Chapter – 1: INTRODUCTION

“Automation in University Libraries of Gujarat State: An Empirical Study
CHAPTER 1: INTRODUCTION

1.1 Introduction
1.2 Library Automation: The Concept
  1.2.1 Automation
  1.2.2 Library Automation
1.3 Library Automation in India: A brief Historical perspective
1.4 Systems approach to Library Automation
  1.4.1 Planning stage
  1.4.2 Designing stage
  1.4.3 Operational stage
    1.4.3.1 Implementation
    1.4.3.2 Evaluation
1.5 Need for the study
1.6 Objectives of the study
1.7 Scope of the study
1.8 Limitations of the study
1.9 Methodology
1.10 Chapterization

1.1 Introduction

Libraries are in the midst of radical changes. These changes are, perhaps, unavoidable and compelling. In the present day context libraries are moving beyond their traditional role as custodians of recorded knowledge and integrating new methods of information storage, retrieval and transmission into their existing services and patterns.

They are, at the same time, incorporating the extensive changes that new technologies bring to organizational structures and staff responsibilities. Libraries currently are experiencing technological transition in how services are provided and in what these services are. These changes are attributed in literature to three major phenomena: the information explosion, escalating costs, and the technology revolution. In particular, in the recent past it is the computer and communication technologies which have drastically changed the working of libraries.

While the computer technology provided hitherto unavailable power for the organization and manipulation of information, communication technology provided immense scope for the speedy and accurate dissemination of information. Over the past few years, there have been many developments in computer technology. One of the revolutionary developments has been the advent of comparatively cheap microcomputer systems, with increasing sophisticated features which can be used for a variety of library applications. As a result, it is not uncommon to find a micro-computer even in a
small library in a developing country like India also. Computers in libraries are used to assist a variety of functions, such as, maintaining and providing access to catalogue items in the collection, managing the circulation of items, controlling the serial publications and allowing the retrieval of information from local files, searching external of information sources for references or for full text of documents and so on. 

Library Automation refers to the use of computers to serve the needs of library users.

The operations of a Library get a quantum jump with the introductions of computers. The computers help to provide fast and reliable access to the resources available in the library as well as elsewhere. The application of computers in the library operations avoids repetitive jobs and saves lot of labor, time, speeds up operations, increases use of library resources. Computers are not only used as a tool for processing the data, but also for data storage and accessing.

Application of computer for library activities is no longer a controversial issue. Many authors have identified and justified the reasons for the development of automated library systems (computer – based library system). Joseph Matthews (1980) has summarized them as follows:

- The tasks of a function may be eliminated or completed more accurately, more quickly, and with increased control than with other alternatives. Typically these tasks are clerical, routine and repetitive in nature, and thus desirable candidates for automation. For example, an automated circulation control system may all but eliminate the need for personal to prepare overdue notices.
- Increase demands for service and their accompanying library work loads must be counterbalanced with improved productivity, especially with either static or declining budget resources.
- Automation may facilitate the collection of data that will assist the librarian in the management of the library’s collection while simultaneously providing new and more detailed data to support its budget.
- Automation may provide the means to offer new or improved services to patrons, provide valuable by – products (often unanticipated) as a result of automation, and facilitate cooperation between libraries.
- Automation may avoid the need to hire additional staff, even with increased demands for service.

1.2.1 Library Automation: The Concept

The word ‘Automation’ has been derived from a Greek word ‘Automate’ which means something which has the power of spontaneous motion or self movement (Webster’s Third New International Dictionary of English Language, 1966). The term ‘Automation’ was first introduced by D.S. Harder in 1936, who was then with the General Motor Company in United States. He used the term automation to mean automatic handling of parts between progressive production processes.
However, the modern usage of the word ‘automation’ is not in vogue in the above sense.

McGraw – Hill Encyclopedia of Science and Technology (1982) defines automation as “a coined word having no precise, generally accepted technical meaning but widely used to imply the concept ‘development’ or use of highly automatic machinery or control system.”

