iii. **Completeness problems.** Occasionally, an alternative is ignored that compromises the quality of the final choice. Moreover, the costs related tocost/benefit analysis may be on the high side or not enough costs may beconsidered to do a complete analysis.



CHECK YOUR PROGRESS

Q3: Fill up the blanks:

i) _____ compares costs of the current system and costs of the candidate systems.

ii) The main drawback in -_____ analysis is that it does not account for the time value of the money and does not discount future cash flow.

iii) _____ analysis keeps track of accumulated costs and revenues on a regular basis.



8.6 LET US SUM UP

- Data analysis is a prerequisite to cost/benefit analysis.
- From the analysis, the requirements for system design are identified and subsequently, alternative systems are evaluated.
- To estimate cost of a system, it is required to consider hardware, personnel, operating and supply costs.
- Cost/benefit analysis gives a picture of the various costs, benefits, and rules associated with each alternative system.
- Costs and benefits are classified as tangible or intangible, direct or indirect, fixed or variable.
- Tangible costs and benefits can be readily identified and measured. Costs which are known to exist but whose monetary value cannot be measured accurately.
- Once all financial data are identified, the analyst must select a method of evaluation.
- When the evaluation of the project is complete, the results are to be interpreted. This introduces in comparing actual results against a standard or the result of an alternative investment.

Summary

- Data analysis refers to a process of cleaning, transforming and modelling data in order to discover useful information for business decision-making.
- Data Analysis consists of Data Requirement Gathering, Data Collection, Data Cleaning, Data Analysis, Data Interpretation and Data Visualization phases.
- Types of Data Analysis are Text, Statistical, Diagnostic, Predictive, Prescriptive Analysis

Cost/ benefit analysis

It is a procedure that gives a picture of the various costs, benefits and rules associated with a system. In performing Cost benefit analysis (CBA), it is important to identify different factors associated with cost and benefit. Developing an IT application is considered an investment for an organization. However, after developing that application, it provides the organization with profits. Profits can be monetary or in the form of an improved working environment. However, it carries risks, because in some cases an estimate can be wrong. Cost benefit analysis helps to give management a picture of the costs, benefits and risks. It usually involves comparing alternate investments.

8.4 COST AND BENEFIT CATEGORIES

Cost/benefit determines the benefits and savings that are expected from the system and compares them with the expected costs. The cost of an information system involves the development cost and maintenance cost. The development costs are one-time investment whereas maintenance costs are recurring. The development cost is basically the costs incurred during the various stages of the system development.

In developing cost estimates, there are various cost factors/elements which include hardware, personnel, facility, operating, and supply costs. Hardware costs relate to the procurement of computer and peripherals. Personal costs relate to staff salaries and benefits as well as for those involved in developing the system. Operating costs are associated with the

day-to-day operation of the system: the amount relates to the number of shifts and efficiency of the operating staff. Supply costs are variable costs because these may increase with the increase use of paper, ribbons, disks, etc.

A system is expected to provide benefits to the stack holders. Benefit can be computed by subtracting costs from the total income. Benefit is accumulated either by increasing income, or decreasing costs, or by both. The system will provide some benefits also. Benefits can be tangible or intangible, direct or indirect. In cost benefit analysis, the first task is to identify each benefit and assign a monetary value to it. The two main benefits are improved performance and minimized processing costs.



CHECK YOUR PROGRESS

Q1: Choose the correct options from the followings:

i) Data Analysis is a process of _____.

A. cleaning

B. modelling

C. transforming

D. All of the above

ii) Data analysis is accomplished by _____ phases.

A. 5

B. 6

C. 7

D. 8

iii) Which of the following is called variable cost?

A. Personnel cost

B. Operating cost

C. Supply cost

D. None of these

when the payback period will be shorter. This method is easy to compute and allows two or more activities. This is calculated by dividing Overall cost outlay by annual cash return.

Break-even analysis

Break-even is the point where the cost of the candidate system and that of the current one are equal. This method compares costs of the current system and costs of the candidate systems. If the cost of candidate system exceeds the costs of existing system then it is called investment period. If the cost of candidate system is less than the existing system then it is called return period.

Cash flow analysis

Cash flow analysis is done to keep track of accumulated costs and revenues on a regular basis i.e. it collects detailed information about the flow of cash in the system. Some projects such as those carried out by computer and word processing applications produce revenues from an investment in computerised system.

Interpret results of the analysis and final action

When the evaluation of the project is complete, the results are to be interpreted. This introduces in comparing actual results against a standard or the result of an alternative investment. The interpretation stage and subsequent decision stage are subjective which needs judgment and intuition. After comparing, the final action is to select the best candidate system.

In summary, cost/benefit analysis is an important tool for evaluating projects rather than a replacement of the decision maker. However, this tool has some problems:

i. **Valuation problems.** Intangible costs and benefits are difficult to quantify and tangible costs are generally more noticeable than tangible benefits.

ii. **Distortion problems**. There are two ways of distorting the results of cost/benefit analysis. First one is the intentional favouritism of an alternative for political reasons and the second one is when data are incomplete or missing from the analysis.

i. Net benefit analysis
ii. Present value analysis
iii. Net present value
iv. Payback analysis
v. Break-even analysis
vi. Cash flow analysis

Net benefit analysis:

Net benefit analysis process subtracts total costs from total benefits and hence, it is quite easy to compute, easy to interpret and easy to present. The main disadvantage in this analysis is that it does not account for the time value of the money and does not discount future cash flow. However, the time value of money is most important in evaluation process which is usually expressed in the form of interest on the funds to obtain the future value.

