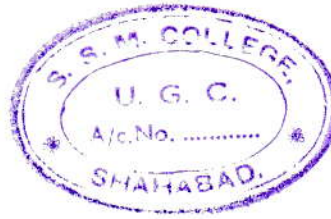


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# Information and Management

## Learning Goals

*In this chapter we will learn:*

1. The distinction between data and information.
2. Basis for the classification of information as strategic, tactical and operational.
3. Division of management into specific functions and within functions into specific hierarchical levels.
4. Information needs at each of the functional and hierarchical levels of management.
5. The desirable attributes of information.

Everyone in his or her day-to-day work gathers and processes data. For example, when a housewife buys milk every morning, she writes in a notebook the number of litres she bought. At the end of the month she adds the data (litres of milk bought per day) in the notebook and multiplies it by the price per litre. The result is the information she uses to pay the milkman. The data on milk purchased each day may be processed in other ways too to obtain different information. For example, if the total milk bought in a month is divided by the number of members in the family, it gives information on average milk consumption per head. If the total monthly expense on milk is divided by the monthly income of the family, it gives information on proportion of income spent on milk. The main point is that *data and information are not the same*. Data is the raw material with which we start. Information is processed data which is used to trigger certain actions or gain better understanding of what the data implies. In this example the knowledge of percentage of family income spent on milk may be used by the family to manage their family budget in a more efficient manner.

As is seen above, data is the raw material with which we begin. Information is the finished product. Collecting data costs money. For example, if we want to survey the preferences of consumers regarding some products, then someone has to go out, interview prospective customers and collect data. As the number of people interviewed increases, the cost of data collected increases. This data by itself is useless unless it is processed to

obtain information which can be used to arrive at marketing decisions. This information is extremely valuable. As data collection costs money in proportion to its volume, it is essential to gather data carefully. One must collect only necessary data and not redundant data.

Figure 1.1 shows that information from process 1 becomes data for process 2. Thus we must not assume that there is always a clear distinction between data and information. The main point is that mere facts and figures about activities do not enable decisions to be made or actions to be initiated. For example, the marks obtained by students in a class, by themselves, do not give any immediate idea about the class performance. By processing this data, a bar chart may be obtained which gives the number of students with marks between 100 and 90, 90 and 80, 80 and 70, etc. Such a chart gives a teacher at a glance the performance of the class and enables him to initiate appropriate action.

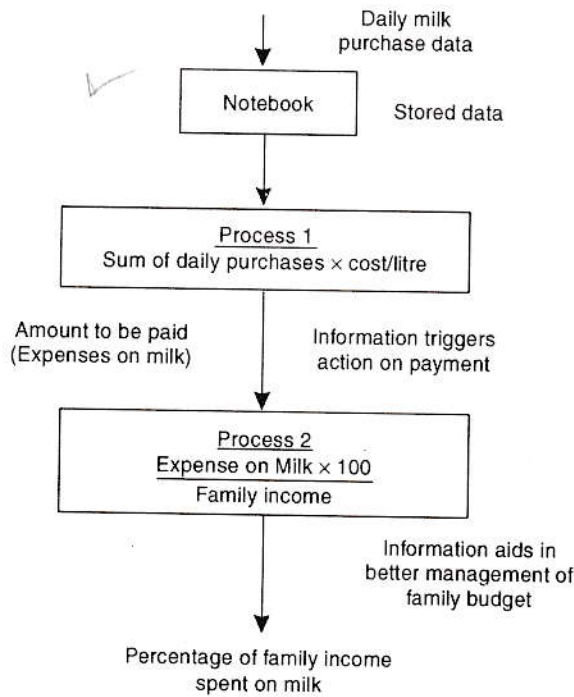


Fig. 1.1 Concepts of data and information.

Arithmetic operations are not the only operations used to process data. Many of the data processing operations are non-numeric. For example, arranging students' names in alphabetic order, with last name first, uses sorting and character manipulation operations.

### 1.1 TYPES OF INFORMATION

We saw that data is processed to obtain information. Further, the same data may be processed in different ways to obtain different types of information. A fair amount of data is processed manually, particularly when the organization is small and the amount of data to be processed is small. Take, for example, a small retail grocery store owner. In

order to run his business would like to know:

1. Which items in
2. Which items are
3. Which items are perhaps not so
4. Which bills sent
5. Which wholesaler
6. How much is the
7. Profit and loss

The above list is indicative of information on his income of items sold and tax needs to run his own business. When the size of the store is small, all the above information is needed. When the size of the store is large, more clerks. The information is categorized into the following categories:

(i) Strategic Information: This type of information is used for long-term decisions and directing the course of the business. It helps to decide whether to expand or contract, whether to work on a new product, etc. Such information can be obtained through advertising etc. This type of information is used in strategic decisions.

