
UNIT 4 SYSTEM IMPLEMENTATION

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4.0 INTRODUCTION

A crucial phase in the system life cycle is the successful implementation of the new system design. Implementation includes all those activities that take place to convert from the old system to the new one. The new system may be completely new, replacing an existing

manual or automated system or it may be major modification to an existing system. In either case, proper implementation becomes necessary so that a reliable system based on the requirements of the organisation can be provided. Successful implementation may not guarantee improvement in the organisation using the new system, but improper installation will prevent it. It has been observed that even the best system cannot show good result if the analysts managing the implementation do not attend to every important details. This is an area where the systems analysts need to work with utmost care.

This unit discusses the three aspects of implementation:

- Training personnel
- conversion procedures
- Post-implementation review

In each area, the particular elements of that aspect are discussed, along with the methods of handling each aspect efficiently and effectively.

4.1 OBJECTIVES

After completing this unit, you should be able to :

- understand the importance of training of personnel involved with system.
- get familiarity with various training methods conversion and operation plans.
- explain post implementation review.
- highlights various issues involved in system maintenance and designing of computer contract.
- get proper understanding about various factors for hardware/software acquisition and vendor's selection.
- understand the importance of service bureau and financing use of computers.

4.2 TRAINING OF PERSONNEL INVOLVED WITH SYSTEM

Even well designed system can succeed or fail because of the way they are operated and used. Therefore, the quality of training received by the personnel involved with the system in various capacities helps or hinders and may even prevent the successful implementation of management information system. Those who are directly or indirectly related with the system development work must know in detail what their roles will be, how they can make efficient use of the system and what the system will or will not do for them. Both systems operators and users need training.

4.2.1 Systems Operators Training

Running of the system successfully depend on the personnel working in the computer centre. They are responsible for providing the necessary support. Their training must ensure that they are able to handle all possible operations, both routine and extra-ordinary in nature.

If the system calls for the installation of new equipment, such as a new computer system, special terminals or different data entry machines, the operators' training should include such fundamentals as how to turn the equipment on and use it, how to power off and a knowledge of what constitutes normal operation. The operators should also be trained on different type of malfunctioning, how to recognise them and what steps should be taken whenever they arise. As part of their training, operators should be given both a troubleshooting list that identifies possible problems and remedies for them, as well as the names and telephone numbers of individuals to contact when unexpected or unusual problems arise. Training also involves familiarisation with run procedures, which involves working through the sequence of activities needed to use a new system on an ongoing basis.

4.2.2 User Training

User may be trained on use of equipment, particularly in the case where, for example, a

micro-computer is in use and the individual involved is both operator and user. In such cases, user must be given training on how to operate the system also. Questions that may be trivial to the analyst, such as how to turn on a terminal, how to insert a diskette into a micro-computer, or when it is safe to turn off equipment without danger of data loss, are significant problems to new users who are not familiar with computers.

In most of the cases, user training deals with the operation of the system itself, with proper attention given to data handling techniques. It is imperative that users be properly trained in methods of entering transactions, editing data, formulating inquiries, deleting and inserting of records. No training is complete without familiarising users with simple systems maintenance activities. Weakness in any aspect of training may lead to awkward situations that create user frustration and errors.

4.3 TRAINING METHODS

Training of operators and users can be organised in several different ways. Most important are :

- (i) Vendor and in-service training
- (ii) In-house training

4.3.1 Vendor and hi-service Training

Often the best source of training on equipment is the vendor who supplies the equipment. Most vendors offer extensive educational programs as part of their services. For example, IBM offers complimentary two or three days short-term courses to purchasers of many of their mini and mainframes. The courses, offered by experienced trainers and sales personnel, cover all aspects of using the equipment, from how to turn it on and off, to the storage and retrieval of data. One session is kept for hands-on training also so that the participants can freely use the system in the presence of the trainers.