From the above definition one can observe that ‘automation’ is the application of ‘machines’ to perform a task automatically.

However, “In business world, the words ‘automation’ and ‘computer’ are often used synonymously…” (Encyclopedia of Computer Science and Technology, 1975).

In most of the literature on automation the term ‘automation’ is in the above sense. Thus, we can conclude that the modern usage of the word ‘automation’ implies predominant use of ‘computers’ and other modern technologies for term ‘automation’ is being used by the investigator in the same sense. Integrated library system: An automation system in which the various Applications share one bibliographic database. Each system comes with a set of core modules as well as additional modules which can be added on if Necessary (or affordable).

Client-server architecture: Turnkey systems are quickly becoming a thing of The past. A client/server system is identified by a more powerful server Machine that handles database manipulation and retrieval while leaving the User interface to the desktop client software. This shares the computational Load between the client and server machines and gives the user a better experience through a faster interface.

1.2.2 Library Automation

The word ‘library automation’ is being used in literature for the last four decades. A perusal of the literature would indicate that many authors have not tried to define the term explicitly. They use the term ‘Library automation’ to mean the use of computers as an aid for library activities. However, some authors have tried to define the term. For instance Markers on (1967) says “Library automation in the broadest sense can be taken to mean the employment of machines for library processes. In general, however, library automation has come to mean the application of computers and related data processing equipment to libraries.

Salmon (1975), has tried to give a more exhaustive definition. According to him “Library automation is the use of automatic and semi-automatic library activities as acquisition, cataloguing, and circulation. Although these activities are not necessarily performed in
traditionally associated with libraries; library automation may thus be distinguished from related fields such as information retrieval, automatic indexing and abstracting, and automatic textual analysis.”

Further he says that “linguistic purists have argued rightly that the term ‘automation’ applies more correctly and narrowly to automatic process control… and ‘library automation’ is now far the most commonly used term for mechanization of library activities using data processing equipment.”

Form the first part of the above definition it can be observed that the term ‘library automation’ is used to imply just the mechanization of traditional and/or manual house–keeping routines of a library. In other words, it confines itself to the use of data processing equipments and associated technology to perform exactly what has always and already been done in libraries through manual process, of course, with the justification of reduced cost and/or increased performance. However, literature shows that such distinction is not maintained. The scope of library automation goes beyond the automation of just house–keeping activities of the libraries.

Hayes and Becker (1970) have identified the area of library automation. According to them, the areas of library automation include:

1. The application of data processing equipments to do/to support the clerical/repetitive functions found in technical processing circulation control and serials control.
2. The application of data processing equipments to the fields of information storage and retrieval, automatic indexing and abstracting and in reference work; and
3. The application of computers/data processing equipments for operation research and system analysis.

It is observed that much work has been done in the first two areas, whereas one finds less literature on the third. Though, it might be difficult to find a universally accepted and a comprehensive definition of library automation, one can accept the areas identified by Hayes and Becker as coming under the purview of library automation. Library automation offers many opportunities to improve service to library patrons. Among other benefits, it makes materials easier for patrons to locate as well as allowing staff to better serve patrons by facilitating a multitude of staff tasks such as acquisitions, cataloguing, circulation and Reference. On the other hand, the financial and staff commitment needed to move to an automated system or from one system to another is substantial. And long-lasting. Automation cannot be approached as a panacea for systemic problems in a library. Without staff support and training no system can offer its full potential.

Your strategic vision must now provide the framework or context for the next step in the automation process, which is to determine which library functions should be automated.
and in what order of priority. For example, processes that are repetitive occupy large amounts of staff time, require retrieving Information from large, unwieldy files, or are high-profile functions of the library (such as the public catalog) are prime candidates for automation.

Determining the functions that you wish to automate and their priorities relative to each other is important for all sorts of reasons. If needs and priorities are clear, functions can be automated in phases, allowing for more effective use of frequently scarce funding. Moreover, it is a way to develop credibility with funding agencies and be able to take advantage of "sudden" funding opportunities. Finally, evaluations of systems and options will be easier and more productive if you are able to match your highest functional priorities against the corresponding modules available in the marketplace.

