COST-BENEFIT ANALYSIS OF AUTOMATION

5.1 Introduction:

Evaluation is an integral part of the management process. It presupposes the existence of stated objectives. Since automation of libraries has a set of objectives it can be evaluated. For evaluation we can have two criteria i.e. users’ satisfaction and cost-benefit analysis. All organisations wish to produce the goods or services in the most economical way. Hence it is possible to develop evaluation procedures for performance measurement of non-profit making organisations like libraries. Traditionally the people are allergic to the evaluation and measurement of services of non-profit making or service organisations. This ‘Mcnamara Fallacy’ in the words of Daniel Yankelovich is as, “The first step is to measure whatever can be easily measured. This is okay as far as it goes. The second step is to disregard that which can not be measured or give it an arbitrary value. This is artificial and misleading. The third is to presume that what can not be measured easily is really not very important. This is blindness. The fourth step is to say that what can not be easily measured, really does not exist. This is suicide.”

Costing a library system includes the document resources, manpower (professional and non-professional), physical facilities and other equipments which constitute the input of the library. But we have no ways of evaluating the performance or to assess at what level it is functioning.
5.2 Types of Evaluation:

Evaluation of library system and its services may be carried out at the following three levels –

i) Effectiveness;
ii) Cost – effectiveness; and
iii) Cost – benefit

An evaluation of effectiveness is an evaluation of users’ satisfaction. Such an evaluation should determine how well an information service/library satisfies the needs of its users. However, this type of evaluation is restricted to a consideration of how well the service meets the demands of the users (expressed needs), the latest needs being completely ignored. King and Bryant had drawn an important distinction between macro and micro evaluation. While the macro evaluation tries to answer the question, ‘How well the system is performing?’ and the result of such evaluation may be purely quantitative. On the other hand micro evaluation is concerned with the reasons behind the results and with the identification of ways in which the performance of the system might be improved.


Cost – effectiveness is concerned with internal operating efficiency of a system. Such a study measures how efficiently (in terms of cost) the system is satisfying its objectives i.e. meeting the needs of its users. In other words cost – effectiveness is method of finding either a) the cheapest means of accomplishing a defined objective or b) striking a balance between the cost of developing and operating a system and the benefit derived from the system or c) achieving maximum results or value at the least cost. It is a measure of the efficacy with which various means
will achieve a given level of performance of a system, judged to be satisfactory. It is a technique with which we can attempt to find out the costs and evaluate the relative effectiveness or performance level of library systems or services. Cost–benefits analysis is a technique that attempts to set out and evaluate the social costs and social benefits of a project or system. It is usually little difficult to conduct. It attempts to determine, whether the expenses of providing services is justified by the benefits derived from it and helps in decision making process to suggest alternative services to justify the cost involved.

5.3 Evaluation or Measuring the Performance:

Evans and Borko after an extensive review of the literature, identified six possible performance criteria for evaluating library services, such as: 1) Accessibility 2) Cost 3) User satisfaction 4) Response time 5) Cost-benefit ratio, and 6) Use. These criteria are not restricted to the evaluation of library effectiveness and cost benefit consideration. The performance of any library and information service can be measured or evaluated from several possible view points, such as:

i) How well the service is satisfying its objectives, which usually means how well it is satisfying the demands placed upon it. This is an evaluation of effectiveness of service/automation.

ii) How efficiently (in terms of costs) it is satisfying its objectives. This is cost–effectiveness evaluation.

iii) Whether the service (being automated) justify its existence. Keeping the service as constant, it suggests to find out alternative methods to justify the costs.
In addition to the above considerations the efficiency of the library system can be viewed as:

a) The ability of the library to deliver a particular item when it is needed.

b) The ability of the catalogue and the shelf arrangement to disclose the holdings of particular items or of materials on particular subjects.

c) The ability of reference staff to answer questions completely and accurately.

d) The speed with which a reference query can be answered or a literature search conducted and the results presented to the library users.

e) The speed with which a particular item can be located when needed.

f) The amount of effort that the user must himself expand in exploiting the services of the library (including factors of physical accessibility of the library and its collections, the size and the quality of the library staff and the ways in which the collections are catalogued, indexed and shelved).

The above measures bear a similarity to the performance criteria for an Information Retrieval System. Information services, like most other services, generally will be evaluated in terms of time, cost and quality factors. Cost does not necessarily mean monetary cost, although if the information service does charge its users directly, the actual cost of the service will be an important characteristic by which the service will be judged. In case where no direct charge is made for service, other type of cost factors still are important. One of these, is the amount of efforts a user must expand, a) In using the system (and in learning how to use it), 2) In interpreting the form of output provided by the system, and 3) In obtaining the actual documents referred to by the system.
5.4 Cost – Benefit Analysis of Computerisation:

Cost – benefit analysis happens to be one of the most important aspects of management in general and of decision making in particular. To study the feasibility of any system, to valuate it or to choose one system out of several alternatives, the decision making authorities have to make a cost – benefit analysis. In this process total costs involved in terms of equipments (machines), material and manpower have to be taken into account and also value of all the benefits i.e. economy in terms of money, efforts and time involved, being accrued from it, have to be calculated. If the value of benefits is more as compared to the cost involved, the system is suitable and if the results are opposite to this the system is misfit. It is, therefore, essential to have a cost – benefit analysis of computerisation instead of following others blindly. Here an attempt is being made to highlight some problems involved in making cost – benefit analysis of computerising any of the library services or operations –

To begin with, an exercise in costing of any activity or service in the library is almost an impossible task for the simple reason that there exist many immeasurable components in the library operation. This is because the operations or services of any library are not mechanical. They required lot of human involved i.e. the library staff of different categories and also that one operation in some or other way is linked or dependent upon other. To cite an example, the cost of one hour work of a Deputy or Asstt. Librarian is not equivalent to the same time of a clerk or Junior Professional Asstt. in terms of money. Similarly for calculating benefits of the one hour time of a student or technician saved due to computerisation is not equivalent to one hour of a senior professor in an academic institution or General Manager of a business house. One comes across hundreds of such items while computing the cost and returns of the library service. However, it does not mean to be an agreement against the cost – benefit study of library
operations, but that precise estimation of cost as well as benefits in terms of money is difficult to arrive at in such an exercise.

Several attempts have been made in evaluating the library services. All of them suggest that the only convincing and valid criteria for measuring the library services is the satisfaction of users. It is also suggested that the satisfaction of the library staff would also be considered as a factor that ensures the validity of the users’ claim of their satisfaction with the library services. However, it will be unanimously agreed upon that the satisfaction, whether of users or library staff is fully an abstract phenomenon and can not be measured to concrete terms. Also satisfaction is highly subjective i.e. levels vary from person to person and even more to the same person at different states of minds or to say moods. Still there is need for providing some tool by which the library services could be measured in concrete terms. Normally, those who are desired to evaluate library services or the impact of computerisation are non-librarians and may be even non-academicians. The library has to confront with such persons who could be convinced only by the language of rupees. Hence the librarian must attempt to convert at least those parts of the immeasurables that can be converted into figures and into rupees. For an example, to calculate users’ satisfaction, it is possible to calculate the users as well as the use. Obviously, the use can not be fully calculated in terms of its real value but one can be successful in measuring some parts thereof.

The measurable aspects of the library services are –

a) the number of users using the library;
b) number of visits to the library by the users – in a day;
c) number of books being issued by the library in a day;
d) number of books being consulted by the users in the library;
e) number of loose – issues of the journals being consulted by the readers;
f) number of articles xeroxed from the library resources;
g) the time spent by readers in locating books and getting the books issued;

h) use of the bibliographical and information services offered by the library;

i) how many times the CD-ROMs, Videos films etc. are being used and so on.

These items are no doubt measurable and indicate the extent to which the library is serving the purpose for which it is being set up, but however they can hardly be measured in terms of money.

It is difficult to compute the returns on the expenditure incurred on the computerisation of the library in terms of money, but applying the same logic in respect of library services an attempt can be made to estimate the going on account of computerization. The most relevant factor would be the increase in the use of the library due to computerization. One can argue that if more readers are found to visit the library after it has been computerized and if the readers spend more time in the library than they were doing in the past (i.e. before computerization), then the computerization has paid the dividends. Similarly if the library services are used on a larger scale after the computerization, it can be called as cost – effective. However, this is difficult to calculate it in terms of money. Some other gains, which may be called to be psychological benefits, are as follows –

a) Mental fatigue that is caused due to literature search is saved for many readers and library staff.

b) The relief from physical fatigue of standing and consulting the catalogue is another advantage.

c) The status conciousness which is ever existing in the minds of library staff and proves to be an obstacle in the healthy functioning of total library activity, gradually fades away as the use of computers increases.
d) The entire system becomes highly disciplined and regulated.

A slightest diversion can not simply be tolerated by the machines. This influences the behaviour of the staff as well as that of readers in the library and has favourable effect on the total working and service environment.

e) The cleanliness that goes with sophisticated machinery leads to the pleasant environment in the library.

f) The level of accuracy involved in many operations is very high. This surely affects the quality of output of the parent organisation.