Present value analysis:

Present value analysis calculates the costs and benefits of the system in terms of today's value of the investment and compares with all alternatives. A critical factor to consider in computing present value is a discount rate equivalent to the forgone amount that the money could earn if it were invested in a different project.

The formula for finding present value analysis is

$$P=F/(1+i)^n$$

Where P indicates present value of investment, F refers to future value of an investment , i implies interest rate and n indicates number of years.

Net present value:

The net present value is computed by subtracting discounted costs from discounted benefits. This value is relatively easy to calculate and accounts for the time value of money. This value is expressed as a percentage of the investment.

Payback analysis

The payback analysis is an ideal measure of the relative time value of a project. It determines the time it takes for the accumulated benefits equal to the initial investment. It is obviously clear that a profit can be realized sooner

8.5 PROCEDURE FOR COST/BENEFIT DETERMINATION

There exists a difference between expenditure and investment. We usually spend to get something, but we invest to realize a return on the investment. Designing a computer-based system is considered an investment. Costs are incurred throughout its system development life cycle. In contrast, benefits are observed in the form of reduced operating costs, improved corporate image, staff efficiency, or revenues. The basic function of cost / benefit analysis is to what extent benefits outweigh costs.

Cost/benefit analysis gives a picture of the various costs, benefits and rules associated with a system. The costs and benefits can be determined by maintaining the following steps:

1. By Identifying the costs and benefits pertaining to given project.
2. Classifying the various costs and benefits for analysis.
3. Selecting a method of evaluation.
4. Interpreting the results of the analysis.
5. Taking an action.

Costs and benefits identification

There are two types of identification: easily identifiable and non-identifiable. In easily identifiable, the costs and benefits can easily be identified, such as direct cost towards the price of a hard disk can be identified from company invoice payments. Again, direct benefits often associate to direct costs, especially savings from decreasing costs in questioning activity. In the second type, the costs and benefits are not easily identifiable. An example of this type is the opportunity costs and opportunity benefits. These are the costs or benefits forgone by selectingone alternative over another one. They are not visible in the organization accounts and therefore they are not easy to identify.

Classifications of Costs and Benefits

Costs and benefits can be categorized as:

Tangible or Intangible Costs and Benefits

The cost and benefits which can be measured are called tangible. An outlay of cash for a specific item is known as a tangible cost. Hardware costs, salaries for human resources, software cost are all tangible costs. They are readily identified and measured. The purchase of hardware or software, personnel training, and employee salaries are example of tangible costs. On the other hand, costs which are known to exist but whose value cannot be measured are referred to as intangible costs. The cost of breakdown of an online system during banking hours is an example of intangible cost. Employee morale issues caused by a new system are called intangible costs.

Benefits may also be categorised into tangible or intangible classes. Like costs, they are often difficult to specify accurately. Completing jobs in less hours, producing reports without any errors are examples of tangible benefits which are quantifiable. More customer satisfaction, improved company status, etc are all intangible benefits. Both tangible and intangible costs and benefits should be considered in the evaluation process. Although management often tends to ignore intangibles, but according to Oxenfeldt, considering a zero value on intangible benefits is wrong and outcome of the evaluation may be quite different.

Direct or Indirect Costs and Benefits

From the cost accounting point of view, the costs are treated as either direct or indirect. Direct costs are having money value associated with a project. They are directly applied to the operation. Purchasing of a box of DVDs for Rs. 200/- is considered direct costs. Direct benefits are also attributable to a given project. For example, if the proposed system that can handle more transactions say 25% more than the present system then it is direct benefit.

Indirect costs are attributed from the operations that are not directly associated with a given system or activity. Insurance, maintenance, heat, light, air conditioning are all indirect costs. These are also termed as overhead. Indirect benefits are realised as a by-product of another activity or system. Direct and indirect costs/benefits can be identified for tangible costs and benefits respectively.

Fixed or Variable Costs and Benefits

Some costs and benefits are fixed regardless of how well a system is used. Fixed costs which are also known as sunk costs don't change. Once encountered, they will not recur. Depreciation of hardware, Insurance, etc. are all fixed costs. In contrast, variable costs are incurred on regular basis (weekly or monthly). Recurring period may be weekly or monthly depending upon the system. They are proportional to the work volume and continue as long as system is in operation.

Fixed benefits are also constant. For example, a decrease in the number of human resources by say 25% by virtue of the use of computer system may incur a fixed benefit. On the other hand, variable benefits are realized on a regular basis. Benefits are improved performance and minimized processing costs.



CHECK YOUR PROGRESS

Q2: Choose the correct options from the followings:

i) Benefits are realised in the form of _____.
   A. operating costs
   B. improved corporate image
   C. staff efficiency
   D. All of the above

ii) Which of the following is an example of tangible cost?
   A. Employees morale issues
   B. Employees salary
   C. Depreciation of hardware
   D. None of these

Select evaluation method

Once all financial data are identified and broken down into cost categories, the system analyst must proceed to the next step to select a method of evaluation. Although many evaluation methods are proposed, but the commonly employed methods are: