive dialogue among members such as bulletin boards and RLNET.News. The proposed interactive dialogue between RLNET members' computers is an extremely powerful information technology tool for improving communication and access among RLNET members.

8.7.6 Co-operative systems development and support

The system development and support committee should be the one who is responsible about the current design of the network functions, and should be ready at any stage of the implementation for improvement and upgrading the system when required. System support should be a co-operative work between this committee, RLNET co-ordinators, and the vendor(s) who install the network hardware infrastructure. KFNL should also sign a contract with the vendor for at least five years for daily technical support as well as employing a special support team (at least five personnel) to deal with day-to-day operations and problems which arise from member libraries. These personnel should be well qualified in networking and allowed by member libraries to have access to their computers and follow up the implementation and progress of RLNET. The design operation of the system should be handled at KFNL, consideration of alternative equipments, operations, and activities should be in hand. The support of activities will be provided from this committee not from individual libraries; therefore, the system development and support committee should have the experience and the qualifications necessary for such work. Moreover, they should provide members with the latest development network equipment and programmes, and maintain system evaluation regularly and obtain statistical data from the network operation and progress for improvement.
8.7.7 Co-operative manpower training:

The study survey indicated that Riyadh's libraries have hired quite a large number of staff, but a language barrier exists among these libraries' staff. Also, it is more likely that these staff have no experience in dealing with co-operation activities and networking operations. Therefore, there is a need for an adequate number of highly qualified staff with special training in library networking. The proposed training programme should focus on: a) how to use networking in general, and b) how to apply networking techniques for required RLNET functions. Underwood (1990: 166) pointed out that staff training should concentrate on exploring the ways in which the new system will affect existing patterns of work and assisting staff to gain the necessary skills to use new equipment and processes. The manpower training committee should set up a strong programme to improve member libraries' personnel skills needed to handle the proposed RLNET different functions by arranging the following activities:

1. To establish an on-line training programme that is accessible to all libraries' staff.

2. To arrange for training programmes which last from three to six months with coordination with member institutions who presently offer training programme in their normal activities in the country such as the Institute of Public Administration; Imam University, School of Library and Information Science; and King Saud University, the School of Library and Information Science. The suggested training programme should be held at KACST and keep libraries personnel up to date with the continuing and fast development of networking and communication.
The manpower shortage in science and technology, however, has been the government’s concern over the past years. It has been stated in the Saudi Arabia’s Sixth National Development Plan (1995-2000) that although the Kingdom has established many universities, technical colleges and technical and vocational training centres, there still exists a shortage of good scientists, engineers and technicians to ensure substantial future development (Ministry of Planning, 1995: 295). Accordingly, the Saudi government during the plan has proposed some new policies to overcome these problems and increase skill levels of Saudi’s personnel. Therefore, the proposed training programme for RLNET personnel should also be developed along with the National Scientific and Technological Manpower Development which is a section of the human resources development in Saudi Arabia’s National Development Plan (see Appendix G).

3. To collaborate with the vendor(s) who will install RLNET’s hardware and software to provide an appropriate in-house training programme for member libraries staff.

4. To provide an Intranet/Internet training course at KFNIL for the personnel who will work and perform on-line access to the Internet facilities.

5. To arrange visits for professional staff among member libraries, with special qualifications and training in networking and computing, to take part in the training programme and process.

8.8 Technical Solutions for RLNET

Although the vendors interviewed were very interested in the proposed network, only two vendors responded to the researcher which were:
The other three vendors did not respond and seemed disinterested because they see this project only as a part of a research for a degree; therefore, they will not gain profit from it. However, after careful assessment of the received two proposals, the solution for RLNET initial design and cost is as follows.

RLNET needs to cover the following aspects:

- provide a connection and allow access to different library information systems.
- provide a communication media between libraries to transmit and share records, messages, data files, multimedia and teleconferencing.
- connection with other national and international networks specially the Internet.

The network must be designed to address all existing systems and topologies in all libraries or network nodes. The network must also be ready to support all current and future trends of the computer systems and local and wide area networking technologies. The network must also be ready to be used by individuals who will dial to access the network regardless of the status of Internet in the country. The network must be designed to work and provide accessibility to users in the forms of mainframe terminals, LAN PC's, individual PC's without depending on other local or international networks.