The above will ever remain immeasurable. However, the benefits of computerisation that can be calculated in terms of money are the manpower saved on current activities and the manpower saved on additional services that become possible due to computerisation can also be computed in monetary terms. In order to do the cost-benefit analysis of a library system one has to assess the expectations from the system. The system requirements are –

a) Better customer services.
b) Faster information retrieval.
c) Quicker notice / reminder preparation.
d) Better billing accuracy.
e) Lower processing and operating costs.
f) Improved staff efficiency.
g) Consistent procedure to eliminate errors.

5.5 Cost and Benefit Categories:

In developing cost estimates for a system, we need to consider several cost elements. Among them are hardware, personnel, facility, operating and supply
costs. Hardware costs relate to the actual purchase or lease of the computer and peripherals like printer, disk drive, tape unit etc. Determining the cost of hardware is generally more difficult when the system is shared by various users than for a dedicated stand alone system. In some cases, the best way to control for this cost is to treat it as an operating cost. Personnel costs include EDP staff salaries and other benefits (like medical reimbursement, insurance, leaves, leave travelling allowance etc.) as well as pay for those involved in developing the system. Costs incurred during the development of a system are one – time costs and are named developmental costs. Once the system is installed, the costs of operating and maintaining the system become recurring costs. Facility costs are expenses incurred in the preparation of the physical site where the computer will be in operation. This includes wiring, flooring, acoustics, lighting, air-conditioning etc. These costs are treated as one-time or non-recurring cost and are incorporated into the overall cost estimate. Operating costs include all costs associated with the day – to – day operation of the system; the amount depends on the number of shifts; the nature of the computer, and the calibre of the operating staff. There are various ways of covering operating costs. One approach is to treat operating costs as overhead. Another approach is to charge each authorized user for the amount of processing they request from the system. The amount charged is based on computer time, staff time, and the volume of the output produced. In any case, some accounting is necessary to determine how operating costs should be handled. Supply costs are variable – costs that increase with increased use of paper, ribbons, disks and the like. They should be estimated and included in the overall cost of the system.

A system is also expected to provide benefits. The first task is to identify each benefit and then assign a monetary value to it for cost/benefit analysis. Benefits may be tangible and intangible, direct or indirect. The two major benefits are improving performance and minimizing the cost of processing. The performance
category emphasizes improvement in the accuracy of or access to information and easier access to the system by authorized users.

Minimizing costs through an efficient system – error control or reduction of staff – is a benefit that should be measured and included in cost – benefit analysis.

5.6 Procedure for Cost / Benefit Determination:

Building a computer-based system is an investment and not the expenditure. The difference between two is that expenditure is done to fulfill the needs while the investment is made to realize a return on it. Costs are incurred throughout the life cycle of system. Benefits are realized in the form of reduced operating costs, improved corporate image, staff efficiency or revenues. To what extent benefits overweigh costs is the function of cost – benefit analysis. Cost – benefit analysis is a procedure that gives a picture of the various costs, benefits and rules associated with a system. The determination of costs and benefits entails the following steps–

(i) Identify the costs and benefits pertaining to computerization.
(ii) Categorize the various costs and benefits for analysis.
(iii) Select a method of evaluation.
(iv) Interpret the result of analysis.
(v) Take action.

Identification of costs and benefits:

Certain costs and benefits are more easily identifiable than others. For example, direct costs, such as the price of a hard disk, are easily identified from company invoice payments or cancelled cheques. Direct benefits often relate one-to-one to direct costs, especially savings from reducing costs in the activity in question. Other direct costs and benefits, however may not be well defined, since they
represent estimated costs or benefits that have some uncertainty. A category of costs or benefits that is not easily discernible is opportunity costs and opportunity benefits. These are not easy to identify. The costs and benefits may be tangible or intangible, direct or indirect, fixed or variable.

_Tangible or Intangible costs and benefits:

_Tangibility refers to the ease with which costs or benefits can be measured. An outlay of cash for a specific item or activity is referred to as a tangible cost. They are usually shown as disbursements on the books. The purchase of hardware or software, personnel training, and employee salaries are tangible costs. They are readily identified and measured. Costs that are known to exist but whose financial value can not be measured accurately are referred to as intangible costs. For example, employee morale problems caused by a new system or lowered company image is an intangible cost. In some cases, intangible costs may be easy to identify but difficult to measure. For example, the cost of the breakdown of an on-line system will cause wastage of Time and energy of the users and staff. How much actual loss is caused due to this? It can not be measured in terms of money. In other cases, intangible costs may be difficult even to identify, such as an improvement in customer satisfaction stemming from a real – time order entry system. Benefits are also classified as tangible or intangible. Like costs, they are often difficult to specify accurately. Tangible benefits, such as completing jobs in fewer hours or producing reports with no errors, are quantifiable. Intangible benefits, such as more satisfied customers or an improved corporate image, are not easily quantified.