(ii) Tactical Information: This type of information is used for short-term decisions to run the business. It helps in moving items, giving discounts, etc. This type of information is used in tactical decisions.

(iii) Operational Information: This type of information is used for day-to-day operations of a business. It helps in particular day would be unpaid bills beyond due date. This type of information is usually easy to obtain and is of a large volume of such information.

(iv) Statutory information: This type of information is required by law.



order to run his business efficiently he would need different types of information. He would like to know:

1. Which items in his store are about to be exhausted and need to be re-ordered,
2. Which items are sold fast so that he can order more and keep them well stocked.
3. Which items are not sold so that he can dispose them off at discounted price and perhaps not stock them in future,
4. Which bills sent to customers remain unpaid beyond due date.
5. Which wholesale merchants are <sup>reliable</sup> suppliers at competitive prices.
6. How much is the daily sale and trends in sales.
7. Profit and loss account at the end of the year.

The above list is indicative and not exhaustive. A store owner is required by law to send information on his income and profit to the income tax office; on his sales, and details of items sold and tax collected to sales tax office, etc., in addition to the information he needs to run his own business. As long as his store is small and his volume of sales is small, all the above information may be obtained by manually processing available data. When the size of the store increases, it may still be done manually by employing one or more clerks. The information required by the store owner may be classified into the following categories:

(i) **Strategic Information.** This is the information needed for long range planning and directing the course the business should take. The store owner may like, for example, to decide whether to expand his business by stocking new varieties of items in his store, whether to work on a small profit margin to expand sales, whether to open a new branch etc. Such information cannot be obtained by mere clerical processing of data. He has to obtain information on trends, effect of reduction in price of some items, impact of advertising etc. This type of information is less structured. Further, the volume of important information in strategic planning is small and is difficult to obtain.

(ii) **Tactical Information.** This type of information is needed to take short range decisions to run the business efficiently. For instance, the information on fast and slow moving items may be used to take the tactical decision to stock more of the former and give discount on the latter. Information on the payments of bills by customers may be used to decide appropriate credit limits to be given to customers. Tactical information requires specifically designed processing of data. Most of it is obtainable easily from day-to-day collection of routine data unlike strategic information. Further, the volume of tactical data is more than strategic data.

(iii) **Operational information.** This type of information is needed for day-to-day operations of a business organization. For instance, the list of items out of stock on a particular day would be used to trigger the action of ordering them. List of customers' unpaid bills beyond due date would be used to send reminders. Operational information is usually easy to obtain by straightforward clerical processing of data. Further, the volume of such information is much more than tactical information.

(iv) **Statutory information.** Information and reports which are required by law to be /



sent to government authorities are normally clearly specified and require straightforward processing of data.)

In Table 1.1 we summarize the points made so far. The main point to note is that strategic information which is most important for long range growth of an organization is difficult to quantify and process from available data and consequently its volume is small. Operational information, on the other hand, is easy to process from available data and also more voluminous. Tactical and operational information are essential for efficient day-to-day operations of an organization whereas strategic information is vital for its long range well-being and growth.

**Table 1.1** Information Needs in Managing a Retail Store

Type	Examples	Manager
Strategic unstructured	Should new branches be opened? Should the business be diversified?	Chief Executive
Tactical	How to rate vendors? Should credit limits of customers be changed? How much of each item should be stocked? How much should be re-ordered and from whom? Should new discount policies be introduced?	Middle Level Managers
Operational	List of items to be reordered List of defaulting customers Excess or deficient supply by vendors. List of late supplies by vendors. List of outstanding bills to be paid. Daily ledger accounts.	Line Managers

**1.2 WHY DO WE NEED A COMPUTER-BASED INFORMATION SYSTEM?**

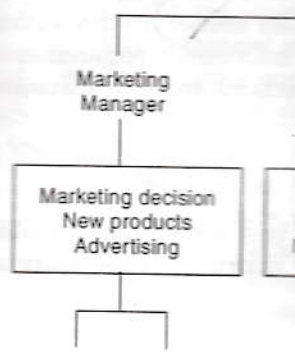
As long as organizations are small and have limited operational goals manual information systems are satisfactory. Many trends in the development of industry and commerce have made computer-based information systems essential to efficiently run organizations. These are:

