Management Information Systems
Copyright ©

This book contains the course content for Management Information Systems.

First Edition 2013

Printed by
Universal Training Solutions Private Limited

Address
05th Floor, I-Space,
Bavdhan, Pune 411021.

All rights reserved. This book or any portion thereof may not, in any form or by any means including electronic or mechanical or photocopying or recording, be reproduced or distributed or transmitted or stored in a retrieval system or be broadcasted or transmitted.
# Contents

<table>
<thead>
<tr>
<th>Chapter I</th>
<th>Introduction to Management Information System</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aim</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Objectives</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Learning outcome</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1.1 Introduction</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1.2 Importance of Information</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1.3 Role of Information in Management</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1.4 MIS and its Definition</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1.5 Systems Concept</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>1.6 Characteristics of Useful Information</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>1.7 Information System Process</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>1.8 Computer Based Information Systems</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>1.9 Aims of Studying MIS</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>1.10 MIS and Operational Information</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>1.11 Management Information System and Academics</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>1.12 MIS and the User</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Summary</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>References</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Recommended Reading</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Self Assessment</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

Chapter II | MIS and Information Technology | 11 |
| Aim       |                                               | 11 |
| Objectives|                                               | 11 |
| Learning outcome |                                       | 11 |
| 2.1 Introduction |                                           | 12 |
| 2.2 Characteristics of IT Impacting Industries |                         | 12 |
| 2.2.1 Powerful Information Processing |                         | 12 |
| 2.2.2 Convenient Data Storage and Retrieval |                         | 13 |
| 2.2.3 Better Communication |                                | 13 |
| 2.2.4 Rich Multimedia |                             | 13 |
| 2.2.5 Digital Representation |                             | 14 |
| 2.2.6 Versatile Input/ Output Capabilities |                         | 14 |
| 2.3 Data Processing |                           | 14 |
| 2.4 Transaction Processing |                       | 15 |
| 2.5 Application Process |                        | 15 |
| 2.6 Information System Processing |                     | 15 |
| 2.7 Impact of the Management Information System |               | 15 |
| 2.8 Management Information System and Computer |            | 16 |
| Summary    |                                               | 17 |
| References |                                               | 17 |
| Recommended Reading |                           | 17 |
| Self Assessment |                                       | 18 |

Chapter III | Nature of Management Information | 20 |
| Aim       |                                               | 20 |
| Objectives|                                               | 20 |
| Learning outcome |                                       | 20 |
| 3.1 Introduction |                                           | 21 |
| 3.2 Levels of Management Focus |                         | 21 |
List of Figure

Fig. 1.1 Information System Process ............................................................................................................. 3
List of Tables

Table 3.1 Information characteristics and levels of management ......................................................... 22
Table 3.2 Framework for nature of management information .................................................................... 24
Abbreviations

AOL - America Online
ARPANET - Advanced Research Projects Agency
CP - Central Processor
CPU - Central Processing Unit
CRM - Customer Relation Management
DSS - Decision Support Systems
EIS - Executive Information Systems
ERP - Enterprise Resource Planning
GDSS - Group Decision Support System
GUI - Graphical User Interface
IDE - Integrated Development Environment
IT - Information Technology
KM - Knowledge Management
LAN - Local Area Network
LEO - Low Earth Orbit
MEO - Medium Earth Orbit
MIS - Management Information System
OLAP - Online Analytical Processing
RAM - Random Access Memory
ROM - Read Only Memory
SCM - Supply Chain Management
TPS - Transaction Processing System
UPC - Universal Product Code
WAN - Wide Area Network
Chapter I
Introduction to Management Information System

Aim
The aim of this chapter is to:

- define management information system
- highlight the role of information in MIS
- describe various processes involved in MIS

Objectives
The objectives of this chapter are to:

- explain the concept of information and its role in management
- identify the concept of system and MIS
- elucidate information system process

Learning outcome
At the end of this chapter, you will be able to:

- understand the meaning and importance of MIS
- identify various processes involved in MIS
- describe computer based information system
1.1 Introduction
The capabilities, developments and achievements of human beings depend on their mind. Our mind gives us immense power or advantage, by using information as the raw material. Thus the well-being and success of any individual, enterprise or an economy is closely related to their ability. A project can accomplish significant development in its performance by ensuring that its managers are provided with appropriate information required by them for performing their work. Management Information System deals with understanding the ways and means of doing this effectively. It includes understanding two wide areas:

- One is concerned with the question of determining the nature of information required by the managers in an organisation and how organisation effectiveness can be improved by better information support.
- Second concern of MIS is developing ways of making the required information available effectively and economically. It requires understanding of information technology.

1.2 Importance of Information
Information has always played an essential and important role in working and development of human societies and the need and importance of information has been growing at an accelerated pace over ages. Information is needed for people to work cooperatively. No cooperative work is possible without the use of information to exchange knowledge and understanding on various issues like work to be performed collectively.

All the technological wonders of the 21st century are based upon the foundations of knowledge created over the period of ten thousand years. The most innovative technology or methods used today are the results of many small inventions, discoveries and improvements from the past. The technological developments in IT particularly the computers with an ability to accept, store and execute a series of user defined instructions enable organisations to use information more effectively.

1.3 Role of Information in Management
Information is essential for all the activities involved in our modern life. Latest technology cannot be used without information or understanding of the developments. Most of the activities of our present life are impossible without information. Managers need information about the environment of their organisation they manage and within which they operate. To work effectively they must understand the internal weaknesses and strengths of the organisation. They must be aware of the opportunities and external threats faced by the organisation.