1.3 Library automation in India – A brief historical perspective

In 1936 Ralph H. Parker, then loan librarian at the University of Texas Library, published one of the first articles on library automation (1936). This article described the implementation and detailed the practical usage of two Hollerith punched card machines. One machine perforated punched cards and the other sorted them. The process enabled the lending department to more easily handle collection and circulation clerical issues. The significance of this first step towards library automation was not lost on Parker, who summed it optimistically with regards to the future of librarianship as a “new day of no mistakes, no nervous strain, and much less manual labor for the library worker”

One key discovery is that technology alone played a tertiary or lesser role in Parker’s vision of a highly automated library. As the director of the library, financial and logistical conditions affected considerably more pressure to discover efficient methods for dealing with growing collections and circulation, especially post-War. However, it was his role as a manager of librarians that the primary reason to automate surfaced. His main preference was an apparent concern for the quality of librarianship itself and for the people who filled those positions.

As early as 1955, computerization work started with the installation of HEC – 2m computer system imported from UK, at the Indian Statistical Institute (ISI), Calcutta. ISI also acquired a Soviet built computer URAL – 1 as gift in 1958. The first indigenous computer was designed in 1964 by ISI, Calcutta in collaboration with Jadavpur University, Calcutta. During the introductory phase period (1955 – 64) as many as sixteen computers were installed in different parts of India. During the period 1966 – 72 the process of computerization speeded up with the installation of one hundred and seventy more computer systems, although most of them were imported from the Western countries. Later particularly during 1980s, many institutions/organizations started using computers. The advent of affordable and powerful micro – computer is responsible for the upsurge in the in the usage of computers in India.
As far as use of computers for library work is concerned, INSDOC was the leader in experimenting with computers for their application in documentation and information work in 1964. The first application was to computerize the author and subject indexes of ‘Indian science Abstracts’ published by INSDOC. In 1967, INSDOC brought out the ‘Roster of Indian Scientific and Technical Translators’ with the help of computers. Again, it is INSDOC which brought out the first Union Catalogue with the help of computers under the title ‘Regional Union Catalogue of Scientific Serials, Bombay – Poona’ in 1973. In 1978 INSDOC initiated SDI service as a NISSAT project with Chemical Abstracts and INSPEC databases, with the use of CAN/SDI software at IIT, Madras. In the meanwhile DRTC, Bangalore conducted a number of experiments in the field of automated document classification, design of document finding system and subject indexing. In early 1970s, Tata Institute of Fundamental Research (TIFR) library developed a program for generating a monthly list of recent additions to the library with a keyword index. Further it also developed programs for stock checking and serials control.

The Bhabha Atomic Research Centre (BARC) developed a system called ‘Automation for Storage and Retrieval of Information’ (AFSARI) and also a set of programs in COBOL for current awareness services and preparing indexes such as author, corporate bodies, personal, subject and KWOC. The Physical Research Laboratory (PRL), Ahmedabad produced ‘Library additions list’ with a KWOC index. Later, a periodical management system and book procurement system were developed. IIT, Delhi developed a computerized acquisition routine of serials in 1969. At a later date a list of textbooks available in library was generated using ICL 1960 computer available on its premises. IIT, Madras has conducted a number of experiments and operations pertaining to library automation and bibliographic data services. It has also developed a book acquisition system in PL/I language. However, in, mid – 80s a separate and more comprehensive system was developed in dBase. I BHEL (R&D), Hyderabad imported Clark Library Acquisition System from USA in 1982. Even this system was replaced by a system developed within the library (This study covers this system also).

Similar efforts of application of computers for their library activities have been reported in literature. It is not the intention of this study to list them all. However, it may be suffice to say that efforts are being made in all major libraries in India to automate their activities.