- The size of organizations is becoming larger. This is particularly true in India due to increase in population and rapid rate of industrial development.
- Computer-based processing enables the same data to be processed in many ways, based on needs, thereby allowing managers to look at the performance of an organization from different angles.
- As the volume of data has increased and the variety of information and their timeliness is now of great importance, computer-based information processing has now become essential for efficiently managing organizations.
- Organizations are now distributed with many branches.
- Markets are becoming competitive. To maintain favourable balance of payments in a country, organizations have to be internationally competitive.

• The general socio information. His regulations have other interested groups, financial All the above developments and presented information

**1.3 MANAGEMENT STRUCTURE**

The store owner of our example is a set of distinct functions. As long as the salesman. As long as the all the above functions. responsibility to specialis functioning.) In Fig. 1.2 we give the of each function is known



**Fig. 1.2** Fun

the Chief Executive who is will, in turn, have many as They are known as line man in Fig. 1.3. In this pyramid require strategic information perform their function and would require operational hierarchy he receives summ analysis of basic data is re

- The general socio-economic environment demands more up to date and accurate information. Human society is changing faster than ever before. Governmental regulations have become complex. Organizations have to interact with many other interested parties such as consumer groups, environmental protection groups, financial institutions, etc.) which did not exist before.

All the above developments demand decision making based on up to date, well analyzed and presented information rather than thumb rules and hunches of an earlier era.

### 1.3 MANAGEMENT STRUCTURE

The store owner of our example, besides using different types of information, also performs a set of distinct functions. He works as a purchaser, storekeeper, accountant, and salesman. As long as the business is small it may be possible for one person to do all the above functions. As the business grows it becomes essential to delegate responsibility to specialists in each area and make them accountable for their efficient functioning.

In Fig. 1.2 we give the typical functions of managers of each category. The manager of each function is known as a middle level manager. Middle level managers report to

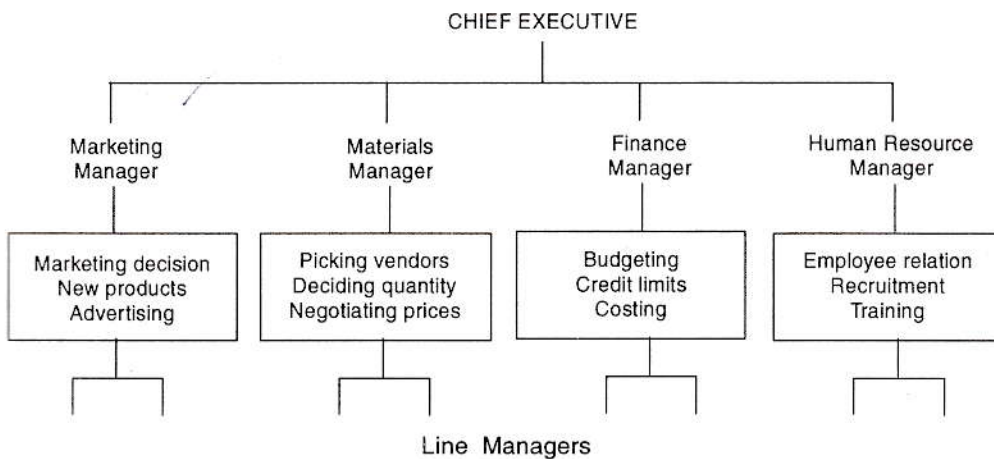


Fig. 1.2 Functional responsibilities in a management system.

the Chief Executive who is overall in charge of the organization! The middle level managers will, in turn, have many assistants who are responsible for specific day-to-day operations. They are known as *line managers*. The management structure is thus a pyramid as shown in Fig. 1.3. In this pyramid the Chief Executive, being overall in charge of policy, will require strategic information. The middle level managers require tactical information to perform their function and the line managers being responsible for day-to-day operations would require operational information. Thus we see that as a manager rises higher in the hierarchy he receives summarized information which is also less structured. More complex analysis of basic data is required as we go up in the hierarchy.