The following different systems and topologies needs to be addressed in the final design of the network:
- Legacy Systems (centralized CPU, e.g. IBM mainframes, HP 3000, ...):
  The users here are terminals.

- Client Server Systems:
  The users have PCs and different LAN protocols (TCP/IP, OSI, ...).

- Individual users accessing the network through telephone lines:
  Using Terminal Emulation etc.

- Individual users accessing the network through Al-Waseet (the X.25 public network).

- Individual users accessing the network using the Internet.

King Fahad National Library will not be able to force all other libraries to build a state-of-the-art computer systems based on the TCP/IP networking topology. So, a simple router-based solution might not be enough to provide a complete solution and a useful library network. Instead, the network must include switches to connect legacy systems to provide access to existing terminals; and at the same time be ready to connect LANs using routers and provide access to PCs and LANs. The solution recommended is detailed in the following:

- An integrated network between all member libraries regardless of their systems.
- 100% stand alone network.
- 100% ready to be linked to any other local and/or international network.
– Provide accessibility to individual users and researchers from smaller organizations or even from homes.

– Media Independent; Links between members may be achieved using Leased lines, Dial-up lines, Al-Waseet services, and the Internet.

The solution will provide seamless integration between all network members. It will allow any library to access the other library information systems if authorized as a remote user. It will also allow individual users to access KFNL systems to search for required information.

The kernel of the network will be at KFNL and will consist of a switch and a router. The switch will be connected to the HP 3000 system using an X.25 or FRAD interface which should be added to the system. The kernel can also be connected to the HP 3000 using the multi-user serial ports.

The nodes of the network will exist in every library. Each nodes will vary in configuration depending on the size and the existing computer and networking systems. The nodes shall be equipped with one of the following:

– Nodes with Mainframes and LANs (same as KFNL):
  
  A switch, and X.25 or FRAD gateway/interface card for the main system, and a router.

– Nodes with Mainframes but not LANs:
  
  Only a switch with an X.25 or FRAD gateway/interface for the main systems.

– Nodes with LANs:
Only a router will be needed.

- Individual users:

Need only a modem and proper software.

Figure 7 describes a proposed RLNET’s design solution.

Figure 7: Proposed RLNET’s design solution
The cost of the above system to establish a network between the 12 libraries is estimated to range from a minimum of 200,000 SR (£37,000) for basic interconnection costs up to at least 500,000 SR (£90,000). Obviously the situation in each library and the number of terminals, routers, switches, and other software/hardware equipment required would have to be assessed and would greatly affect the final cost.

Summing up all the above considerations, the proposed solution is not a final design, the cost is estimated and the costs of computer equipment are constantly changing, therefore, KFNL staff should look at this information as an initial design for RLNET and the cost given will provide a rough figure for the cost expected.

8.9 Funding

The successful initiation of development of RLNET depends upon a strong financial support from as many resources as possible. RLNET funds should be obtained from services and products provided to member institutions as well as the public and private sector contributions. Since the RLNET is to be co-ordinated and set up by KFNL, it is proposed that KFNL will establish a special provision for running the expenses of RLNET within its present Department of Finance. "KFNL budget consists of: a) government subsidies; b) funds obtained from its activities; and c) contributions and gifts from the private sectors" (Council of Ministers, 1991: 16). In fact, Al-Ajlan (1997) stressed that KFNL is strongly supported by the government of Saudi Arabia in general, and the private sectors as well. Therefore, it has never witnessed a shortage of funds since its establishment. "Over the past years the private sectors, for instance, has contributed a sum of 3,263,387 (UK pounds) equal to 20,233,000 Saudi Riyals" (KFNL, 1997: 16f.).
It is evident that the previous Saudi’s National Development Plans (1970-1994) and the present Sixth Plan (1995-2000) did not mention in any section about the library development in the country. Therefore, it proposed that librarianship development, and the cost of implementing and operating RLNET should be incorporated into the coming Saudi’s Seventh National Development Plan (2001-2005). Robinson (1980: 246) pointed out that networks have a variety of costs to cover that require funds in different amounts at different times in its progress, as presented:

1. Design: systems analyses feasibility studies to determine the most appropriate configuration for network organization and services.
2. Implementation: the cost of starting up.
3. Operating: annual costs of staff, overhead, hardware.
4. Expansion of service including: demonstration projects, software development, production of co-operative tools, training costs, and upgrading of quality of the network by acquiring new hardware and software.

Because RLNET is proposed to provide many important co-operative library services and functions for research and educational purposes, it is essential to guarantee an annual budget for the network costs to be able to maintain its operations. The annual budget should be paid by the Council of Ministers, who actually supervise KFNUL, through the Ministry of Finance. Users of RLNET are also required to pay a fee either annually or to cover the cost of actual service or product. The general members who add records to RLNET’s system should pay less than the member libraries who are using RLNET facilities only. Accessing the Internet via RLNET should be paid off by the
actual users with special discount (not less than 60 percent) to universities and institutions which serve educational and research purposes.

8.10 Timetable

It is difficult to implement RLNET without laying down an effective strategic plan which extends over many years. Also, RLNET cannot be implemented overnight, it should pass through several phases. A timescale of at least eight years is needed to implement and operate RLNET. The eight years proposed are based on the three years remaining of the Sixth Saudi’s National Development Plan (1998-2000) (see Appendix G) and five years of the coming Seventh Saudi’s National Development Plan (2001-2005). It is proposed therefore the following phases for RLNET.

8.10.1 Phase One: Preparation

KFNL Director General should seek an acceptance to establish RLNET from KFNL Board of Trustees as one of the library’s stated functions. The Director General will then pass this agreement to the Head of the General Department of Co-operation and Networking to follow up and prepare for the following:

1. Formulation of the network structure.

2. Informing libraries in Riyadh about the network and the need for a sufficient installation of LAN or computer information system in each library to be ready for connection to KFNL, RLNET.

3. Appointing a responsible co-ordinator.

4. Communicating with KACST to assign a co-ordinator from their side.

5. Preparing for the election of RLNET Board.
6. Calling a general meeting to appoint RLNET different committees.

7. Selecting the most advanced libraries in Riyadh City to be ready for initial implementation.

8. Arranging for requests for proposals (RFP) to be prepared and sent to local vendors.

8.10.2 Phase Two: Election and Legislation

Formation of the eight member executive directors board and the RLNET different committees. Libraries proposed for the initial operation are the most advanced libraries in Riyadh, as this study revealed, including:

1. King Abdulaziz City for Science and Technology (KACST).
2. King Abdulaziz Public Library (KAPL).
3. Institute of Public Administration (IPA).
4. Imam University (IU).
5. King Saud University (KSU).
7. Gulf Co-operation Countries Library (GCC).
10. King Faisal Centre for Research and Islamic Studies (KFC).

Plans are developed and goals and objectives are written. A formal written contractual agreement should be established at this stage and signed by participant institutions.
8.10.3 Phase Three: RFP Evaluation and Accessing the Net

RLNET co-ordinators should have finished the evaluation of RFP received from vendors, and report to the RLNET board about their decision. Contracts with vendor(s) signed and modalities for activities to be implemented. Accessing the Internet is completed.

8.10.4 Phase Four: Communication and Training

Communication and support committee should provide a strong effort to facilitate proper communication and access among member libraries. The on-line training course installed. Manpower survey should be conducted. Training personnel at different places started.

8.10.5 Phase Five: Initial Operation

Operating begins. Organized efforts to establish member libraries Union Catalogues and make them available on-line to all members for co-operative purposes stated. Formulation of standard regulations should be agreed upon at this stage.

8.10.6 Phase Six: Continuing Operation and Development

Perform technical processing on-line. Records shared and exchanged among member libraries. Accessing libraries holdings on-line and placing ILL requests. File transfer performed among members.

8.10.7 Phase Seven: Full Operation

Full RLNET operation of activities. Organized efforts by RLNET board and committees should continue until goals and objectives are reached.
8.10.8 The Final Phase: SaudiNET

Connection to other libraries in major cities in Kingdom of Saudi Arabia should be achieved. Formulation of SaudiNET as shown in Figure 8 is accomplished.