Managers in organisations use and exchange information for different purposes. Coordination of activities of different persons and departments typically include information on the plan of work to be taken up, actual work done and/or progress made and actual results obtained.

Training and development activities implemented in an organisation to improve knowledge, skills and capabilities of an employee, need exchange of information. Policies, procedures, guidelines and similar communications intended to ensure some degree of control and uniformity in an organisation is carried out by delivering information from higher authorities.

- The effectiveness of a manager entirely depends on the nature and quality of information available and their ability to use the information.
- A successful manager identifies ways to develop, use and apply information received that can support the success of an organisation.

1.4 MIS and its Definition
Management Information System is mostly referred to as MIS which relates itself as collection of facilities and processes in an organisation that provides managers the information used by them.

Some of the definitions of MIS are
Henry C. Lucas
A set of organised procedures which, when executed, provides information to support decision-making.
Jayant K. Oke
An integrated system which transforms data (input) into reports (output) for facilitating decision-making through processing using various components of the information system vis., Hardware, Software, Database, Procedures, and personnel.

Kelly
A combination of human and computer based resources that result in collection, storage, retrieval, communication and use of data for the purpose of efficient management of operations and for business planning.

Krober Watson
An organised set of processes that provides information to managers to support the operation and decision making within an organisation.

T. Lucey
A system using formalised procedures to provide management at all levels in all functions with appropriate information, based on data from both internal and external sources, to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible.

Milind Oka
An integrated system that consists of human and capital resources that enables collection, storage and processing of data and information to produce and communicate relevant information to different levels of management in order to provide requisite support in performing management related activities.

1.5 Systems Concept

- The systems concept and systems thinking can be used for understanding MIS better and for designing and developing effective and efficient MIS to suit the requirements of different organisations.
- A system is defined as a collection of interrelated parts forming a synergistic whole that jointly serves the desired purpose. The parts which form the whole system, also called components or elements of the system, can be things, people or both.
- The system as a whole receives inputs from sources outside the system and processes these inputs within the system. The product or results of these processes within the systems are then given out of the system as output of the system.
- A part of the output of a system may be fed back to it as input. This is called feedback. The purpose of feedback is to determine how a system is performing and guide action on improvement of system performance.
- These actions intended to improve system performance are called control actions.

![Fig. 1.1 Information system process](image-url)
1.6 Characteristics of Useful Information

Various characteristics that determine the quality and suitability of information for the proposed use are:

- Relevant information is important for taking a decision. Information should be relevant to the purpose under consideration. Also having too much information is not required which leads to waste of efforts in sorting out relevant information from irrelevant.

- Many times it thus happens that information is collected but not used. Due to this, efforts are wasted and the user is distracted from more information they need.

- It is always recommended to exclude the data for which a clear use and user cannot be identified.

- Inaccurate information can cause more harm than good. Also too much insistence on accuracy can cause excessive delays and increase cost of information.

- An optimum balance between accuracy, cost and time must be maintained for precise in time delivery of information.

- Information has to be complete to be accurate. Incomplete information can be called correct but not accurate to the user’s point of view.

- Reliability of information depends on the reliability of data collection.

- Reliability depends on the source of the information. Information must be gathered from reliable sources and rechecked with related sources.

- Information must be concise, as concise information covers only required facts. It covers only the information required by the user.

- Too much information causes information overload, where a decision maker has too much information and is unable to determine what is really important.

- Information becomes more meaningful to the user when it is appropriately analyzed.

- When people use information, they have to process mentally to make it a part of their internal knowledge. At times they may also process it externally to have a better understanding of the issues involved.

- The analysis and presentation must be decided also based on the user characteristics. The user must understand the information.

- Information must be made available when required. It is advantageous to have information available as early as possible.

- The value of information declines with time.

- Another significant consideration in deciding the nature of information is the degree to which information is secured from unauthorized access and modification.

1.7 Information System Process

Any information has three basic components – input, process and output. Both the input and output are different types of information, though the input information is called data in relation to the system under consideration to indicate that it has not been processed.

- Input to the system can also be the knowledge or understanding of individuals which gets transformed into information only when coded or represented in a form suitable for information processing.

- The various different types of processes that may take place within the system that accepts data within the system, converts it into information, and provides information to users.

- There are five main categories of information system processes:
  - Data Capture
  - Data Storage and Retrieval
  - Analysis
  - Information Presentation
  - Transmission
Data capture involves coding of the input data in a form suitable for processing by the system. The most common form of manual data capture is a person observing something and describing one's observations orally or in writing.

The captured data in the system may need to be stored for analyzing and presentation later. The most common method of storage is the paper record, stored as books and files.

Analysis is the core of information processing, which transforms raw data into information.

Presentation of information in a more easily understandable form is also one of the analytical tasks. Thus analysis also covers tasks like preparing graphs and reports.

Presentation involves converting the information to a form understood by the user. Thus giving an oral or written report is two of the ways of information presentation used in manual systems.

1.8 Computer Based Information Systems

All MIS does not use computers, though most of the business organisations today use computer based information systems for their MIS.

• Computer based information systems are composed of hardware, software, telecommunications, people and procedures that are configured to collect, manipulate, store, and process data into information.

• Hardware is the equipment used to perform input, processing, and output devices. Software is the set of predefined instructions to the computer that determines the sequence of operations performed by the computer.

• Telecommunications allow organisations to link computer systems into effective networks. Networks can connect computers and computer equipment in a building, around the country, or across the world.

• Computer based information systems have enabled managers to automate some of the decisions that earlier required expert judgment of experienced managers.

1.9 Aims of Studying MIS

Following are the aims of studying MIS:

• Managers need to understand how information and information technology impact the working of any enterprise.

• They need to ensure that they and other managers reporting to them are getting good quality information required for effective management of the enterprise.

• They must understand how the nature of information available and the way it is used by managers impacts the performance of an enterprise.

• The aim of studying MIS is to develop the ability to design, install and operate a management information system that aims to:

• Make required information available for the management of an enterprise

• Improve the quality of information available to the managers

• Facilitate the best use of available information for improving managerial performance

• Reduce the total cost of getting and using management information

1.10 MIS and Operational Information

Organisations use information for carrying out operations as well as for managing them. Some examples of operations are placing purchase order on a supplier, determining the best way to machine a gear out of a blank, machining of such a gear, dispatching material from plant to the customer, and billing and payment collection at the check-out counter of a retail store.

All these operations require some information by way of operational data, and in turn may generate some additional operational data. The operational information system in a company is linked to its MIS in two ways.

• The operational system is the source of almost all internal data.

• Some of the external data form the initial input for the MIS.
1.11 Management Information System and Academics

The management information system draws a lot of support from other academic disciplines too. The foundation of MIS is the management theory. It uses the principles and practices of management while designing the system, and gives due regard to the theory of organisational behavior.

It considers the human mind as a processor of information. While designing the report format and forming communication channels, MIS takes into account the behavior of the manager as an individual and in a group. It gives due regard to the personal factors such as bias, thinking with a fixed frame of reference, risk aversion, strengths and weaknesses.

Another area of academics is operational research. The operational research is used for developing the models of management and they are then incorporated in the MIS as decision support systems. The inventory control, queuing theory, and resource programming are used in the MIS as decision support systems. The network theory is used for planning and controlling large projects. The application of PER / CPM to a project planning is now easily possible through the MIS support.

In the area of accounting application, it uses the accounting principles to ensure that the data is correct and valid. It uses the principles of double entry bookkeeping for balancing the accounts. It uses the accounting methodology for generating a trial balance sheet and other books of accounts.

The MIS uses the communication theory in a significant manner. The principle of feedback is used while designing analysis. While designing the report format, attention is paid to avoid noise and distortions in the communication process.

The MIS further relies heavily on the decision methodology. It uses different mathematical techniques to handle the situation of decision making uses the method of decision-making under certainty for decision-making and action.

The MIS is based on database structures, viz., hierarchical; network and relational database have roots in the mathematics and the set theory. The MIS becomes rich in content and more useful when it becomes more and more a decision-making or decision-support system. The is possible when it builds decision making systems in MIS which in turn is possible if it draws tools, techniques, methods, rules and principles from pure and application science, and use them as an integral part of the system. The MIS draws data from its own source and uses it in the application of a variety of tools and techniques to solve the management, mathematics, and accounting.

1.12 MIS and the User

Every person in the organisation is a user of the MIS. The people in the organization operate at all levels in the hierarchy. A typical user is a clerk, an assistant, an officer, an executive or a manager. Each of them has a specific task and a role to play in the management of business. The MIS caters to the needs of all persons.

The main task of a clerk is to search the data, make a statement and submit it to the higher level. A clerk can use the MIS for a quick search and reporting the same to higher level. An assistant has the task of collecting and organising the data, and conducting a rudimentary analysis of integrating the data from different and disciplines to analyze it and make a critical comment if anything adverse is found.

The MIS offers the methods and facilities to integrate the data and report the same in a proper format. An executive plays the role of a decision maker. He is in of responsibility and accountability a position of a planner and a decision maker. He is responsible for achieving the target and goals of the organisation. The MIS provides facilities to analyze the data and offers the decision support systems to perform the task of execution. The MIS provides an action oriented information.
The manager has a position of responsibility and accountability for the business results. His management role expands beyond his management function. He is a strategist and a long-term planner. He is a person with a foresight, an analytical ability and is expected to use these abilities in the functions of top management. The MIS provides information in a structured or unstructured format for him to react. The MIS caters to his constant changing needs of information. The user of the MIS is expected to be a rational person and the design of the MIS is based on this assumption.

However, in reality the impact created on individuals by MIS is difficult to explain. The nature of the impact in a few cases is negative. However, this negative impact can be handled with proper training and counseling.

It is observed that at lower level, is a sense of insecurity. As the MIS takes away the drudgery of search, collection, writing and reporting the data, the work vacuum, so created is not easily filled, thus creating a sense of insecurity. To some extent the importance of the person is also lost, giving rise to a fear of non-recognition in the organisation.

At the level of an officer and an executive, the MIS does the job of data manipulation and integration. It analyses the data in a predetermined manner. This means that the knowledge of business is transferred from an individual to the MIS and is made available to all in the organisation. This change arising out of the MIS creates a sense of being neglected for knowledge, information and advice. The psychological impact is larger if the person is not able to cope up with this change by expanding or enriching the job and the position held by him.

The manager holding a position in the top or middle management suffers from fear of challenge and exposure. The MIS makes these competitors more effective as they have access to the information and have an ability to interpret. This leads to a situation where he is afraid that that his position, decision and defense will be challenged and may be proved wrong sometime. The risk of adverse exposure to the higher management also increases. The effects so far pointed out are all negative and they are seen only in few cases.