1.4 Systems approach to library automation.

The question before the libraries now is not ‘to automate’ or ‘not to automate’ rather ‘how’ to automate. It is a well known fact that considerable human and financial resources are utilized in launching upon automation project. In this connection K.J. Singh (1985) has rightly observed that "no body can deny the advantages of automation, but in developing countries like India, its adoption has to be done with caution, as some of the
huge installations may prove to be white elephants, surplus manpower, over –population
and unemployment.” Hence, enough care has to be taken at each every stage of the
project. Ignoring or overtaking even a minute aspect may later prove to be serious.
Broadly speaking the various aspects involved in automation project, viewed from the
angle of System Development Cycle, may be grouped under the following three stages:

- Planning;
- Designing; and
- Operational;

1.4.1 Planning Stage
The first and foremost step in any automation project is the idea to initiate a project. Valid reasons should support such initiations, particularly so in libraries because they are non – profit organizations working under some parental institution. To emphasize this fact Salmon 1975 has rightly opined that “projects should not be started for the reasons that the library should be “modernized” so that it can keep up with the Joneses of the Library world or just to promote the reputation of the library.”

The next step in the planning stage is to conduct a feasibility study about the proposed projects. The outcome of such a study should help the management in determining whether or not proposed project is feasible. The project is to be considered feasible only if the proposed projects can be useful to the organization. Thus, the purpose of a feasibility study is “to gather, analyze and document the data needed to make an informal, intelligent decision regarding a system’s practicability” (Silver and Silver, 1976).

The following types of feasibility studies may have to be conducted before proceeding further:

- Technical feasibility;
- Operational feasibility; and
- Economic feasibility.

If the overall outcome of feasibility study indicates that the proposed project is feasible, then the activities in the designing stage will be initiated.

1.4.2 Designing stage
Before designing a new automated system, one should carry out a study of the existing system. This study in an evaluation of how current methods are working and the problems involved there in. The result may be taken to determine the features that must be included in a proposed system.

One has to structure the existing system’s study by seeking answers to following questions:
The outcome of such a study should help to identify features of the new system including both the information the system should produce and also the operational features such as processing controls, response time, and input and output methods. An automated system may be designed in many ways. However, it has to be noted here that this is a one–time project which decides the future of the library. So, with enough care and caution, the best solution has to be arrived after considering the advantages and disadvantages of all other possible alternatives.

It is advisable here to share a benefit of the experience of other libraries/information centers that have already launched similar projects. Emphasizing this aspect Salmon (1975) gives a caution that “in early enthusiasm and eagerness to get started, it should not be forgotten to search the literature, to learn (through various means, including contacts with professional association) of similar projects which have been attempted or implemented, and then to take experience of these projects into account.”

The next step in designing the system is normally referred to as ‘logical design’ in contrast to the process of developing actual source code (program/software), which is referred to as ‘physical design.’ This is the state where system specifications are made. Because of the technicalities involved in this phase, it is relatively unfamiliar to librarians. These specifications include the details of output, input, files, database interaction, controls and procedures. The specification should also include the hardware aspect of the system. These specifications are to be well documented so that it is free from ambiguity. In fact, many design tools such as charts, tables, data diagrams, data dictionaries, etc., are used to portray the design accurately.

Physical design follows the logical design. Physical design refers to the development of ‘software’ for automated systems. The lifeblood of any automated (computerized) system is its software. The software decides the success or failure of a system. Software design should accomplish the following objectives:

- The actual programs perform all required tasks and do so in the manner intended;
- The structure of the software permits suitable testing and validation; and
• Future modifications can be made in an efficient manner and with minimum disruption to the design of the system.

Literature of the field identifies six principles which may be deemed as the characteristics of good software design (Senn, 1989). They are top–town partitioning, loose coupling, functional grouping for cohesion, limited span control, manageable module size, and shared modules. If one follows these principles there is likelihood of achieving acceptable levels of reliability and maintainability of the software.