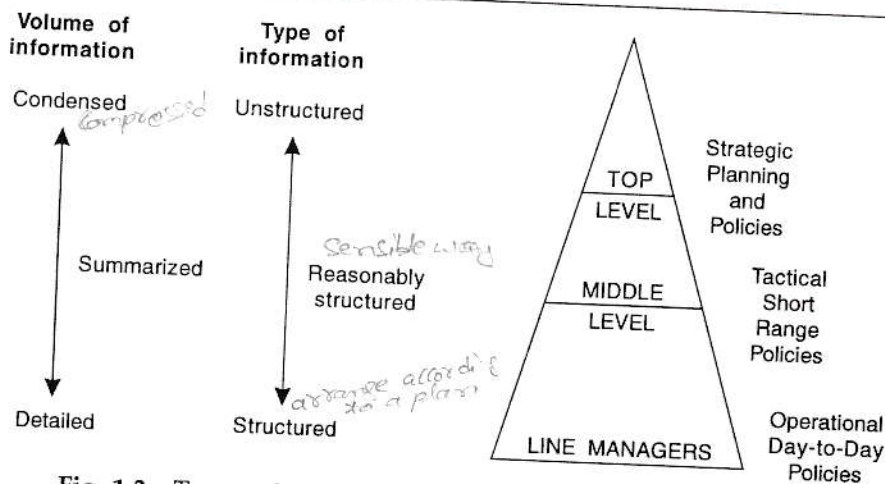


Fig. 1.3 Types of information needed to manage an organization.

### 1.4 MANAGEMENT AND INFORMATION REQUIREMENTS

We saw in Section 1.3 that overall management of an organization would involve many different functions. (The functions would depend on the type of organization. Many functions are, however, common to most organizations. For effective management of each function, specific strategic, tactical and operational information are needed.) In this section we discuss the major goals of some important functions and their information requirements. The information requirements identified in the following subsections are not exhaustive but only indicative.)

#### 1.4.1 Human Resource Management

The major goal of human resource management is to make best use of the available human resources in the organization. To attain this goal, the information necessary at various levels of management is as follows:

(i) **Strategic information**

- Long range human resource requirements at different levels.
- Policies on wages and incentives such as stock options *Compensation*
- Policies on human resource development and training
- Policies on personnel welfare and facilities.

(ii) **Tactical information**

- Performance appraisal
- Demographic make-up of personnel and its impact on retirement
- Production incentives and relation to productivity
- *Human Resources* Morale of personnel *confidence*
- Absentee reduction
- Leave and overtime policies
- Personnel deployment policies.

- (iii) **Operational information**
- Routine assessments
  - Skills inventory
  - Loans/advances
  - Leave record,

#### 1.4.2 Production Management

The goal of production management is to manage the flow of materials to maximize productivity. The following types of information are needed:

- (i) **Strategic**
- Yearly and monthly production targets
  - Policies on machinery and equipment
  - Information on the availability of raw materials
  - Identifying best production methods

- (ii) **Tactical**
- Identifying and controlling inventories
  - Identifying critical production areas
  - Identifying alternative production methods and personnel available
  - Performance measurement (and failure) to detect bottlenecks

- (iii) **Operational**
- Monitoring up to date production progress
  - detecting likely shortages
  - Scheduling better production methods
  - Preventive maintenance
  - Monitoring tools, materials and equipment

#### 1.4.3 Materials Management

The main goal of materials management is to manage the flow of materials through the organization and to keep inventory levels low. The following types of information are needed:

- (i) **Strategic**
- Developing vendor relationships
  - Determining optimum inventory levels
  - Determining proper inventory control systems
  - Reducing varieties of materials

- (ii) **Tactical**
- Developing vendor relationships
  - Determining the impact of design changes and

**(iii) Operational information**

- Routine assessment,
- Skills inventory . *experience, ability to meet certain company goals.*
- Loans/advances and recoveries .
- Leave record, )

**1.4.2 Production Management**

The goal of production management is to optimally deploy human resources, machines and materials to maximize production of goods by the organization. To attain this goal the following types of information would be needed:

**(i) Strategic**

- Yearly and monthly production quotas and alternate schedules .
- Policies on machine replacement, *augmentation, and modernization*
- Information on the introduction of new production technologies .
- Identifying best product mix.

**(ii) Tactical**

- Identifying and controlling areas of high cost such as work in progress inventories
- ✓ Identifying critical bottlenecks in production,
- ✓ Identifying alternate production schedules based on tools, machines, material, and personnel availability
- ✓ Performance measures of machines (breakdown histories and cost of repair and failure) to decide on replacement.