The positive effects on the individuals at all levels are that they have become more effective operators. The time and energy which was spent earlier in unproductive work is now applied for a productive work. Some are able to use their analytical skills and knowledge with the information support for improving their position in the organisation. Managers, having improved their decision making ability, are able to handle the complex situations with relative ease. Some are benefited by improving their performance and being held in high esteem by the higher management.

The enterprising managers are able to use the systems and the models for trying out a Number of alternatives in a given problem situation. The impact of the MIS on people of the organisation is phenomenal as it has made the same body of people collectively more effective and productive.

The recent major technological advances in communication such as Multimedia, Imaging, Graphical User Interfaces (GUI), Internet, Web etc. and the ability to access the data stored at different locations on the variety hardware of platforms would make MIS more attractive and efficient proposition. An intelligent user of information can demonstrate the ability of decision making, since his manipulative capability is considerably increased, with the information now being available on his desktop. Through the MIS, the information can be used as a strategic weapon to counter the threats to business, make business more competitive, and bring about the organisational transformation through integration. A good MIS also makes an organisation seamless by removing all the communication barriers.
Summary

- In this chapter we have studied about information its importance and the part it plays in any organisation.
- The success of any individual, enterprise or an economy is closely related to their ability to get and use information effectively.
- Information system process follows three steps input, process and output. Data capture, data storage and retrieval, analysis, information presentation and transmission are the categories of information system processes.
- Computer based information system includes hardware, software, telecommunications and people from an organisation.

References


Recommended Reading

1. Information has always played an essential and important role in working and development of __________.  
   a. human societies  
   b. organisation  
   c. economy  
   d. employees

2. ___________ activities implemented in an organisation to improve knowledge, skills and capabilities of an employee need exchange of information.  
   a. Presentation  
   b. Training and development  
   c. Campaigning  
   d. Forum

3. ___________ information is important for taking a decision.  
   a. Important  
   b. Lengthy  
   c. Relevant  
   d. Precise

4. ___________ involves coding of the input data in a form suitable for processing by the system.  
   a. Data Storage and Retrieval  
   b. Analysis  
   c. Data Capture  
   d. Information Presentation

5. ___________ information can cause more harm than good.  
   a. Important  
   b. Lengthy  
   c. Inaccurate  
   d. Precise

6. Which of the following statements is true?  
   a. MIS is developing ways of making the required information available effectively and economically.  
   b. MIS cannot develop ways of making the required information available effectively and economically.  
   c. MIS is developing ways of making the required information expensive.  
   d. MIS is developing ways of making the required information available efficient.

7. Which of the following statements is true?  
   a. All the technological wonders of the 21st century are based upon the knowledge crated over ten years.  
   b. All the technological wonders of the 21st century are based upon the knowledge crated over thousand years.  
   c. All the technological wonders of the 21st century are based upon the foundations of experience crated over period of ten thousand years.  
   d. All the technological wonders of the 21st century are based upon the foundations of knowledge crated over period of ten thousand years.
8. **Which of the following statements is true?**
   a. Employees use information for carrying out operations as well as for managing them.
   b. Organisations use experiences for carrying out operations as well as for managing them.
   c. Organisations use information for carrying out process as well as develop them.
   d. Organisations use information for carrying out operations as well as for managing them.

9. **Which of the following statements is true?**
   a. It is always recommended to exclude the data for which a clear use and user cannot be identified.
   b. It is always recommended to include the data for which a clear use and user cannot be identified.
   c. It is always recommended to exclude the data for which a clear recipient cannot be identified.
   d. It is always recommended to exclude the information for which a clear use and user cannot be identified.

10. **Which of the following statements is true?**
    a. Reliability of information depends on the conciseness of data collection.
    b. Reliability of information depends on the reliability of data collection.
    c. Standard of information depends on the reliability of data collection.
    d. Reliability of information depends on the reliability of data execution.
Chapter II
MIS and Information Technology

Aim
The aim of this chapter is to:

• enlist the characteristics IT impacting industries
• explain different processes involved in information system application
• elucidate various capabilities of IT like input/output, digital representation and so on

Objectives
The objectives of this chapter are to:

• explain technical factors of IT affecting the industries
• define transaction and data processing
• explicate information system application processes

Learning outcome
At the end of this chapter, you will be able to:

• understand technical and user interface factors affecting industries
• comprehend information system application process
• identify versatile input/output capabilities of IT
2.1 Introduction

The development of modern information system is a difficult process. It needs knowledge, skills and technology in almost all the disciplines. The developer, the designer and the user must be knowledgeable in their respective area of functions and responsibilities. As information systems are in huge demand for on-line real time usage in business management thus its development requires thorough understanding of the business and the way in which it is executed.

Also different technologies other than the information technology are used in the business for providing input to the information systems. The information system is also undergoing cultural changes making them more sensitive to the business needs.

2.2 Characteristics of IT Impacting Industries

Technology developed because of the availability of a better knowledge base combined with the improved ability of people to access, recognise, incorporate and use this knowledge. The size of communities living together and interacting with each other increased. With this, the sphere of business expanded gradually from simple barter between two persons living in close proximity, to a complex system of trade across large populations involving sale and purchase involving multi-tier exchange using money as a common measure of worth of many different types of products.

Developments in IT have far reaching effects on business today, which will have far reaching effects on the way we do business. To understand these developments in IT and how they impact the business, let us examine the main characteristics of IT as it stands today and the direction in which it is moving. These characteristics can be broadly divided into technical factors that are internal to the technology itself and interface factors relating to the way this technology is being used by people.