If special software such as teleprocessing package or database management system is being installed, sending personnel to off-site short term courses providing in-depth training is preferable to in-service training. These courses, which are generally provided by charging a fee, are presented to personnel from many organisations that are acquiring or using the same system. The benefit of sharing questions, problems and experiences with persons from other companies is substantial.

4.3.2 In-house Training

The main advantage of offering in-house training is that instruction can be tailored according to the requirements of the organisation. Often the vendors negotiate fees and charges that are more economical so that company can involve more personnel in the training program than is possible when travel is required. However, the disadvantage of distracting telephone calls, business emergencies and other interruptions must not be overlooked.

The other common approach is to evaluate by taking case-study example that contains all sort of frequently encountered situations that system is able to handle. Then the user must use the system to handle the actual situations; that is, enter data as required, process the data and prepare the desired reports.

Although high-quality training is an essential step in systems implementation, yet it is not sufficient by itself.

4.4 CONVERSION METHODS

Conversion is the process of changing from the old system to the new one. It must be properly planned and executed. Four methods are common in use. They are: parallel systems, direct conversion, pilot system and systems phase-in. Each method should be considered in the light of the opportunities that it offers and problems that it may create. However, it may be possible that sometimes, we may be forced to apply one method over others, even though other methods may be more beneficial. In general, systems conversion should be accomplished in shortest possible time. Long conversion periods create problems for all persons involved including both analysts and users.

4.4.1 Parallel Systems

The most secure method of converting from an old to new system is to run both systems in parallel. Under this approach, users continue to operate the old system in the usual manner but they also start using the new system. This method is the safest one because it ensures that in case of any problems in using the new system, the organisation can still fall back to the old system without loss of time and money.

The disadvantages of the parallel systems approach are:

It doubles operating costs

The new system may not get fair trial.

4.4.2 Direct Conversion

This method converts from the old to the new system abruptly, sometimes over a weekend or even overnight. The old system is used until a planned conversion day, when it is replaced by the new system. There are no parallel activities. The organisation relies fully on the new system. The main disadvantages of this approach are: no other system to fall back on, if difficulties arise with new system. Secondly, wise and careful planning is required.

4.4.3 Pilot System

Pilot approach is often preferred in the case of the new system which involves new techniques or some drastic changes in organisation performance. In this method, a working version of the system is implemented in one part of the organisation, such as a single work area or department. The users in this area are aware that they are piloting a new system and that changes can be made to improve the system. Based on the feedback, changes are made and the system is installed in the remaining departments of the organisation, either all at once (direct conversion method) or gradually (phase-in method). This approach provides experience and live test before implementation.

4.4.4 Phase-in Method

This method is used when it is not possible to install a new system throughout an organisation all at once. The conversion of files, training of personnel or arrival of equipment may force the staging of the implementation over a period of time, ranging from weeks to months. It allows some users to take advantage of the new system early. Also it allows training and installation without unnecessary use of resources.

4.5 CONVERSION AND OPERATION PLANS

After the system conversion is completed using any one of the methods mentioned above, the conversion plan starts. In the conversion plan, all the activities that must occur to implement the new system are properly defined and put into operation. It identifies the persons responsible for each activity and includes a time schedule for each activity.

During the pre-implementation stages, when the conversion is being planned, analysts should prepare a list of all tasks, including the following:

- List all files of conversion
- Identify all data required to build new files during conversion
- List all new documents and procedures used during conversion
- Identify all controls to be made during conversion
- Assign responsibility for each task

Verify conversion schedules

The conversion plan should anticipate possible problems and methods for controlling them. The missing documents, mixed data formats between current and new files, errors in data translation and situations that were overlooked during systems development are the common problems. The conversion manager must guard against the omission of steps in the conversion. This manager is also responsible for reviewing conversion plans, verifying the delivery of equipment, software and preparing the site.

4.5.1 Site Preparation

A major aspect of conversion is the preparation of the systems site. Preparation activities include electrical and air-conditioning preparation, site layout and installation of the equipment. It is the best to have the site preparation completed prior to the arrival of the equipment, since vendors are not in favour of delivering the system if the construction work is going on.