From a cost accounting point of view, costs are handled differently depending on whether they are direct or indirect. Direct costs are those with which a figure in rupees can be directly associated. They are applied directly to the operation. For
example, the purchase of a box of diskettes for Rs. 900.00 is a direct cost because the diskettes can be associated with the rupees expended. Direct benefits also can be specifically attributable. For example, a new system that can handle 25% more transactions per day is a direct benefit. Indirect costs are the results of operations that are not directly associated with a given system or activity. They are often referred to as overhead. A system that reduces overhead realizes savings. If it increases overhead, it incurs an additional cost. Insurance, maintenance, protection of computer centre, heat, light and air conditioning are all tangible costs, but it is difficult to determine the proportion of each attributable to a specific activity. Indirect benefits are realized as a by-product of another activity or system. For example, the data, entered once at the time of ordering the documents, is used for checking the bills, accessioning, cataloguing and providing information services like compilation of bibliographies, CAS and ready reference services. These indirect benefits are difficult to value in concrete terms. Direct and indirect costs and benefits are readily identified for tangible costs and benefits, respectively.

Some costs and benefits are constant, regardless of how well a system is used. Fixed costs are sunk costs i.e. they are fixed and do not change. Examples are straight – line depreciation of hardware, and insurance. In contrast, variable costs are incurred on a regular basis. They are usually proportional to work volume and continue as long as the system is in operation, e.g. computer stationery, inkjet of printer etc. Fixed benefits are also constant and do not change. An example is a decrease in number of personnel by 20 percent resulting from the use of a computer. The benefits of personnel savings may recur every month. Variable benefits on the other hand, are realized on a regular basis. The amount of time saved is variable and indirect benefits. Savings are realized when there is some kind of cost advantage. A cost advantage reduces or eliminates expenditures. So we can say that true savings reduce or eliminate various costs being incurred.
The Planning Evaluation and Review Technique (PERT) and Critical Path Method (CPM) network techniques are well developed management tools, which were developed concurrently with same purpose. The term PERT/CPM or network analysis refers to the general method of planning, scheduling and controlling of progress on various constituents of a project. This technique can be effectively used in detail planning and scheduling of library projects. Due to time and resources’ constraint for conducting a Library Systems Study Project, the system analyst has to pre-plan the time schedule for its completion. Such constraints could be caused due to the limitation placed by the authorities to finish the project within a given time and due to financial, technological and manpower limitations. It is not only essential to find out the optimum project duration but also to control the performance time to series of activities of the project to finish it on schedule. Not controlling the schedule implies an increase in the sum of direct or indirect cost. For this purpose, one has to plan and establish time estimates for completion of each activity of the project. Fix target times for its start and finish. Synchronise schedules of concurrent and successive activities of the project. PERT/CPM, the project management techniques are based on network model, and are used for developing a workable plan of a project involving:

a) Activities that make up the project, including specifications of their interrelation.

b) Times estimates for the completion of each activity within the complete project and total time requires to complete the entire project.

c) Controlling, synchronising and co-ordinating the sequences of activities of the project.

d) The sequence of activities that will consume the most time in reaching the end event.
A network model is a diagram through which complete picture of a project plan showing logical sequence of the activities and events and interrelationships of various activities is presented. An activity is any segment of a project that consumes time and resources and has a definable beginning and ending. An event means beginning and ending of an activity and does not consume time. It shows a note worthy or significant point in a project. For example, in a library system receipt of books and books bills are starting events, which trigger further actions. To make an inventory of a purchased book in an accession register is an activity and an accessioned book is an end event.

The advantages of a network analysis may be summarised as follows –

a) It forces a thorough pre-planning of the task.

b) It increases co-ordination.

c) It identifies trouble spots, often in advance, and pin points responsibilities.

d) It refines thinking and increases the user’s awareness of the problems involved, and their relative importance in the total operation.

e) It focuses the management’s attention on those activities that are or likely to be in difficulties, rather than on activities that are progressing smoothly and therefore need no attention.

f) It facilitates the hand over if information during changes in management and is a valuable aid when issuing orders.

g) It shows optimum start and finish times for each activity in an operation.

h) It enables the plans to be revised in the best way to suit changed circumstances.
i) It suggests where alternative methods should be sought.

j) It allows progress reporting and the issue of orders without complete loss of security.

k) It allows certain operations that follow a set pattern to be partly pre-planned, so speed up the final planning.

l) It is an important means of training personnel in the techniques of handling the operations.

m) It forms a useful comprehensive record that requires a minimum of storage space.