Listed below are main technological and interface factors of IT affecting industry processes:

Technical factors

- Powerful information processing
- Convenient data storage and retrieval
- Better communication
- Rich multimedia
- Digital representation
- Versatile input/output capabilities

User interface factors

- Convenient
- Fast
- Economical
- Access devices popularity
- Widespread development efforts

2.2.1 Powerful Information Processing

IT enables us to process information more effectively in several ways as listed below.

- Complex analysis performed easily
- Error free processing
- Automated processing
- Wide range of applications covered
The information processing covers many different types of processing as listed below:

- Statistical and mathematical operations
- Sorting and filtering data
- Operational data generation
- Updating of records and files
- Form conversion and translation
- Editing
- Making copies

The editing facilities available cover a wide range of functions such as:

- Content modification and correction
- Spelling and grammar correction
- Style and format modification
- Find and replace
- Copy/cut and paste
- Merge
- Changing sequence

2.2.2 Convenient Data Storage and Retrieval

In business we need to maintain huge amounts of data, from which we recover, refer, examine and use data from time to time. It is important to have the required data stored as well as the ability to retrieve that data quickly and easily. The required data must be easily accessible when needed or there is no point in storing it. Information technology has made data storage and retrieval convenient in several ways:

- Economy of space
- Ease of capturing data
- Multiple user access and updating
- Easy search facilities

2.2.3 Better Communication

In business we need to receive information from others and in turn provide information to others. Our ability to do this has been enhanced by IT in several ways:

- Global reach
- Instantaneous transmission
- On-line communication
- One to many transmission

Communication over the internet and similar new systems has removed differences in time and cost of communicating over different distances. Earlier the fixed line telephone was the only practical means for common individuals and most of the businesses for communicating directly over long distances. The cost of communication over such a telephone varied with the distance covered. But now internet offers immediate communication at low cost irrespective of distance. Cell phones have made it possible for individuals to have the telephone facility with them on the move.

2.2.4 Rich Multimedia

Language is a representation of realities of this world. The word “house” refers to a physical house. This representation of house is by means of written text. The same thing could be represented by the spoken word, a picture, or an engineering drawing. The pictures could be animated and may be accompanied by sound. Thus, information can be represented in a variety of mediums such as:
• Text
• Graphics and pictures
• Animation
• Audios
• Videos
• High resolution/fidelity
• Virtual reality

Such multimedia representations make information much more appealing and useful.

2.2.5 Digital Representation
Digital representation is at the core of all modern information technology. Just as anything and everything in English language can be expressed as a combination of the twenty-six alphabets and a few punctuation marks, advanced IT today uses just binary digits to represent any information in any medium.

This digital representation, which started off as a technological requirement, has developed into a major strength of advanced IT. This means that it is theoretically possible to store and handle electronically any information in any form. Also it becomes easier to convert information from one format to another.

2.2.6 Versatile Input/Output Capabilities
People interact with computers and other equipment and facilities of IT through input and output devices. With the development of IT, many different and versatile input/output devices are available. These devices enable the user to capture data, feed it to IT systems, and retrieve it from there in many different forms easily. Some popular input/output devices now available include:
• Personal Computers
• TV sets
• Mobile and fixed line phones
• Optical readers, scanners and digital cameras
• Service/product dispensers (e.g. ATM)
• Printers
• Display terminals and projectors
• Floppy, CD and DVD drives (including writers)

There is a trend towards convergence of many of these devices. Earlier TV was used for entertainment and computer was used for work. But now people can watch movies and listen to music over their TV. Computers combine with the Internet facility and are also serving as telephones. Mobile phones are now also used as personal digital assistants (PDA), internet terminals and digital cameras. This congruence also has far reaching implications on the utility of IT for individuals and businesses.

2.3 Data Processing
In any information system application, the method generally followed is to design modular or hierarchical steps of processing leading to an output in a report form or information having certain value specific or perceived as seen by the user. The steps involved are data processing, transaction processing, application processing and system processing.

Data is the smallest atomic entity in the information system which is basic to build the information. The character of data decides the quality of information it offers to the user. If the data is accurate it would surely give an effective output.
2.4 Transaction Processing
After the data has been processed the next step is to process transaction itself on certain lines. A transaction is scrutinised for conformance to the rules, policy or guidelines before it is taken up for further processing. The rules are directly related to the transaction or may have some relation and association with other transaction.

The transaction is processed for adherence to business rules, correctness and consistency of data values for validity of transaction. The person designing transaction processing system must have or acquire the knowledge of business rules for introducing them in the transaction.

2.5 Application Process
After data and transaction processing, the data finalised in these stages gets placed on the affected files. Application processing is designed to process more than one type of transaction to bring out the specific business results in one or more business functions. This processing is carried out once the transaction is processed for its validity.

The scope of application is designed to bring out inventory status affected by material transaction.

2.6 Information System Processing
The system processing is at higher level over the application processing. The system is defined as a product made up of several applications set in orderly manner to produce a higher level information output different than the output of the application processing. The system outputs are generally required by the top management responsible for the strategic management of the business. In all the business organisations the basic application deck may be the same but it’s input-process-output.