If the system is micro-computer, little site preparation work is needed. However, the electric lines should be checked to ensure that they are free of static or power fluctuations. It is desirable to install a "clean" line that is not shared by any other equipment. Static electricity is very harmful for computers. Carpet should be avoided in the computer room. If carpet is necessary, it should be the anti-static type that will not allow static build-up.

The site layout should allow sufficient space for moving equipment in and setting it up for normal operation. Vendors will provide clearance requirements for performing service and maintenance and for air circulation. These requirements must be strictly adhered to or warranties can be voided and maintenance discontinued until specifications are met.

4.5.2 File and Data Conversion

Data and file preparation consumes a large proportion of conversion time. Not only must the data be converted to a format acceptable in the new system, but analysts must ensure that this is done without loss of detail or accuracy. By using record counts, financial controls and hash totals, analysts are able to detect correct problems quickly, before they get out of control, even if the conversion involves data transmission.

4.6 POST IMPLEMENTATION REVIEW.

After the system is implemented and conversion is complete, a review should be conducted to determine whether the system is meeting expectations and where improvements are needed. A post implementation review measures the systems' performance against pre-defined requirements. It determines how well the system continues to meet performance specifications. It also provides information to determine whether major re-design or modification is required.

A post-implementation review is an evaluation of a system in terms of the extent to which the system accomplishes stated objectives and actual project costs exceed initial estimates. It is usually a review of major problems that need converting and those that surfaced during the implementation phase.

The post implementation study begins with the review team, which gathers and reviews requests for evaluation. Unexpected change in the system that affects the user or system performance is a primary factor that prompts system review. Once request is filed, the user is asked how well the system is functioning to specifications or how well the measured benefits have been realised. Suggestions regarding changes and improvements are also asked for.

Check Your Progress 1

1. List out the various training methods for imparting training to operators and users.

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2. List out the four methods of system conversion.

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3. Explain the importance of post implementation review briefly.

4.7 REVIEW PLAN

The review team prepares a formal review plan around the objectives of the review, the type of evaluation to be carried out and the time schedule required. An overall plan covers the following areas:

- (i) Administrative Plan: Review area objectives, operating costs, actual operating performance and benefits.
- (ii) Personnel requirements Plan: Review performance objectives and training performance to data.
- (iii) Hardware Plan: Review performance specifications
- (iv) **Documentation** Review Plan: Review the system development effort.

The review not only assesses how well the current system is designed and implemented, but also is a valuable source of information that can be applied to the next systems project.

The review team prepares a formal review plan around the objectives of the review, the type of evaluation to be carried out and the time schedule required. The review plan cover the following areas:

- (i) Administrative Plan: The following two activities are reviewed under this plan:
 - (a) User Objective: This is an extremely critical area since it may be possible that over a period of time either the system does not meet the initial objectives of the user or the user objectives get changed as a result of changes in the overall objectives of the organisation, The results of the evaluation are documented for future reference.
 - (b) Operating Costs and Benefits: Under the administration plan, current budget designed to manipulate the costs and savings of the system is closely reviewed.
- (ii) Personnel Requirement Plan: Under this plan, all activities involving system personnel and staff members associated with the system are evaluated. After the plan is developed, the review group evaluates:
 - (a) Personnel performance objectives compared with current performance levels
 - (b) Training performance through testing, conducting interviews and other data gathering techniques.
- (iii) Hardware Plan: The hardware of the new system is also reviewed including terminals, CRT and communication network. The main target is a comparison of current performance specifications with design specifications. It also points out necessary modification to be made.
- (iv) Documentation Review Plan: The reason for review plan is to evaluate the accuracy and completeness of the documentation compiled to date and to its conformity with documentation standards established earlier.