PERT/CPM can be effectively used in detailed planning and scheduling of library projects, such as analysing the library systems or operations and improving their performance; construction of a library building; shifting of library collection to a new location or building; transferring library staff from one place to another; making major changes in the working of a library department, planning and re-organising different departments of a library, and so on. Thus, we find that network analysis is the tool that systems analysts can use for –

a) Breaking down the project into a series of activities and events and arranging them in a logical network to accomplish the objective of a project successfully.

b) Estimating the duration and resources requirements of each activity, drawing up a schedule and finding which activities control the completion of the project to increase the chance of completing the project by target date.
c) Re-allocating money, men or other resources to improve the schedule and do rescheduling to reduce the total time required to complete the project.

d) Controlling and monitoring progress as the project proceeds.

The above description makes it quite clear that cost-benefit analysis of library system can not be done like business enterprises and the calculation of benefits can be only in terms of economy in the manpower and the time taken to perform a job. Say for example if a particular library, before computerisation needs 6 persons for acquisition and 6 persons for cataloguing, but after computerisation the whole work is managed by 9 persons only then the economy in staff is by 50% or if the library needed 04 staff members to do the work of circulation counter before computerization and only 02 staff members to do the same work efficiently and effectively after computerization then we shall have 100% economy in staff. Similarly the time taken by the library staff in placing the order, checking the receipt, sending reminders for non-receipts, checking the bills and accessioning 1000 volumes of books is 200 hours before computerisation and only 50 hours after computerization of all the above jobs then the economy in terms of time is 200%. It is for this reason that in the section E of my questionnaire only 5 questions were raised. Question no. 1 was to find that in which year the library could install a computer system or have to share a mainframe with other departments. Question no. 2 and its subsections relates to the cost of computer, its peripherals including stationery, manpower developing cost and recurring cost of maintenance. Question no. 3 desires to know that how many staff members a particular section of library had pre-automation and the same of post-automation. Question no. 4 makes an attempt to find economy in time, and through question no. 5, the information is gathered about the new services the library could introduce after computerization. The answer may have two implications, the one is that the computerization made it possible to spare the staff for other new services
and the second is that by using computers the same data can be utilized for
different activities, for example the bibliographical descriptions of the books
entered at the time of placing orders, can be used for accessioning, cataloguing,
preparation of list of new arrivals, and also for circulation.

5.7. Details of Costs and benefits of computerisation in Libraries of
Indian Institutes of Technology:

The library of IIT, Kanpur has its own mini-mainframe computer system. The cost
of installation including hardware is reported to be Rs. 15,000,00 (Fifteen Lacs) as
non-recurring and Recurring cost, including after-sale service and stationary etc. is
reported to be Rs. 5,000,00 (Five Lacs). The recurring and non-recurring costs
include salary for research engineers, retrospective conversion, bar-coding,
training of staff, site preparation, peripherals and air-conditioning. The benefits
accrual of computerisation are – Prior to automation the library needed 06 staff
members for the work of ordering of books, passing the bills and accessioning etc.
jobs of book acquisition and 06 staff members for classification, cataloguing, shelf
list preparation etc. jobs of technical processing. And after automation the jobs of
both these section is managed efficiently by 03 staff members only. This shows
that against 12 staff members only 03 are needed after automation i.e. an economy
of 400%. Similarly 14 staff members had been working in circulation section for
registration of members, preparing borrowers’ cards, issuing and returning of
books, sending reminders and charging over-due fines etc. before computerisation
and after computerisation only 06 staff members are performing all the jobs of
circulation section. This shows an economy of 233% in staff. In periodical section
09 staff members had been working for subscription of journals, sending
reminders and control of current and back volumes of the journals before
computerisation and after automation only 03 staff members are capable of doing
all the jobs. This is again an economy of 300% in number of staff. The other indirect benefit is that before automation only 01 staff member could be put to take care of reference services to the users. As is evident that to cater to the needs of more than 6,000 users on campus and above 500 users seeking reference assistance per day 01 staff member was very insufficient. After automation 06 staff members are engaged in reference service. This means that efficiency of reference services and in turn users’ satisfaction is increased six times. This is a remarkable, though can not be calculated in terms of money, achievement of automation. Also, after computerisation the library could introduce current awareness services in Mathematics, Psychology, Sociology, Management, Chemical Engg., Mechanical Engg., Civil Engg., Computer Science, Electrical Engg. And Electronic Engg.