2.7 Impact of the Management Information System
Since the MIS plays a very important role in the organisation, it creates an impact on the organisation’s functions, performance and productivity. The impact of MIS on the functions is in its management. With a good support, the management of marking, finance, production and personnel become more efficient. The tracking and monitoring of the functional targets becomes easy. The functional, managers are informed about the progress, achievements and shortfalls in the probable trends in the various aspects of business. This helps in forecasting and long-term perspective planning. The manager’s attention is brought to a situation which is exceptional in nature, inducing him to take an action or a decision in the matter. A disciplined information reporting system creates a structured data and a knowledge base for all the people in the organisation. The information is available in such a form that it can be used straight away or by blending analysis, saving the manager’s valuable time.

The MIS creates another impact in the organisation which relates to the understanding of the business itself. The MIS begins with the definition of a data entity and its attributes. It uses a dictionary if data, entity and attributes, respectively, designed for information generation in the organisation. Since all the information system use the dictionary, there is common understanding of terms and terminology in the organisation bringing clarity in the communication and a similar understanding an even of the organisation.

The MIS calls for a systemization of the business operation for an affective system design. A well designed system with a focus on the manager makes an impact on the managerial efficiency. The fund of information motivates an enlightened manger to use a variety of tools of the management. It helps him to resort to such exercises as experimentation and modeling. The use of computers enables him to use the tools techniques which are impossible to use manually. The ready-made packages make this task simpler. The impact is on the managerial ability to perform. It improves the decision making ability considerably.

Since the MIS works on the basic systems such as transaction processing and databases, the drudgery of the clerical work is transferred to the computerised system relieving the human mind for better work. It will be observed that a lot of manpower is engaged in this activity in the organisation. If you study the individual is time utilisation and its application; you will find that seventy per cent of the time is spent in recording, searching, processing and communication.
This is a large overhead in the organisation. The MIS has a direct impact on this overhead. It creates an information-based work culture in the organisation.

2.8 Management Information System and Computer

Translating the real concept of the MIS into reality is technically, an infeasible proposition unless computers are used. The MIS relies heavily on the hardware and software capacity of the computer and its ability to process, retrieve communicate with no serious limitations.

The variety of the hardware having distinct capabilities makes it possible to design the MIS for a specific situation. For example, if the organisation needs a large database and very little processing, a computer system is available for such a requirement. Suppose the organisation has multiple business location at long distances and if the need is to bring the data at one place, process, and then send the information to various location, it is possible to have a computer system with a distributed data processing capability. If the distance is too long, then the computer system can be hooked through a satellite communication system. The ability of the hardware to store data and process it at a very fast rate helps to deal with the data volumes, its storage and access effectively. The ability of the computer to sort and merge helps to organise the data in a particular manner and process it for complex lengthy computations. Since the computer is capable of digital, graphic, word image, voice and text processing, it is exploited to generate information and present it in the form which is easy to understand for the information user.

The ability of a computer system to provide security of data brings a confidence in the management in the storage of data on a magnetic media in an impersonal mode. The computer system provides the facilities such as READ ONLY where you cannot delete to UPDATE. It provides an access to the selected information through a password and layered access facilities. The confidence nature of the data and information can be maintained in a computer system. With this ability, the MIS become a safe application in the organisation.

The software, an integral part of a computer system, further enhances the hardware capability. The software is available to handle the procedural and nonprocedural data processing. For example, if you want to use a formula to calculate a certain result, an efficient language is available to handle the situation. If you are not use formulas but have to resort every time to a new procedure, the nonprocedural languages are available.

The software is available to transfer the data from one computer system to another. Hence, you can compute the results at one place and transfer them to a computer located at another place for some other use. The computer system being able to configure to the specific needs helps to design a flexible MIS.

The advancement in computers and the communication technology has the distance, speed, volume and complex computing an easy task. Hence, designing the MIS for a specific need and simultaneously designing a flexible and open system becomes possible, thereby saving a lot of drudgery of development and maintenance and maintenance of the system. The concept of user friendly systems and the end user computing is possible, making information processing a personalised function.

However, the application of the management principles and practices in today’s complex business world is possible only when the MIS is based on computer system support.
Summary

- Technical factors include powerful information processing, convenient data storage and retrieval, better communication, rich multimedia, digital representation, and versatile input/output capabilities; and user interface factors include convenience, speed, economy, access devices popularity, and widespread development efforts.
- The business management process has changed from function management to process management.
- In any information system application the steps involved are data processing, transaction processing, application processing and system processing.
- Data is the smallest atomic entity in the formation system which is basic to build the information system.
- The person designing transaction processing system must have or acquire the knowledge of business rules for introducing them in the transaction processing system.

References

- 2011. 4 - Concept of Information - I, [Video Online] Available at: <http://www.youtube.com/watch?v=rNicySmHoTA&playnext=1&list=PLSjNq84HUSgNtTiov5TZjNLZEtLVBdQRx&feature=results_main> [Accessed 13 August 2012].

Recommended Reading

Self Assessment

1. ____________ developed because of the availability of a better knowledge base combined with the improved ability of people to access, recognise, incorporate and use this knowledge.
   a. Technology
   b. Information system
   c. Data processing
   d. Data storage

2. _______________ in IT today have far reaching effects on business today, which will have far reaching effects on the way we do business.
   a. Researches
   b. Development
   c. Reduction
   d. Decline

3. _______________ processing is designed to process more than one type of transaction to bring out the specific business results in one or more business functions.
   a. Application
   b. Powerful Information
   c. Transaction
   d. Data

4. __________ is the smallest atomic entity in the information system which is basic to build the information.
   a. Application
   b. Powerful Information
   c. Transaction
   d. Data

5. _______________ is a representation of realities of this world.
   a. Researches
   b. Language
   c. Reduction
   d. Decline

6. Which of the following statements is true?
   a. Digital representation is at the core of all modern information technology.
   b. Graphical representation is at the core of all modern information technology.
   c. Rich multimedia representation is at the core of all modern information technology.
   d. Better communication representation is at the core of all modern information technology.