4.8 SYSTEM MAINTENANCE

The last part of the system development life cycle is system maintenance which is actually the implementation of the post-implementation review plan. When systems are installed, they are generally used for long periods. The average life of a system is 4 to 6 years, with oldest application often in use for over 10 years. However, this period of use brings with it the need to continually maintain the system. Programmers/Analyst spend sufficient time for maintaining programs. The study on the maintenance requirement for the information system revealed that

- (a) 60-90 per cent of the overall cost of software during the life of a system is spent on maintenance.
- (b) In documented cases, the cost of maintenance, when measured on the basis of writing each instruction in coding form, is more than 50 times the cost of developing a system.
- (c) The software demand is increasing at faster rate than supply. Many programmers are devoting more time on systems maintenance than on new software development. There is a backlog of new development work.

The maintenance can be classified as corrective, adaption or perfective. Corrective maintenance means repairing, processing or performance failures or making alterations because of previously ill-defined problems.

Adaption maintenance means changing the program functions. Enhancing the performance or modifying the programs according to user's additional or changing needs are included in perfective maintenance. The greatest amount of maintenance work is for user enhancement and improved documentation of the system for better efficiency. More time and money are spent on perfective than on corrective and adaptive maintenance together.

Maintenance covers a wide range of activities including correcting coding and design errors, updating documentation and test data and upgrading user support. Many activities classified as maintenance actually fall under enhancements. Maintenance means restoring something to its original position. Unlike hardware, software does not wear out; it is corrected. In contrast, enhancement means adding, modifying or re-developing the code to support changes in the specifications. It is to keep with changing user needs and the operational environment.

The keys to reduce the need for maintenance while making it possible to carry on with essential tasks more efficiently are as follows:

- (a) More accurately defining the user's requirement during systems development.
- (b) Preparation of system documentation in a better way.
- (c) Using more effective ways for designing processing logic and communicating it to project team members.
- (d) Making better use of existing tools and techniques.
- (e) Managing the systems engineering process effectively.

An additional factor in the success of the maintenance programmer is the work environment. Maintenance programmers have generally been paid less amount and receive less recognition than other programmers. Little attention has been paid to their training and career plans within the MIS function. Maintenance demands more orientation and training than any other programming activities, especially for entry-level programmers. The environment must recognize the needs of the maintenance programmer for tools, methods and training.

4.9 DRAWING UP COMPUTER CONTRACT

Generally it is observed that vendors have their own standard form of contract which is prepared keeping in mind the interest of the vendor only. But during final discussion with the vendor, it can be negotiated to add, delete or modify certain clauses so that terms and conditions of the contract become reasonably equitable for both the sides.

The buyer just look into the following provisions in the contract to safeguard his interest.

4.9.1 Respective Responsibilities of Vendors and Buyers

The responsibilities and remedies available to the two sides in the event of non or faulty performance of the system should be clearly defined in the contract. The remedies include special remedies, damages (actual, consequential and liquidated) and specific performance. 'special remedies' may be invoked when the vendor fails to give the delivery on time or is found deficient at the time of carrying out acceptance tests. Alternatives to special remedies are claims for actual consequential and liquidated damages. 'Actual damages' compensate a party for the advantages lost in the actual bargain. 'consequential damages' compensate the parties in respect of all foreseeable losses because of breach of contract. 'Liquidated damages' fix a certain amount in the event of breach of contract condition. 'Specific performance' clauses are attracted when a system fails the acceptance tests because of memory storage. In this situation, buyer can ask for additional memory at nil or nominal cost within a specified time.

4.9.2 Documentation

The customer should have the right to stop payment if proper documentation required for the effective running of the system is not provided by the vendor.

4.9.3 Hardware

It is necessary that each component of the contracted hardware is identified and its performance criteria is clearly stated in normal operating condition.

4.9.4 Delivery and Acceptance

It should be clearly described about the delivery schedule and the acceptance test/standards to be met by the computer during normal operating conditions throughout a specific period of use.

4.9.5 Right of Use of Equipment from Other Vendors

The customer should have liberty to link peripherals from other manufacturers to the CPU. The vendor must have protection from any damage or extra costs resulting therefrom.