Besides, the library could introduce Selective Dissemination of Information (SDI) service, on-line catalogue search, current contents search, New arrivals, journals subscriptions, journal holdings, circulation queries, book – Indent queries etc. for the convenience of users after computerization. These all benefits, though immeasurable, are very important and a real profitable return of the costs involved in automation.

The library of IIT, Mumbai (Bombay) had to put a non – recurring cost of Rs. 17,39,000/- (seventeen lacs and Thirty Nine Thousand only) on purchase and installation of its main frame Maxman, pentium and PCs and had to put another Rs. .5,00,000/- (Five lacs only) on manpower development for computerisation. Every year the recurring cost of maintenance, stationery and others comes to Rs. 90,000/- (Ninety thousand only). The achievements of the library in the field of automation are as under –
1. Creation of database of about 2,00,000 books with those minimum bibliographical details as are needed for circulation.

2. Creation of the database consisting of approx. 75,000 bound volumes of periodicals (of approx. 3,500 titles).

3. Creation of database of 1,550 current periodicals.

4. Database of faulty publications consisting of 3163 records.

5. Creation of about 7,000 readers records including faculty, supporting staff, students, corporate members, alumni member.

6. Barcoding of about 2,00,000 books and 75,000 bound volumes of journals.

7. The circulation function has been fully computerised. The other house keeping operations such as book acquisition, cataloguing and serial control are also computerised.

The itemwise costs involved in the computerisation of above activities are listed below –

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
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<tbody>
<tr>
<td>PC – AT (2 nos.)</td>
<td>Rs. 80,000.00</td>
</tr>
<tr>
<td>PC (11 nos)</td>
<td>Rs. 2,53,000.00</td>
</tr>
<tr>
<td>File server – 300 MBI</td>
<td>Rs. 3,50,000.00</td>
</tr>
<tr>
<td>Printer (3 nos.) – 80 columns</td>
<td>Rs. 30,000.00</td>
</tr>
<tr>
<td>Active hub (2 nos.)</td>
<td>Rs. 20,000.00</td>
</tr>
<tr>
<td>Electronic Typewrite (2 nos.)</td>
<td>Rs. 30,000.00</td>
</tr>
<tr>
<td>CD – ROM Drive (1 no.)</td>
<td>Rs. 30,000.00</td>
</tr>
<tr>
<td>Barcode Laser Scanner (2 nos.)</td>
<td>Rs. 1,08,000.00</td>
</tr>
<tr>
<td>Voltage Stabilizer – 2 KVA (4 nos.)</td>
<td>Rs. 48,000.00</td>
</tr>
<tr>
<td>Isolation Transformer (2 nos.)</td>
<td>Rs. 60,000.00</td>
</tr>
<tr>
<td>UPS 1 KV</td>
<td>Rs. 65,000.00</td>
</tr>
<tr>
<td>A.C. (2 nos.)</td>
<td>Rs. 70,000.00</td>
</tr>
<tr>
<td>LAN Software</td>
<td>Rs. 20,000.00</td>
</tr>
<tr>
<td>------------------------------------------</td>
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<tr>
<td>Compensation of a programmer for 3 years</td>
<td>Rs. 1,10,000.00</td>
</tr>
<tr>
<td>Compensation of attendant for 3 years</td>
<td>Rs. 40,000.00</td>
</tr>
<tr>
<td>Compensation of data entry operator (2) for 3 years</td>
<td>Rs. 2,40,000.00</td>
</tr>
<tr>
<td>Compensation of Supervisor for 3 years</td>
<td>Rs. 1,10,000.00</td>
</tr>
<tr>
<td>Stationery and consumables for 3 years</td>
<td>Rs. 20,000.00</td>
</tr>
<tr>
<td>Cost of furniture (15 chairs + 15 tables)</td>
<td>Rs. 40,000.00</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Rs. 15,000.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>Rs. 17,39,000.00</td>
</tr>
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</table>

The benefits obtained against this expenditure, as reported by Dr. H.S. Waydande are – The Acquisition or Book Order Section after computerisation could spare 02 professionals, the Technical Processing Section could manage its work efficiently with 1 supervisor and 06 semi-professions i.e. sparing two professionals (cataloguers), the circulation section while operating manually needed 11 staff members but after automation it is functioning with 07 staff members, the Journals’ section, after computerisation, could relieve 02 professional staff. Before computerisation there was no separate staff for reference work and service and users were guided only off and on by the staff doing other jobs, but after computerisation 03 professionals are fully engaged in providing reference assistance to the level of satisfaction of users.