**(iii) Operational**

- Monitoring up to date production information by examining assemblies, detecting likely shortages and giving early warning
- ✓ Scheduling better production dynamically
- ✓ Preventive maintenance schedules of machines
- ✓ Monitoring tools, machines, and human resource availability.)

**1.4.3 Materials Management**

The main goal of materials management is to have readily available materials needed by the organization and to keep optimal levels of stock of items. To achieve this goal the following types of information would be needed:

**(i) Strategic**

- Developing vendors for critical items.
- Determining optimal levels of inventory
- Determining proportion of material to be ordered from different vendors
- Reducing varieties of inventory.

**(ii) Tactical**

- Developing vendor performance measures
- Determining the impact on material cost, availability and procurement with design changes and new product introduction



- Determining optimal reorder levels
- Controlling high value inventory.

(iii) Operational

- Goods received, rejected and issued
- List of excess and deficient items received
- List of items rejected
- Critical items received
- Backlog of supplies
- Stores in transit and in inspection
- Value of inventory in hand.

1.4.4 Finance Management

The main goal of this function is to ensure financial viability of the organization, enforce financial discipline and plan and monitor the budget. The various levels of information required to meet these goals are as follows:

(i) Strategic

- Methods of financing
- Pricing policies
- Tax planning.

(ii) Tactical

- Variance between budget and expenses
- Large outstanding payments/receipts
- Credit and payment status
- Cost increases and pricing
- Impact of taxation on pricing.

(iii) Operational *regular interval*

- Periodic financial reports
- Budget status to all functional managers
- Tax returns
- Share registration and transfers
- Profit and loss account
- Payments and receipts
- Payroll, provident fund accounts
- Calculation of direct costs-overheads-standard cost.)

1.4.5 Marketing Management

The goal of this function is to maximize sales and ensure customer satisfaction. To attain this goal the various types of information needed are:

(i) Strategic

- Search for new markets and marketing strategies
- Analysis of competitors' strategy
- Technology and demographic forecasts and product changes.

(ii) Tactical

- Advertising
- Customer pr
- Correlation
- Sales force d
- Exploring ab

(iii) Operational

- Sales analysis
- Sales target v
- Market share
- Seasonal vari
- Effect of mod
- Performance
- Costs of sales

1.4.6 Research, Design

The goal of this function is to ensure financial viability of the organization, enforce financial discipline and plan and monitor the budget. The various levels of information required to meet these goals are as follows:

(i) Strategic

- Which product
- What type of in
- What long ran
- What technical
- What areas wo

(ii) Tactical

- Setting interme
- Checking avail
- Determining pr
- Deployment of
- Information on groups.

(iii) Operational

- Progress agains
- Budgeted expen
- Status of outstar

1.5 QUALITIES OF INFO

In the previous section we saw the various types of information needed are: levels. We will now discuss

- The information mu and that of the proce is accurate. Incorre



**(ii) Tactical**

- Advertising techniques and analysis of their impact
- Customer preference surveys
- Correlation of prices and sales
- Sales force deployment and targets
- Exploring alternate marketing channels. Timing of special sales campaigns.

**(iii) Operational**

- Sales analysis by regions, customer class, sales persons
- Sales target versus achievement
- Market share and trends
- Seasonal variations
- Effect of model changes
- Performance of sales outlets
- Costs of sales campaigns and benefit.)

**1.4.6 Research, Design and Development Management**

The goal of this function is to continuously improve existing products and develop new products and processes. To attain this goal following types of information are needed:

**(i) Strategic**

- Which products are to be developed?
- What type of improvements are required?
- What long range research is most promising?
- What technical collaboration would be appropriate?
- What areas would require new human resource inputs?

**(ii) Tactical**

- Setting intermediate goals for projects and assess progress
- Checking availability of equipment and appropriate selection
- Determining proportion of resources to be allocated to various parts of a project
- Deployment of personnel to projects based on talent and performance
- Information on similar and related research projects undertaken by other groups.

**(iii) Operational**

- Progress against goals
- Budgeted expenses versus actuals
- Status of outstanding orders for equipment and components.)

**1.5 QUALITIES OF INFORMATION**

In the previous section we saw the nature of information managers need at various functional levels. We will now discuss (the qualities of the information) to be provided to managers.