Figure 8: The proposed SaudiNET distribution centres
8.11 Action plan:

The following action plan is proposed:

<table>
<thead>
<tr>
<th>No</th>
<th>Phases</th>
<th>Period</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Preparation</td>
<td>Jan. 1998-Jun. 1999</td>
<td>One year and 6 months</td>
</tr>
<tr>
<td>2</td>
<td>Election and Legislation</td>
<td>Jun.-Dec. 1999</td>
<td>6 months</td>
</tr>
<tr>
<td>3</td>
<td>Evaluation and Accessing the Net</td>
<td>Jan.-Dec. 2000</td>
<td>One year</td>
</tr>
<tr>
<td>4</td>
<td>Communication and Training</td>
<td>Jan.-Dec. 2001</td>
<td>One year</td>
</tr>
<tr>
<td>5</td>
<td>Initial Operation</td>
<td>Jan.-Dec. 2002</td>
<td>One year</td>
</tr>
<tr>
<td>6</td>
<td>Continuing Operation and Development</td>
<td>Jan.-Dec. 2003</td>
<td>One year</td>
</tr>
<tr>
<td>7</td>
<td>Full Operation</td>
<td>Jan.-Dec. 2004</td>
<td>One year</td>
</tr>
<tr>
<td>8</td>
<td>SaudiNET</td>
<td>Jan.-Dec. 2005</td>
<td>One year</td>
</tr>
</tbody>
</table>

In conclusion, it should be mentioned again that this plan is based on the findings of the present study, therefore, it is important that KFNL staff go through it again and improve it when necessary before taking further steps for implementation. KFNL personnel should use this plan only as a guide and not as a final plan for action because such a strong plan for the implementation of the proposed network needs to be done by a group of specialists, computing, networking, and information analysts beside librarians who should finalize RLNET's different needed functions and the goals and objectives that need to be achieved in the short and the long run.
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Dear Librarian:

As a doctoral student at the School of Library, Archive and Information Studies, University College London, I am performing a research project to study the feasibility of establishing an automated bibliographic network among Riyadh libraries.

Would you complete the following questions please.

I appreciate, in advance, your kind cooperation.

Sincerely yours,
M. AL-Khulaifi
Doctoral candidate
1. Library name:

2. Library type:

   A) National ( )
   B) Public ( )
   C) Research ( )
   D) School ( )
   E) Special ( )
   F) Academic ( )

3. How many volumes does the library contain?

   | A) <10000 | Monographs | ( ) | Serials | ( ) | MSS | ( ) | A/V | ( ) |
   | B) 10000 - 50000 | ( ) | ( ) | ( ) | ( ) | ( ) |
   | C) 50000 - 100000 | ( ) | ( ) | ( ) | ( ) | ( ) |
   | D) 100000+ | ( ) | ( ) | ( ) | ( ) | ( ) |

4. Is the library currently automated (computerized)?

   Yes ( )  No ( )

5. If no, is the library planning to be automated?

   Yes ( )  No ( )

6. If the library has already automated, what kind of computer does the library utilize?

   A) Supercomputer ( )
   B) Mainframe ( )
   C) Minicomputer ( )
   D) Microcomputer ( )

   Type: ........................................................

   Operating system: ...........................................
7. What is the name of the software retrieval system that the library presently operating?
   
   A) DOBIS/LIBIS  
   B) MINISIS  
   C) In-house  
   D) Other (please specify, ....................................................)

8. What is the computer system storage capacity?
   
   ........................................

9. Does the library employ any telecommunication network, e.g. Tymet, Telenet, Western Union International?
   
   Yes ( )  No ( )

   If yes please specify: .................................................................

10. Could you please give a rough figure for your IT budget?

    A) Current ( )  
    B) 1993+ ( )
APPENDIX B

Questionnaire in Arabic
سلام عليكم ورحمة الله وبركاته.. وبعد:

شفاعتُ صادقًا، ينتمي إلينا محمد بن صالح الخلفي أحد مبتعثي كلية العلوم الاجتماعية لبريطانيا لدراسة المعلومات لدرجة الدكتوراه، ويقوم الآن بزيارة لمدينة الرياض من أجل جمع معلومات تتعلق بموضوع "احتمالات إنشاء شبكة معلومات بيئية للرياضة بين مكتبات مدينة الرياض". شامل من معايير التدريب بالتعاون معه نحو تحسين مهامه في الحصول على المعلومات المطلوبة، وذلك لغرض البحث الذي يقوم به.

شكراً لكم من خلالكم.

عميد كلية العلوم الاجتماعية

د. عبد العزيز بن محمد النفيشي
السلام عليك ورحمة الله وبركاته ..