There are two approaches for software development. One may install purchased software as in turn – key systems or may develop a new custom designed programme. The choice depends on the cost of each option, the time available to write software’s, and the availability of programmers. In any case, the software should be aimed at fulfilling the above objectives and principles.

Further, the software should be well documented so that it ensures easy use of the system and helps in the future development.

1.4.3 Operational stage
If the above mentioned two stages are passed through satisfactorily, a good result the operational stage may be expected. In this stage, for the first time the physical components of the system are placed in their operational environment. The stage in fact consists of two steps: implementation, and evaluation.

1.4.3.1 Implementations
Implementation is the process of putting the new equipment to use, train the users, install the new application, and construct the data files required.

The most important work in implementation is the system conversion. Conversion is the process of changing form the old system to the new one. Depending on the resources and personnel available any one of the following methods of system conversion may be adopted. Each method has its own advantages as well as limitations.

(e) Direct conversion: Here, the old system is completely replaced by the new one within a short period of time. The major problem in this conversion method is that there is no other system to fall back on if serious problems arise with the new system.

(f) Parallel conversion: Here the old system is operated along with the new system. Under this approach, both old as well as new systems will be operated simultaneously. This method is the safest conversion approach, since it guarantees that, should problems arise in using the new system, the library can still fall back on the old system without loss of time, or service.

The disadvantages of this method are significant. First of all, the system costs, since there are two sets of systems under operation. In some instances it is necessary to hire temporary personnel to assist in operating both systems simultaneously.
Second, the fact that the users know they can fall back to the old ways may be a disadvantage. As a consequence, the new system may not get a fair trial.

(g) Phased conversion: This method is used when it is not possible to install a new system by the organization all at once. Here the conversion takes place phase by phase.
The disadvantages of this method may be that it is not suitable for all situations and it is difficult to identify which phase has to be automated first.

(h) Pilot conversion: When a new system involves new techniques or drastic changes in existing routine of the library, the pilot approach may be preferred. The new system is used only in one part of the organization for pilot study. When the system is deemed functional, it is installed.

1.4.3.2. Evaluation
Evaluation of the system conducted at this stage is normally termed as ‘post – installation evaluation’. It involves the examination of the system’s performance. Once the automated system is introduced in libraries/information centers, they have to be monitored and evaluated. Evaluation of the system is performed to identify its strength and weakness.

The evaluation can occur along any one or more of the following lines:
• Operational evaluation
  Assessment of the manner in which the system functions including ease of use, suitability of information formats, overall reliability and levels of performance.
  It may be noted here that the present study intends to conduct this type of evaluation.
• Organizational impact
  Identification and measurement of the benefits to the organization – financial and/or otherwise.
• User – staff assessment
  Evaluation of the attitudes of the users as well as the staff towards the new system. It also comprises of the testing of the user – satisfactions of the new system. This is normally termed as subjective evaluation.
  After careful evaluation, the results may be used for suitable modifications in the system to improve the overall efficiency of the system and thereby to derive maximum benefit from the system.
  Such evaluations not only assess how well the automated system is designed and implemented, but also provide valuable information for future projects in the same organization (library) and for similar projects in other organization.

1.5 Need for the study
After the development of powerful microcomputers at comparatively low cost, libraries in India have been utilizing computers for their routine as well as other activities. One ca
vividly sees the upsurge of articles/reports in Indian journals and conferences about the computerization activities in Indian libraries. Some surveys have also been conducted to study and report the computerization activities in India.

It is evident by perusing the literature that many libraries in India are developing their own indigenous systems rather than purchasing the commercially available ones. However, a few commercially available systems in India are available. Some of them are LIBMAN from Kasbah Systems, Madras; UNILIB from Hindustan Computers Ltd, Bangalore; ARCHIVES from Mina fax Electric System Bombay; SALIM from Uptron India Limited, New Delhi; LIBRA from IVY systems LTD, New Delhi, LIBSYS from Info – Tek consultants Pvt. Ltd, and New Delhi and so on. But libraries seem to have preferred to develop their own tailor–made systems. Reasons for this, perhaps, are:

- The cost of commercial systems is high
- They do not suit the local requirements of the libraries
- Ignorance about the availability of the systems
- Apprehensions about the quality and reliability of the systems as no comprehensive evaluation of commercial systems have been reported so far.