4.9.6 Warranties

Warranties should be included in the contract.

4.9.7 Guarantees

For assuring reliability of the system, guarantees should encompass the following points:

- minimum hours of usable time per day.
- mean-time-between failures (MTBF).
- maximum time to repair.

4.9.8 Payments

It should be clearly explained in the contract whether the rental/lease payments made by the customer are in respect of number of hours actually used per month/shift or they are to make at a flat monthly rate. In lease contracts, provision of buying the equipment at certain stipulated prices should also be kept.

The contract should provide the facility to protect the already negotiated prices. Also, if the vendor insists on escalation clauses, the customer should have the right to terminate the contract and recover compensation for costs incurred on preparation.

4.9.9 Bankruptcy

The contract should provide explicit protection to the customer in the event of the vendor becoming bankrupt.

It is fact that all the areas of problems and disputes between vendors and customers of

computer hardware cannot be covered in the contract. Still, the aforementioned check-lists try to cover the problems areas usually encountered.

4.10 HARDWARE ACQUISITIONS

Once a decision has been reached to install an in-house computing device, the next step is to prepare a list of specifications of the proposed system so that suitable vendors would be invited for meeting the specific requirements.

The tender specifications are prepared as per norms of approved feasibility report. Main technical parameters of the various units of the required hardware objectives of the project and implementation schedule are also included in the tender specifications. Vendors may also be asked to quote separately in respect of 'leasing' and 'buying' options. In addition to this, the vendors may be required to furnish the details of the infrastructure which the customer will have to arrange and the likely cost thereof.

4.10.1 Tender Evaluations

It is often seen that requirements as indicated by the customer do not match with the offer made by individual vendors where the specification given by the vendors are far below the essential requirements of the customers, such offers may be rejected straightway from the purview of short listing. Marginal shortfalls may be considered on merits. However, in case of additional features in the offers which could be categorised as 'desirable', it becomes necessary to assign appropriate weights to such features, in order to bring all the bids on equal footing. The additional features include quantifiable differences are:

- One time costs as well as in the continually running and maintenance costs.
- Equipment characteristics such as storage capacities, speeds of various units of computing device.
- In-built spare capacity as well as capability of the system to support additional peripherals.
- Additional support to be provided by the vendor.

4.10.2 Costing Factor

Cost consideration is quite important factor in computer acquisitions. Costs are of two types:

- (i) One-time costs such as cost of site preparation (space, false ceilings, special floorings, electrical fittings, air-conditioning etc.)
- (ii) Continued running and maintenance costs of the entire installations,

4.10.3 Equipment Characteristics

Hardware device which provides higher transfer rates (that is arrange number of bytes passing between various functional units per unit of time), or has large storage capacity or in case of printers, if the printed characters per line are quite high, then such additional characteristics get entitled to weightage to the extent of their practical utility to the buying organisation. Appropriate weightage can also be given to such characteristics as high mean-time-between-failures (MTBF), compatibility with the equipment, peripherals etc. available in the market.

4.10.4 Potential for Growth

Following features can be considered in this category:

- Potentiality of the system to grow beyond the currently specified capacity by adding on certain components,
- Potentiality of growth within a particular family of computer models,
- Capacity of the system to handle a large variety of peripherals,
- Ability of the system to handle additional workloads after considering the peak hour load.

4.10.5 Vendor Support

The features to be given weightage under the vendor support include:

- hardware maintenance facilities offered,
- training facilities provided
- assistance to be provided in software development
- back-up facilities provided by vendor in case of system failure
- comparative delivery periods offered by different vendors.