حيث أتمنى أن تتزويد بجامعة الإمام محمد بن سعود الإسلامية - قسم المكتبات والمعلومات - بأحدث مكتبة محاكاة للدراسات الدكتوراه في مجال المعلومات، جامعة لندن، ومهني تأسس شبكة معلومات بلوحة أخلاق مكتبة مدينتك الرياض.

لذلك فأنّ تزويدك بمعلومات وافية وصحبة عن ذلك سوف يساعدني على إعداد هذا الترويج بالشكل المرضي.

وتحقيق ذلك أرجو التكرم بالإجابة على الاستبانين المرفقًا شاكراً وممنًا لكم

الباحث:
محمد بن صالح الخليفي
2 - نوعية المكتبة (ضع علامة / على ما ينطبق):
   
   - مكتبة جامعية
   - مكتبة عامية
   - مكتبة متخصصة
   - مكتبة مدرسية
   - مكتبة وطنية

3 - ذكر عدد مجموعات أو مقتنيات للمكتبة:

<table>
<thead>
<tr>
<th>كتب الدوريات المخطوطة</th>
<th>المواد المعمية</th>
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<tbody>
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<td></td>
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</tbody>
</table>

أ - أقل من 1000
ب - ما بين 1000 - 5000
ج - ما بين 5000 - 10000
د - أكثر من 10000

4 - هل تستخدم المكتبة الحاسب الآلي؟

- [ ] نعم
- [ ] لا

5 - إذا كنت اجابت لاizable xxx ب لا، هل خططت أو تخطيط المكتبة لاستخدام الحاسب الآلي في خمانها قريبا؟

- [ ] نعم
- [ ] لا
6 - إذا كانت المكتبة محببة فضلاً ذكر نوع الحاسب المستخدم (ضع علامة ✔ على ماهي).

[ ] Microcomputer
[ ] Minicomputer
[ ] Mainframe
[ ] Supercomputer

- نظام التشغيل المستخدم:

7 - فضلاً ذكر اسم نظام الاسترجاع المستخدم في الحاسب الآلي.

[ ] دوبس / ليس
[ ] مينيماين
[ ] تامبل
[ ] أخرى (حدد الاسم من تفضلك)

8 - ما هي سعة تخزين نظام الاسترجاع المستخدم ؟

9 - هل تستخدم المكتبة أي نظام للاتصال عن بعد مثل تيلينت، طيلينت، تيلينت تامينت، تيلينت تامينت...

[ ] نعم
[ ] لا
10 - إذا كانت إجابتك للمؤشر السابق نعم، تذكر أسم النظام أو الأنظمة المستخدمة:

- أ
- ب
- ج

11 - هل يمكن أن تذكر رقمًا تقريبًا ل비용ات المكتبة المحددة للتقريبية للمعلومات أو استخدام التقريبية المتقدمة في المكتبة؟

أ - الحالية
ب - العام القادم

- إذا كانت المكتبة تملك معلومات أو وثائق عن نظام التحصيل المستخدم فيها، فلرجو تزويدي بنسخة منها، شكراً ومقدراً تعاونكم معي.
APPENDIX C

Libraries surveyed arranged alphabetically
1. Al-Mather Public Library
2. Al-Nassim Area Public Library
3. Arab Security Study and Training Centre
4. Armed Forces Hospital Library
5. British Council Library
6. General Presidency for Girls' Education
7. General Statistics Directorate
8. Gulf Co-operation Countries
9. Imam Muhammad Ibn Saud Islamic University
10. Institute of Public Administration
11. Institute of Diplomatic Studies
12. King Abdulaziz Academy College Library
13. King Abdulaziz City for Science and Technology
14. King Abdulaziz Public Library
15. King Abdulaziz Research Centre
16. King Fahd Hospital
17. King Fahd National Library
18. King Fahd Security College Library
19. King Faisal Air Force College
20. King Faisal Centre for Research and Islamic Studies
21. King Faisal Specialised Hospital Library
22. King Faisal Street Library
23. King Khalid Academy College
24. King Khalid Eye Hospital Library
25. King Saud University
26. Ministry of Agriculture and Water
27. Ministry of Education Library
28. Ministry of Higher Education
29. Ministry of Information Library
30. Ministry of the Interior Library
31. Ministry of Justice
32. Ministry of Labour and Social Affairs
33. Ministry of Petroleum and Mineral Resources
34. Ministry of Pilgrimage and Endowments
35. Ministry of Planning.
36. Ministry of Post, Telegraphs, and Telephones
37. National Centre for Economic and Financial Information
38. National Commission for Wildlife Conservation and Development
39. National Guard Headquarters
40. Regional Arab Bureau of Education
41. Riyadh Chamber of Commerce and Industry
42. Saudi Arabian Basic Industrial Company
43. Saudi Arabian Organization for Specification and Measurement
44. Saudi Consulting House Library
45. Saudi Industrial Development Fund
46. Security Forces Hospital
APPENDIX D