Besides above, the other tangible benefits of automation are calculated in terms of money by Ganpule and Waydande. The functions of cataloguing operations are being done by the computers resulting net saving on search time as : Average 500 books are being issued out of the library of which 250 are searched by readers through the catalogue. If we take that a person can not search more than 100 books on the traditional catalogue per day and searching 250 books on computer will be half a day’s job, there is net saving of 2 mandays of a reader per day on account of
the catalogue search. The search is done by cross section of users ranging from students to senior professors. The savings can be calculated in terms of money on the basis of compensation of item of one readers at middle level, say, who draws Rs. 9000 p.. Thus there is a saving of Rs. 18,000/- p.m. on account of the catalogue search by readers. Library needs to search 100 books per day in the catalogue in its day to day in house activities. After automation this is being done in half an hour. Thus, there is saving of Rs. 3000/- equivalent to the compensation of one employee per month. The generating of catalogue cards needed the service of 02 typists when done manually. This is totally eliminated ,as the entry made by Book Acquisition Section can be manipulated for generating catalogue entries. This results into saving of Rs. 16,000/- per month. Half a day of a library professional on the counter was being spent on answering readers’ queries, such as the status of a book, claims, fine etc. This can now be done by the readers themselves resulting into a saving of Rs. 4000/- per month.

Other than the above benefits, there are additional facilities that could be rendered due to automation for which no cost need be incurred. The cost that would have been necessary, had there been no computerisation could be taken as benefits. Though these facilities were considered as part and parcel of any library but could not be offered before automation due to shortage of manpower.

The analysing library operations such as maintaining statistics of the users of the library, the types of books used etc. would have taken the services of 01 senior professional, which can now be done without such a person. Thus, there is net saving of at least Rs. 4,000/- per month. The SDI services when given manually required 03 professional staff, 01 typist and atleast half time of an officer costing roughly Rs. 40,000/- p.m. This can be done now by 01 professional and 01 typist/Data entry operator. Hence there is a saving of Rs. 15,000/- per month. It can easily be estimated that a period of about 3 months of a Ph.D. student is spent
on literature search done manually, often it is still more, but now when the library
has an online access to national and international databases using Internet and to
the database of library through LAN there will be a saving of at least 02 weeks per
research student I.I.T., Bombay enrols 200 research student per year and gives
them 43,000/- p.m. scholarship. Saving of 400 weeks i.e. about 100 months of
their time saves Rs. 3,00,000/- per year. All the above savings can be summarised,
considering about 20% increase in salaries of staff during last 3 years i.e. from the
date of collecting the data, as follows –

i) Savings on existing functions - Rs. 2,66,000/-
ii) Additional services - Rs. 2,28,000/-
iii) Research workers' time saved - Rs. 3,00,000/-

Total Rs. 7,94,000/-

The services of a programmer, a supervisor (for hardware maintenance) and a data
entry operator will continue to be required. The annual cost of there would be
{(6,000 + 6,000 + 3,000) x 12} = Rs. 1,80,000/-

The net benefits, therefore, would be (Rs. 7,94,000 – 1,80,000) Rs. 6,14,000/- It
can be said that a very conservative estimate benefits on measurable factors of
library services work out to the extent of Rs., 6,14,000/- per year on the
investment of Rs. 17,39,000. Taking 10-20% positive or negative it can be said
that the minimum savings/benefits will be of Rs. 6,00,000/- per year.

In addition to the above tangible benefits, the automation also has following
intangible or psychological benefits –

i) Mental fatigue that is caused due to literature search is saved for many
readers and the library staff.
ii) The relief from physical fatigue of standing and consulting the catalogue is another advantage.

iii) The status consciousness which is ever existing in the minds of library staff at different levels and which proves to be an obstacle in the healthy functioning of total library activity gradually fades away as the use of computers increases.

iv) The entire system is highly disciplined and regulated. A slightest diversion can not simply be tolerated by computers. This influences the behaviour of the staff as well as readers in the library and has a favourable effect on the total working and service environment.

v) The cleanliness that goes with the sophisticated machinery leads to the pleasant environment in the library.

vi) The level of accuracy is very high which surely affects the quality of output of parent organisation.