- The information must be *accurate*. In other words, the correctness of the input data and that of the processing rules should be ensured so that the resulting information is accurate. Incorrect information is worse than no information.

bad

- The information should be *complete*. That is, it should include all data and not exclude some. *honest or truthful*
- It should also be *trustworthy*. The processing should not hide some vital information which may, for example, point out the inefficiency of some individuals. *need essential*
- The information should be *timely*. It should be given to the manager when he needs it. Delayed information may sometimes be of no value. For example, if a daily newspaper is delivered a day later, it becomes useless.
- Information should also be *up to date*. It should include all data available at the time of processing. A newspaper delivered in time early in the morning but reporting a week old news is timely but not up to date.
- Information should be tailored *fitting* to the needs of the user and be *relevant* to him. Massive volumes of irrelevant information would waste a lot of manager's time and there is a danger of his missing important relevant information.
- It is essential to give brief *summarized* information to ensure quick action.
- The information should be presented when he needs it and where he needs it in such a way that he may immediately *understand its importance*. For example, presentation of information in a graphical form such as bar charts, pie charts, etc., ensures quick recognition of the significance of the information. It is also essential to present the information in an attractive format which a user can immediately understand. Considerable time is spent by information system designers with the users to design the format of management reports besides their contents. Table 1.2 summarizes these points.

Table 1.2 Qualities of Information

Quality	How to Ensure Quality
Accurate	Ensure correct input and processing rules
Complete	Include all data
Trustworthy	Do not hide unpleasant information
Timely	Give at right time
Up to date	Include all data up to present time
Relevant	Understand user needs
Brief	Summarize relevant information
Significance understandable	Use attractive format and graphical charts

In this chapter we have discussed the need for information for managing organizations. Information is obtained by appropriate processing of available data. In fact, in practice, it is necessary to work backwards from a knowledge of required information to the data which, when processed, would give the information. Data collection and organization should be based on an *extensive* analysis of information requirements. We will return to this topic in later chapters. Processing of data may be done manually to obtain necessary information. That is, in fact, done in many organizations and is quite adequate if the *satisfactory*

volume of data is small or if various mechanical aids are concerned in this book on *analysis in the small part*

1. Data and information may be processed by merging, selection, etc.
2. Information requires strategic, tactical and operational information.
3. Strategic information is difficult to obtain by processing of data.
4. Tactical information of the functioning of processing of data.
5. Operational information is obtained by simple voluminous.
6. Statutory information
7. Management of organization, each
8. Large organizations with level managers, middle level managers, and top level managers achieve optimal performance supervise day-to-day of level managers. They
10. The primary functional production, Materials, Finance
11. The information given It must also be up to presented and its significance

- 1.1 Distinguish between data and information obtained by processing of data.
- 1.2 Give two examples of data and information.



volume of data is small or if the processing to be done is not very complex. Over the years various mechanical aids were developed and used for processing data. We will be concerned in this book on how computers may be used to process data when appropriate.

*Analysis: is the process of breaking a complex topic or substance into small parts in order to gain a better understanding of it.*

### SUMMARY

1. Data and information are not synonymous. Information is processed data. Data may be processed by performing arithmetic operations on them. Data may also be processed by reorganizing them by applying appropriate rules such as sorting, merging, selection, matching, filtering, etc.
2. Information requirements for managing organizations may be classified as strategic, tactical and operational.
3. Strategic information is needed for long range planning. It is less structured and difficult to obtain by processing raw data.
4. Tactical information is used to take short range decisions and for better control of the functioning of the organization. It requires complex and ingenious processing of data.
5. Operational information is used for day-to-day management of organizations. It is obtained by simple processing of data, it is well structured, and more voluminous.
6. Statutory information consists of reports to be sent to government by law.
7. Management of organizations is divided functionally. Depending on the size of the organization, each function maybe delegated to different managers.
8. Large organizations would have a hierarchical management structure with top level managers, middle level managers and line managers.
9. Top level managers are expected to make policies and need strategic information. Middle level managers direct and control the functioning of organization to achieve optimal performance and need tactical information. Line managers supervise day-to-day operations and steer operations to meet targets set by middle level managers. They need operational information.
10. The primary functional areas of many organizations are Human Resource, Production, Materials, Finance, Marketing and Research, Design and Development.
11. The information given to managers must be accurate, complete and trustworthy. It must also be up to date and timely. It must be relevant, brief, attractively presented and its significance understandable.

### EXERCISES

- 1.1 Distinguish between data and information. Give two examples of data and information obtained by processing data.
- 1.2 Give two examples of non-arithmetic data processing.