4.11 CRITERIA FOR VENDOR'S SELECTION

Mandatory requirement is that, if a vendor fails to meet them, he would be screened out without any reason. The desirable characteristics would surely be little bit difficult to evaluate because he may offer several alternatives in lieu of them. The criteria of vendor selection may be listed in descending order by importance as below:

4.11.1 Economic Factors

Cost comparisons

- Return on investment
- Acquisition method

4.11.2 Hardware Factors

- Hardware performance and its reliability
- Facilities for modularity
- Provision for back up facilities
- Firmness of delivery date
- Compatibility with existing systems
- Expandability

4.11.3 Software Factors

- Performance of software and its price
- Efficiency and reliability of available software
- Programming languages available
- Availability of well documented package programs
- Firmness of delivery date for a promised software
- Ease of use and modification as per user requirements
- Portability and its capacity to interface with the environment.

4.11.4 Service Factors

- Facilities provided by the manufacturer for detecting errors in the new programs
- Providing of good training facilities
- Assistance in software development and conversion facilities provided
- Maintenance terms and quality

4.11.5 Reputation of Manufacturer

- Financial stability
- Past history for keeping promises

These criteria may have to be further sub-divided particularly for hardware performance and support services.

4.12 ACQUISITION FOR PROPRIETARY SOFTWARE PACKAGES

Apart from few cases where software packages are developed by outside agencies as per requirement and at the expenses of the user organisation, the proprietary rights in the package remain with the original developer. This means that software package developed by outside agencies can only be licensed for use. The mode of payment for the purpose can be possible in one of the following ways:

- Off-the-shelf acquisition of programs stored in a floppy or in a plug-in ROM module. (These modes are quite popular in the case of software to be used on PCs).
- Acquisition of the right to use a package by means of a monthly/periodical licence fee.
- One-off payment for a fixed period.
- Lump-sum payment in the beginning and periodical service charges later on.

Some computer vendors are also interested to supply software packages along with the system and thus they form an integral part of computer operations. However, they like to charge a nominal fee for the use of such packages just to establish ownership.

4.12.1 Technical Aspect of Proprietary Software

While considering the acquisition of a proprietary software package, following technical characteristics must be taken into account:

Memory size	:	Amount of memory required when resident in the CPU.
Run time	:	Some programs may occupy lesser memory but much larger run times.
Adaptability	:	Ability to mix into a multi-programming environment and to utilise the existing resources such as peripherals, operating systems, various utility programs, etc.
File storage	:	File storage requirements and how efficiently it can store and retrieve data.
Modularity	:	A package with a high degree of modularity has the capacity to operate on various machine with different configurations.
Expandability	:	It emphasizes the sensitivity of a software package to handle an increased volume of transactions or to integrate with other programs.
Reliability	:	Significant reliability related aspects also include: <ul style="list-style-type: none"> • the extent to which a package can still be used when a particular module fails, • types of errors on the part of the user which affect performance of the packages, • ease of recovery in case of failure, • capability of the package to run on different configuration.
Efficiency	:	This aspect encompasses capability of the package to perform under peak load conditions. Efficiency of a package much depends on the language in which it is written and the operating system used.
Ease of Implementation	:	Implementation of an application package refers to all the associated activities and vendor support up to the point where the package satisfies users needs and the user can run it independently.
Usability	:	It refers to the effort required to operate, prepare the input and interpret the output of a program. Additional points to be considered are portability and understandability.
Vendor support	:	This is critically important in such areas as documentation, software, modification/enhancement/maintenance and educating the user staff at different levels-clerical, technical, operational and managerial.

Security : This refers to the in-built capability of the package to prevent unauthorised access to software and data and to maintain proper integrity of the system.

4.12.2 Approaches to Software Evaluation

For software evaluation, following approaches have been discussed:

- (a) **Benchmarking:** Benchmark is nothing but a sample program specially designed to evaluate the comparative performance of hardware or software.
- (b) Experience of **other** users: Vendors generally gives a list of users who are satisfied with their work. But it is advisable to seek the opinion independently from the existing users whose configuration and operational environment is closely identical.
- (c) Report of independent research organisation: Now-a-days many research organisations undertake project of evaluating the proprietary software offered by various software agencies. These evaluations are objective and comprehensive in nature. They publish the **report** at regular interval, The prospective buyer of a software package can have faith in their evaluation.

4.13 SERVICE BUREAUX

It has been observed that installing in-house computer is quite costly affair, Thus a small user faces the problem of justifying such a large amount in the initial stage and recurring expenditure later on. It may also be possible that he may not like to get involved in the setting up and staffing of a computer department until a few applications have shown results. For such a user, number of consulting and service bureaux exist that provide computer facilities to their clients on a **fee** basis. This service is available on an as-needed basis or on a continuing contract basis.

Large **number** of such service bureaux are functioning in our country. Quality of service rendered by these vary widely. Some bureaux are run by companies who have acquired a computer for meeting their own requirements and rent out the spare lime. Their rates are **low** but customer service is negligible. The user has to arrange for his own computer operator and related **computer stationery**. This type of bureaux is good for persons having knowledge of EDP and is available at a cheaper rate. On the other hand, some service bureaux provide everything such as computer operator, tapes and disks etc. Such **bureaux** are little bit expensive but they are customer oriented.

Alternatively, the user can entrust his **entire** job to a service bureau or **data** centre. The charges of such bureaux vary considerably depending on the responsibilities taken by them and the reputation of the firm. The charges are made up of the fixed cost for systems development work and also variable cost which depends on the volume of the data processed.

4.13.1 Advantages of Using Data Centres

The various advantages of using data centres instead of an in-house computer facility are given below:

- (i) The major benefit of using data centre is that they can make use of computer without spending large initial amount.
- (ii) It eliminates staff and management problems caused by the employment of a team of highly paid technical professionals in a rapidly changed field of computer.
- (iii) The small organisation can **utilise** the expertise knowledge of experienced and qualified staff of data centre in his data processing job which is not available within the organisation,
- (iv) There is no fear of **equipments** becoming obsolete.
- (v) The small organisation can get valuable experience of working on computer before deciding whether or not to install an in-house computer.

4.13.2 Disadvantages of Using Data Centre

- (i) Using data centre services relinquishes control of vital business data whereas in-house computer offers the possibility of strict security measure.
- (ii) Loss of control over the time taken to process data is suffered by an organisation due to data centre. Off-premise computer processing may be inconvenient.
- (iii) In using the data centre, staff members of the organisation are not getting familiarity with working on computers.
- (iv) Use of data centre makes the organisation dependent on a second party which is not aware of the need of the organisation.

4.14 FINANCING USE OF COMPUTERS

After deciding which computer to acquire, the basic configuration and a general plan for its expansion, a further decision has to be taken as how to finance the use of computers. There are three major approaches for financing the use of computers: renting, leasing or outright purchase. Determining which approach is appropriate depends on the characteristics and plans of the organisation at the time the acquisition is made. None of the above approaches have an edge over others. The features of each method of acquisition have been summarized in the following table:

Comparison of Computer Systems Financing Options

Method of Acquisition	Advantages	Disadvantages
Renting	Short-term commitment. High level of flexibility. Does not require cash up front.	Most expensive option. Little control of equipment change. All vendors are not in favour of renting.
Leasing	Pre-determined payments for fixed period. Does not require cash up front. Usually better service from vendor than under rental. Little risk of obsolescence.	More expensive than purchase. May have limitations on hours or equipment use.
Outright purchase	Least cost in the long run. Distinct tax advantages in case of profit-making firm. A business investment. Full control over equipment use.	Risk of obsolescence. Permanent commitment. Full responsibility for all types of problems. Immediate and more requirements as compared to other options.

4.14.1 Renting

The renting method is generally popular. Rent is paid for using the system on a short-term duration, generally from 1 to 12 months. It is paid on a monthly basis. Both the user and supplier have the option of cancelling the rental with advance notice, usually 30 or 60 days ahead of the termination date.

Because of short-term commitment, the renter (user) has lot of flexibility. The decision for purchasing a system can be delayed until financing is adequate. Flexibility can be particularly important when an organisation is experiencing planned rapid growth and will outgrow a specific system in a short period. Another advantage is that the user can obtain better maintainability, as the manufacturer is responsible for the maintenance of the equipment.

Rental is quite expensive as compared with other acquisition methods. Monthly payments are higher and the user organisation does not get any tax benefits, other than deduction of the monthly rental as a business expense.

4.14.2 Leasing

A lease is a commitment to use a system for a specific time, generally from three to seven years. Payments are pre-determined and do not change throughout the course of the lease. Depending on the terms of the lease, payments are monthly, quarterly, semi- annual or annual and include the cost of equipment service and maintenance. At the end of lease period, the lessor generally does not become the owner of equipment.

Leasing is less costly as compared with rental. Because of commitment for a longer duration, the supplier will generally provide better services and facilities to user. Leasing protects against technical obsolescence also.

No capital investment is required to lease a computer system. Leasing offers specific tax benefits. In addition to deducting the cost of the lease as a business expense, tax credits are sometimes available for the investment, which directly lowers the income tax a business pays.

4.14.3 Outright Purchase

The ownership of computers through outright purchase is the most common method of computer acquisition and is becoming popular as lease costs rise. In due course of time, the purchase option frequently costs the least, especially in the light of the tax benefit that can sometimes be achieved.

Under purchase, the user organisation takes little to the equipment. Of course, the money for the purchase must be taken from operating funds or borrowed. And, in a sense the user organisation is locked into the system it purchases, since changing to a different system is difficult problem.

The user organisation must arrange its own maintenance, either by engaging his own maintenance staff, of by entering into maintenance contract with the manufacturer. The former method involves stocking of components and all the associated attendant problems. In addition, if the equipment was financed, payment on the loan must be made periodically, the cash outflow still may be lower than with renting or leasing, depending on the terms arranged by the purchaser. In return for the outgoing cash, purchase offers some tax benefits also.

Check Your Progress 2

1. What do you know about system maintenance?
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2. What is the criteria for vendor's selection?
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3. List nut the different approaches for software evaluation
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4. What are the advantages of using Data Centres ?

5. What are the different ways for financing the use of computers:"

4.15 SUMMARY

This unit explains the significance of the implementation phase of the software development life cycle. Even though it occurs at the fag end of the life cycle, it can't be ignored because by doing so, all the efforts that has been put till the previous phase will become void. Each aspect of implementation i.e. training of personnel, converting the system and reviewing the system after implementation has a significant role to play in the successful implementation of the system.

4.16 MODEL ANSWERS

Check Your Progress 1

1. Training of operations and users can be organised in several different ways. Most important are:
 - (i) Vendor and in-service training
 - (ii) In-house training
2. Methods of system conversion are:
 - (i) Parallel system
 - (ii). Direct conversion
 - (iii) Pilot system
 - (iv) Phased-in method
3. Apost-implementationreview is an evaluation of a system in terms of the extent to which the system accomplishes stated objectives and actual project costs exceed initial estimates. It is usually a review of major problems that need converting and those that surfaced during the implementation phase.

Check Your Progress 2

1. The last part of the system development life cycle is system maintenance which is actually the implementation of the post-implementation review plan. Maintenance covers a wide range of activities including correcting coding and design errors, updating documentation and test data and upgrading user support.

2. The criteria of vendor selection may be as follows:
 - (i) Economic factors
 - (ii) Hardware factors
 - (iii) **Software** factors
 - (iv) Service factors
 - (v) Reputation of manufacturer
3. Different approaches for software evaluation are:
 - (i) Benchmarking
 - (ii) Experience of other users
 - (iii) Report of independent research organisation
4. Various advantages are:
 - (i) One can make use of computers without spending large initial amount.
 - (ii) Expert knowledge of **qualified** staff of **data** center can be utilised.
 - (iii) There are no fear of equipments becoming obsolete
 - (iv) It eliminates staff and management problems caused by employing highly paid technical professionals in a rapidly changed field of computer.
5. Different ways for financing the use of computers are:
 - (i) Renting
 - (ii) Leasing
 - (iii) Outright purchase

NOTES