The literature survey conducted by the investigator before taking up this study indicated that most of the literature on library automation in India, unfortunately, is not evaluative in nature and it either tells about successes or what is planned. The reason for such a tendency is, perhaps, that when an automated system is up and running it is considered as a sufficient evidence of its success. However, it is needless to say that only evaluation studies will be able to quantify the goodness of the systems. Further, reporting of problems and/or failure is as important as reporting of successes of system.

So, there was a need for taking up a research project to evaluate the performance of the indigenously developed systems to measure how well the systems are and how much well do they perform. However, systems are implemented to achieve specific purposes and it is important for the development of any organization that new systems are evaluated to check what has been achieved. Evaluations of systems in operation can serve a number of objectives. Firstly, they can demonstrate whether the intended improvements in the activity have been achieved. Secondly, evaluation can show the barriers and difficulties that prevent the full exploitation of the system by its users and may lead to certain action which may ultimately help to remove these barriers. Thirdly, evaluations can provide the evidence upon which future development plans can be built.

Apart from theses, as noted in the earlier past of this chapter, evaluation (post–installation evaluation) forms an integral part of any systematic projects. Thus, all systems need to be evaluated. The major benefit of evaluation is that not only will the library using the system know the quality of its systems but it will also help other libraries working on similar projects to be wiser by such evaluation reports.
In view of these considerations, the investigator took this study to evaluate the existing automate library systems in certain selected special libraries in South India.

1.6 Objectives of the study

Following are the broad objectives envisaged for the present investigation:

- To study and examine the functional performance ability of the automated housekeeping systems used by certain selected libraries in South India.
- To determine the reasons underlying success or failure of each system covered in the study.
- To explore and suggest areas of improvement for increasing the performance level of the systems.
- To find out common problems faced by the libraries in relation to automated systems.

1.7 Scope of the study

The following is the scope of the study:

- The study covers only automated systems which are in actual use.
- The study covers only three areas of library house – keeping activities, viz., Acquisition, Serials Control and Circulation.
- The study covers only automated systems available in the University libraries of the four University Library viz., Gujarat University Library, M.S. University, S.P. University, and Gujarat – Ayurved University Library Jamnagar.
- The study covers only those systems which are indigenously developed within the library/parent organization.

1.8 Limitations of the Study

The present study being a one – man investigation, the work had to be done with available resources and time. The following are the limitations of the study:

- The study covered only those automated house – keeping systems which have at least few functions so as to make a meaningful evaluation. For example, Geological Survey of Gujarat State Library, S.P. University Library had only book ordering function in its acquisitions. Thus, the system has not been covered in this study.
- The study covered only those libraries which permitted and provided essential and sufficient data to the investigator. There are instances where the investigator was not allowed to study their system. Thus, this study cannot be taken as an exhaustive coverage of all the automated systems available in the University libraries in Gujarat State.
As the objective of the present research is to study only indigenously developed systems, those libraries which are using commercially available systems have been excluded.

1.9 Methodology

This study is basically an evaluative one. The evaluation is relative in nature. That is, to determine the level of performance of various systems, the systems either must be compared to one another or all systems to some reference model. The latter approach to evaluation is both objective and precise, provided a reference model is available. Such reference model should indicate detailed criteria or specifications against which one can evaluate all systems. The criteria should outline expected performance rather than specific methods. The model should be such that it should reflect, accurately, the needs of system requirements of Indian libraries. The model should also consider various technical facilities available in India at present. As this study is covering three areas of in-house operations, viz., Acquisitions, Serial Control and Circulation Control, three models were required to conduct this study.