7. Which of the following statements is true?
   a. The character of communication decides the quality of information it offers to the user.
   b. The character of data decides the quality of information it offers to the user.
   c. The character of rich multimedia decides the quality of information it offers to the user.
   d. The character of application process decides the quality of information it offers to the user.
8. Which of the following statements is true?
   a. Powerful information processing is designed to process more than one type of transaction to bring out the specific business results in one or more business functions.
   b. Application processing is designed to process more than one type of transaction to bring out the specific business results in one or more business functions.
   c. Transaction processing is designed to process more than one type of transaction to bring out the specific business results in one or more business functions.
   d. Data processing is designed to process more than one type of transaction to bring out the specific business results in one or more business functions.

9. Which of the following statements is true?
   a. Data is the smallest atomic entity in the information system which is basic to build the information.
   b. Transaction processing is the smallest atomic entity in the information system which is basic to build the information.
   c. Rich multimedia is the smallest atomic entity in the information system which is basic to build the information.
   d. Powerful information processing is the smallest atomic entity in the information system which is basic to build the information.

10. Which of the following statements is true?
    a. In business we need to maintain huge amounts of data, from which we recover but not examine the data from time to time.
    b. In business we need to maintain huge amounts of data, from which we recover, refer, examine and use data only once.
    c. In business we need to maintain huge amounts of data, from which we recover, refer, examine and use data from time to time.
    d. In business we need to maintain small amounts of data, from which we recover, refer, examine and use data from time to time.
Chapter III

Nature of Management Information

Aim

The aim of this chapter is to:

• explain the impact of type of business information on design of MIS
• elucidate the nature of collaboration
• explicate various levels of organisational groups

Objectives

The objectives of this chapter are to:

• classify objectives of management tasks
• explicate managerial tasks and functions
• explain the three level classification of management focus

Learning outcome

At the end of this chapter, you will be able to:

• identify nature of information used in businesses
• recognise objectives of management tasks
• understand the nature of collaboration
3.1 Introduction
The purpose of an MIS is to provide the required information to managers in an organisation to support and facilitate their work. To be able to design such an MIS, we need to be able to identify the nature of information required. Such identification of required information is based on the study of an organisation’s working and requirements, coupled with a general understanding of variety and nature of information used for the management of organisations.

In the previous chapter, we discussed some general characteristics of information which are common to all types of information, and not limited to just management information. This included the concept of data, information and knowledge, and the general characteristics of useful information. In this chapter we will look at the nature of information required specifically for the management of organisations.

We can classify management tasks and functions in several ways as an aid in identifying the nature of information and how it is used for each. We can understand better the management information needs of business and how it affects the business performance by examining some of these ways. Here, we will examine the following eight different ways of looking at the use of information in business:

- Levels of Management
- Levels of Organisational Groups
- Nature of Collaboration
- Impact on Business Performance
- Information Flow Direction
- Managerial Tasks
- Business Function
- Content and Presentation of Information
- How Information Supply is Initiated

3.2 Levels of Management Focus
All work in an organisation can be broadly classified in three levels of management focus required. These are:

- Operational management
- Tactical management
- Strategic planning

Operational management
These covers the management of routine day-to-day operations like shop floor activities of manufacturing and maintenance, making purchase orders, and making sales calls on customers. Operational management is largely the function of lower levels of managers who makes decisions that affect day-to-day operations. Generally these decisions can be programmed using predetermined rules and procedures. The impact of these decisions generally extends over a short term.

The purpose of operational management information is to support the normal operations of the organisation. Operational management information is generally extracted out of internal business transactions data, with only limited use of external data. Operational management usually calls for information generated at periodic intervals such as daily, weekly or monthly. The facts reported in these are generally expected ones with only marginal variations. The information is very detailed, which is often presented in a structured format. The degree of accuracy in reporting is high.
Tactical management
These covers the middle management activities of operational planning and control. Tactical management is largely the responsibility of middle level managers. They undertake tasks such as plan working capital, schedule production, formulate budgets, and make short-term forecasts. Usually it involves non-programmed decisions. There are no specific predetermined steps that can be followed to each solution. Tactical management usually calls for summary reports rather than details as in operational management. The emphasis is more on reporting exception or deviation from the expected. While some reports may be generated at periodic intervals such as monthly and quarterly, there is much greater use of ad hoc reports that may need to be produced quickly in response to requests from managers. The purpose of tactical management is to plan and control operations and to resolve unexpected operational problems.