The library of IIT, Madras could not provide the costs of computerisation, but considering the costs of hardware and software in other IITs it can be estimated to about lacs. This library also failed to specify the savings on staff but reported that only 03 staff is managing all jobs of Acquisition and only 03 the work of Technical Processing Section, hence it is evident that computerisation has resulted a saving of atleast 50% staff i.e. 06 staff members. Similarly 06 persons are working in Periodical section and 02 in Reference section which shows economy in staff taking into account the quantum of work. Since the circulation system is not computerised i.e. work is in progress they require 09 staff members to work in two shifts. Under present circumstances on a saving of 06 staff members the
tangible benefits comes to about Rs. 3 lacs per annum. The other intangible benefits mentioned in case of IIT, Bombay remain all the more same.

The library of IIT, Kharagpur have reported that though the computer was installed in the year 1994 but till the year 2000 the work of computerisation was in progress and so the costs could not be calculated. However, the library has developed OPAC facility of searching electronic databases on CD-ROM and Hard Disk and electronic SDI service to faculty (monthly) which has its tangible benefits i.e. savings on hours of searching information and references by users and library staff and intangible benefits i.e. satisfaction of users and accuracy in services. The automation has made it possible to provide users with the facilities of Internet, Ernet and LAN which has its own benefits as discussed earlier.

The library of IIT, Delhi reported that costs have not been worked out exactly but it is nearly 18 lacs on hardware and software. The benefits in terms of savings on staff or time involved in each and every activity have also not been calculated. But the improvement in services and introduction of new facilities are observed clearly after computerisation which are obviously intangible benefits. The benefits of computerisation include access to about 1400 electronics journals in full text. This results saving of space, staff and money as compared to subscribing hard copies of the same 1400 titles of the journals. The library offers very exhaustive and fast information services using 12 CD-ROM databases. The OPAC of the library is operational on Internet and Intranet and is accessible to users from all comers of the campus. The library has developed 4 separate databases, one of serials, one of text books, one for book bank collection and one for Ph.D. theses available in the central library. Under computerised services the library developed web-based digitized collection for distant and continuing education in Information Technology. The online directory of courseware is also available on Internet. It
also Developed and maintained Institute's web page. Library House Page offers the following information/services –

a) Guide to the central library, b) Collections and library services, c) Library layouts and floor plans, d) Library hours and membership, e) Computerisation Programme, f) Network connections, g) Web-based Library OPAC, h) Web-based on-line kardex of journals, i) TELNET to DELNET databases, j) Link to CD NET system on campus LAN, h) Recent Additions to the Book collections, l) Web-based access to full text e-journals etc. The introduction of all these services and facilities could be possible only due to computerisation and it is a great benefit.

The central library of IIT, Guwahati as compared to other IITs is being established lately i.e. in 1995 and has smaller collection and users. But is being computerised fully. The whole library automation system is initiated by the Computer Science Department and the costs are incorporated with the budget of institution therefore the library failed to give the details of hardware mentioned by them and LIBSYS software can be estimated to cost above Rs. 10 lacs. As for benefits are concerned, the total library operations are managed by 11 staff members who are trained to work with computers. The Book Acquisition Section Technical Processing Section, Periodical Section and circulation section each is managed by only 02 staff i.e. saving of atleast 50% staff. The library collection is available on LAN and the services are good. Thus it can be calculated that the intangible benefits are much more than the costs involved on computerisation.

The university of Roorkee is being declared as 7th IIT in 2001, though the university was established in 1847. The library started computerisation in 1997. The costs of hardware are included in the budget of the institution. However the cost of software TROODON 2-0 is being reported as 1.20 lacs. The subscription amount for connectivity to BSNL Networking facility is Rs. 7,350/- per annum.
The total recurring expenditure is reported as 1.72 lacs. The benefits accrued from computerisation are many. The users have on-line access to INFLIBNET and DELNET. They also get facility of INTERNET and Web OPAC service. The users can have access to the databases of library as well to the other remote databases. The library offers computerised lending services, Reference service, CD-ROM database services, contents pages services, Indexing and Abstracting services, current Awareness Services and Selective Dissemination of Information services etc.

5.8. Conclusion:

On the basis of above description it can be analysed that though the cost of computerisation is high i.e. ranging from 15 to 22 lacs as non-recurring and minimum Rs. 2 lacs as recurring for computerisation of almost all important work and services in a library like IIT which has a large number of users and a huge collection of varied nature. But the tangible benefits are also equivalent to Rs. 3 lacs or more per annum after subtracting recurring costs. Besides this the savings of mental fatigue to the users and staff, economy of time in providing efficient services, and above all a sense of satisfaction among the users and staff are intangible benefits. Finally it may be concluded that the computerisation is beneficial to the sizeable libraries like those of Indian Institutes of Technology.