The investigator could not trace any reference models suitable for evaluating automated systems in Indian libraries. Thus, he had to make special efforts to develop a reference model each for Acquisitions, Serials Control and Circulation Control. The models are, however, derived from the models, check lists and similar studies available elsewhere in Western Countries (Boss -1979, 1981, 1982, 1986, 1992; Emily 1986; Library Systems Evaluation Guide 8v – 1983 -1988 and so on). However, they have been restructured to reflect the requirements in the Indian context.

Each model has a series of function involved in that particular operation i.e., Acquisitions, Serials control, or Circulation. For example, Acquisitions model has got functions like order production, Received Item Processing, Claims, Search, etc. In the model every function invariably has a number of features, although the numbers of features vary from function to function. Each of these features represents a specific requirement of an automated system. All the features together under a function will reflect a overall functional requirement. (See appendices 1, 2 & 3 for Acquisitions, Serials Control and Circulation Control models respectively).

It is but obvious that all the features under a function are not of equal importance. For a meaningful evaluation of the candidate systems against the models, one has to fix the relative importance of each feature. This determining of importance has to be done only by those who have experience and thorough knowledge of automated systems. Thus, in order to arrive at the relative importance of each of the features, the models were sent following three experts:
The experts were requested to examine the models thoroughly with particular reference to requirements in Indian situation and offer their suggestion/opinion. Further, they were also requested to assign a numerical weight to each feature depending upon their importance. The experts were given a five – point scale to assign the feature weights. The scale is as follows:

<table>
<thead>
<tr>
<th>Numerical Weight</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not Needed/not required feature</td>
</tr>
<tr>
<td>2</td>
<td>Presence of the feature makes no significant differences</td>
</tr>
<tr>
<td>3</td>
<td>Desirable Feature</td>
</tr>
<tr>
<td>4</td>
<td>Important Feature</td>
</tr>
<tr>
<td>5</td>
<td>Essential Feature</td>
</tr>
</tbody>
</table>

After receiving back the models from the experts, they were returned to incorporate suggestions given by the experts. Then, the average of the weights given by the three experts to each feature was taken and rounded off. The resulting age for each feature is considered as the basis for analysis and evaluation purposes.

The investigator, then, personally visited a number of University libraries in the four different University Library of Gujarat, viz., Sardar Patel University, M. S. University, Gujarat University, and Gujarat Ayurved University. However, the final selection of the candidate systems for evaluation was based on availability of suitable data for evaluation. As mentioned earlier in this chapter, some of the libraries did not give sufficient details. So their systems were not considered here. Following are the libraries whose systems are considered in this study.

1. Sardar Patel University, V. V. Nagar
2. M. S. University of Baroda
3. Gujarat University, Ahmedabad
4. Gujarat Ayurved University, Jamnagar
5. Vir Narmad Dakshin Gujarat University, University Library
6. Anand Agricultural University, Anand, University Library
7. Bhavnagar University, Bhavnagar, University Library
8. Dharmsinh Desai University, Nadiad
9. Saurashtra University, Rajkot University Library
10. Nirma University Library, Ahmedabad
Data was gathered from the libraries of the above mentioned institute in three different modes. The first one being the direct application of the models to the existing systems. In other words, each of the features in each model was verified for its presence and also for its trouble free performance. The second mode involved the collection of various print – outs of various outputs, menus, and sub – menus, reports, error messages, database structures, manuals etc. The third mode of data collection involved the interaction of the investigator with the following (where ever available) to elicit their opinion about the success or failure of their system:

➢ The person(s) who is/are actually involved in operating the system
➢ The in –charge/concerned staff members of the libraries who are primarily involved in the development of the system
➢ The actual designer of the system (e.g., system analysts, programmer et al), where ever available.

Data thus collected was consolidated, tabulated and analyzed. Inferences have been mainly drawn based on the analysis of the collected data and sometimes on the personal observations made by the investigator.

It may be further noted that automated systems in Acquisitions, Serials Control and Circulation were not available in all the above mentioned eight libraries. So, depending upon the availability of the automated systems, further selection of the libraries was done which has been mentioned at suitable in the study.