Libraries interviewed
1. Gulf Co-operation Countries Library
2. Imam University
3. Institute of Diplomatic Studies
4. Institute of Public Administration
5. King Abdulaziz City for Science and Technology
6. King Abdulaziz Public Library
7. King Fahd National Library
8. King Faisal Centre for Research and Islamic Studies
9. Ministry of Planning
10. National Centre for Economic and Financial Information
11. National Commission for Wildlife Conservation and Development
12. Riyadh Chamber of Commerce and Industry
APPENDIX E

English version of the study structured interviews
Date of Interview: 
Name of Interviewer: 
Position: 

Topic: ESTABLISHING A BIBLIOGRAPHIC NETWORK AMONG RIYADH'S LIBRARIES.

1) What is the computer system used for in your library?
   a) Ordering and acquisitions ( )
   b) Serials control ( )
   c) Cataloguing/processing ( )
   d) Circulation control ( )
   e) Interlibrary loan ( )
   f) On-line searching of internal databases ( )
   g) On-line searching of external databases ( )
   h) Other(s), (please specify):

2) Does the library maintain its catalogue in?
   a) Arabic script ( )
   b) Roman script ( )
   c) Both ( )

3) How many materials does the library purchase every month?
   a) <50 ( )
   b) 50 - 100 ( )
   c) 100 - 150 ( )
   d) 150+ ( )

4. How many current serials do you subscribe to? (.................................)
5) How many materials are waiting for technical processing, i.e. cataloguing, classification, every month?
   a) <50
   b) 50 - 100
   c) 100 - 150
   d) 150+

6) Total number of staff in the library?
   a) qualified
   b) non-qualified

7) Could you please list the benefits that Riyadh libraries would gain from establishing a bibliographic network among them?
   a) Faster technical processing (cat. & Class)
   b) Save staff time
   c) Reduce the rate of increase in cost
   d) Productivity
   e) Efficiency
   f) Improve access to external services
   g) Other(s), (please specify)

1) .........................................................

2) .........................................................

3) .........................................................
APPENDIX F

Arabic version of the study structured interviews
السلام عليكم ورحمة الله وبركاته وبعد

فأقين سعادتكما بأن الخاضر نقسم المكتبات والمعلومات / محمد بن صالح الجلبي بعد

الآن دراسة حول "شباك المعلومات البليوجرافية" وهي موضوع أطروحته للدكتوراه في
المكتبات والمعلومات.

ويحيى إن الباحث المذكور يقوم في الوقت الحاضر بزيارة علامة علمية للمكتبات في مدينة
الرياض، وظلت جمع معلومات الدراسة من خلال الإجابة على أسئلة المقابلات المصممة لهذا
الغرض. وما أنه لن يستطيع الوصول إلى المعلومات المطلوبة بدقة إلا بالاعتماد على الله تعالى
ثم مساعدتكما المهيدة.

لذا أحل من سعادتكما التكرم في تسهيل مهامه بمتزده بكل ما يحتاج إليه من

معلومات مثيرة.

شكرًا لكم حسن تعاونكم، وتقربوا خالص تقدير.

عميد كلية العلوم الاجتماعية

د/ عبدالرحمن بن سليمان الم활ان
١) ماهي الإغراض التي تستخدم من أجلها الحاسب الآلي في المكتبة؟

<p>| | |</p>
<table>
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<tr>
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<tbody>
<tr>
<td>أ. الإحصاء والتخطيط</td>
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<tr>
<td>ب. ضبط الدوريات</td>
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</tr>
<tr>
<td>ج. الفهرسة وباقي العمليات الفنية</td>
<td></td>
</tr>
<tr>
<td>د. ضبط الإعارة</td>
<td></td>
</tr>
<tr>
<td>ه. الإعارة المتبادلة بين المكتبات</td>
<td></td>
</tr>
<tr>
<td>ی. البحث في قواعد المعلومات داخل المكتبة</td>
<td></td>
</tr>
<tr>
<td>ز. البحث في قواعد المعلومات الخارجية</td>
<td></td>
</tr>
<tr>
<td>ح. أي غير حسباً من فضلك</td>
<td></td>
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</tbody>
</table>

٢) ماهي اللغات التي تستخدمها المكتبة في فمارسها؟

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<td>ج. كلها ما</td>
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٣) كم عدد المواد أو الكتب التي تشترتها المكتبة كل شهر؟

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<td>د. 150 +</td>
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</table>
4) كم عدد الدوريات الأجنبية التي تنشر بها المكتبة؟

5) كم عدد المواد أو الكتب التي تنتظر الإجراءات الفنية كل شهر تقريباً؟
   أ. أقل من 50 (  )
   ب. 50 - 100 (  )
   ج. 100 - 150 (  )
   د. أكثر من 150 (  )

6) ما هي في استدامة كم المواد التي يمكن أن نبنيها المكتبة عند اشتراكها في شبكة المعلومات البيلوبورافية، بين مكتبات مدينة الرياض على غرار OCLC في امریكا أو BLISE في بريطانيا؟
   أ. سرعة إتمام العمليات الفنية مثل الفهرسة والتصنيف (  )
   ب. الحفاظ على وقت العاملين في المكتبة (  )
   ج. التقليل من التكاليف المادية للإجراءات الفنية (  )
   د. زيادة الإنتاجية (  )
   ه. زيادة الفعالية (  )
   و. تسهيل الوصول إلى خدمات خارجية (  )
   ز. أخرى (  )

7) كم عدد الموظفين في المكتبة؟
   أ. موظفون (  )
   ب. غير موظف (  )
APPENDIX G

The Sixth National Development Plan

This appendix includes only Saudi’s national strategic plan towards science and technology development.

Development strategy

The national development strategy and the science of technology sector will be implemented through the following objectives, policies and programmes.

Objectives

- to develop human resources in the field of science and technology;
- to emphasize the use of technological methods appropriate to the needs of the national economy, such as automation;
- to support and expand the national scientific research and technology development base.

Policies

- The national development of qualified manpower in science and technology will be promoted;
- Regulations for the transfer of technology will be finalized;
- Research and development activities oriented towards the development needs of the kingdom will be promoted and supported;
- Educational programmes and curricula relating to science and technology at all education levels will be expanded and upgraded;
- Improvements will be made in the co-ordination of scientific research and technology development undertaken by KACST;
Increasing use will be made of international co-operation agreements in scientific and technological fields.

Programmes

- National Scientific and Technological Manpower Development: This programme aims at the creation of a strong base of qualified manpower capable of driving the process of technological development in the Kingdom.

- Planning Directing and Co-ordinating Science and Technology Activities: This programme aims at preparing a national master plan for science and technology, as well as establishing an adequate mechanism for the proper co-ordination of scientific and technological activities in different agencies to avoid duplication or waste of resources.

- Management and Administration: An ongoing programme without projects to cover the administrative and technical expenditures of KACST.

- Support Services for Science and Technology: This programme aims at boosting information services at KACST, facilitating their provision to specialists, and at deepening public awareness and understanding of science and technology.

- International and Regional Co-operation: This programme aims at enhancing technology transfer through international co-operation agreements and expanding links with other countries.
PLANC Objectives

full-text database - computer
interesting proposals
control file - PLAC format - standards
review

Telematics - customer service

PLANC Networking - Havens, Morgan

Telecommunication's every four years level
of continued executive director full-time
require of board to represent member
interests and to carry out policies

II. Members of PLANC involved
Committee advice and decisions that do not implement

III. How much variance to service offered

Fibre-Optic Network when needed

Public service network or Public Net

Special support team (for PLAC)

Fees? Revenue? How much

Nat. 18/6/1 208/00
The text on the page is not legible. It appears to be a handwritten note with various sections and questions. Due to the poor quality of the image, it is not possible to transcribe the content accurately.