Strategic planning
These are the top-level management activities concerned with matters such as business objectives, policies, strategies and long term plans. Strategic management is primarily the responsibility of top management who provide direction for the company by planning for long term. It involves taking decisions, involves a great deal of uncertainty, and cannot be programmed. Strategic planning level information system need to provide top management information for taking long-term decisions affecting the whole organisation or at least its important actions, and resources. Types of information necessary for top-level managers include the following:

- Comfort information: informs about current situation or achievement levels that are tuned to expectations (Clients served, target achieved, patients treated, operations conducted, etc.)
- Status information or progress information: keeps abreast of current problems and crises and changes (progress on office construction, status of research study, labor negotiation and grant application)
- Warning information: signals that change for good or worse are occurring (stock price, turnover, client complaints, etc)
- Planning information: descriptions of projects/program due in future, knowledge of anticipated developments (future of funding, future of federal/provincial support)
- Internal operations information: indicators on how organisation/program is performing.
- External intelligence: information, gossip, and opinions about activities in the environment of the agency. Competition, funding policies, political changes, emerging social policies, etc
- Externally distributed information: annual report before release, quarterly progress report for donors, press releases about the agency, publicity material before printing, etc

Among these, the first five are internal to the organisation. Two are external to the organisation:

<table>
<thead>
<tr>
<th>Characteristics of Information Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Dependability of results</td>
</tr>
<tr>
<td>Time period covered</td>
</tr>
<tr>
<td>Level of detail</td>
</tr>
<tr>
<td>Source of detail</td>
</tr>
<tr>
<td>Nature of data</td>
</tr>
<tr>
<td>Accuracy</td>
</tr>
<tr>
<td>Typical user</td>
</tr>
<tr>
<td>Level of decision</td>
</tr>
</tbody>
</table>

Table 3.1 Information characteristics and levels of management
3.3 Levels of Organisational Groups

A specific management task may be performed at different levels of organisational groups. These are:

- Individuals
- Functional units within organisations, or
- Whole organisations

An individual salesman typing a letter to his customer is an example of use of IT by individuals. However, when a number of salesmen generate standard letters to their customers using a common database and application package, this becomes an application common to a functional unit. An ERP package covering all the functions within an organisation is an example of use of management tasks at the organisational level.

3.4 Nature of Collaboration

Management tasks can be classified in three different types of work depending on the nature and extent of interaction involved among the users. These are:

- Isolated tasks are performed by individuals or groups in isolation, for example, working out five year financial projections based on data already available. Such work generally involves the use of only information processing and presentation capabilities of IT, for example use of electronic spreadsheet.
- Linked tasks are performed by individuals or groups but their work affects or is affected by others, for example, collecting past performance and environmental data for the preparation of five year financial projections. Such work also requires the use of information sharing and communication capabilities of IT.
- Collaborative tasks involving interaction of more than one individual or groups, for example, developing and agreeing on targets for five year corporate plans. Such work requires use of the total range of IT capabilities including interactive working capabilities.

3.5 Objectives of Management Tasks

Objectives for management tasks, particularly tasks involving changing systems in the organisation can be broadly classified into three categories:

Improving efficiency
This is concerned with reducing costs of performing a job, or making the task of performing the job easier. Thus, it involves basically improving the output/input ratio. Improvement in efficiency may result in increasing the output for the same amount of input. But that is only an incidental effect. The earliest applications of computers in the business (such as payroll processing) fall into this category.

Improving effectiveness
This is concerned with improving the output in terms of quantity, quality and service. Effectiveness can be improved with or without increasing the inputs. Frequently, improvement in effectiveness is also accompanied by improvement in efficiency. But that is not essential. For example, increasing production by giving overtime may increase average labour cost. This will be quite acceptable as long as value added for the increased production more than makes up for the increase in average costs. With improvement in IT technology and better experience of using it, the business has been moving towards such applications. For example, all the applications involving decision support systems fall in this category. The applications which result in faster response using the speed of automated information processing also fall in this category.

Transformation
This involves changing the basic way of doing business. The way people interact with each other and do business with each other has undergone many changes over the ages in response to technological, economic and social changes taking place in the world. Change from the barter based economy of the earliest civilisations to the development of the monetary system is one such revolutionary transformation. The advances in information technology have opened up many opportunities of achieving quantum jumps in effectiveness efficiency by changing the basic ways of conducting business. Internet selling is just one of these new models of business.
These objectives can be applicable to any level of organisation – that is, individual, functional unit or organisation. IT assists in the achievement of different types of objectives at each level of the organisation in different ways. Table 3.2 below gives a framework for the nature of management information for different combinations of organisation levels and objectives.

<table>
<thead>
<tr>
<th>Individual</th>
<th>Functional Unit</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency</td>
<td>Task mechanisms (Word processing, spread sheet)</td>
<td>Process automation (Order entry, credit checking)</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>Work improvement (Better and faster information)</td>
<td>Functional enhancement (CAD, CAM)</td>
</tr>
<tr>
<td>Transformation</td>
<td>Role expansion (What if analysis)</td>
<td>Functional redefinition (Better Business Research)</td>
</tr>
</tbody>
</table>

Table 3.2 Framework for nature of management information

3.6 Information Flow Direction and Source

In an organisation, information can flow
- Upwards
- Downwards
- Horizontally

The upward flow of information is from the lower level of the organisation to the upper levels – from subordinates to their managers. This type of information usually describes the current state of the organisation based on its daily transactions.

Downward flow of information is from the upper level of the organisation to the lower levels – from managers to their subordinates. Such information usually consists of the strategies, goals, and directives that originate at one level and are passed to the lower levels.

Horizontal flow of information occurs between functional business units and work teams. Management information can also be classified according to the source of information. Broadly we can classify sources of all information as:
- Internal and
- External

Another way of classifying source of information is according to the way information was created. In this way, we can classify information as:
- Objective and
- Subjective

Internal information is generated within the organisation and results from the processes and occurrences taking place within the organisation. It generally describes operational aspects of the organisation as well as the state of its resources and performances.
External information relates to things and happenings that exist outside the organisation. It provides insights into an organisation’s external environment including customers, suppliers, competitors, and other environmental issues such as demographics, culture, technological, geographical, economic, legal and political.

Objective information is the observation and measurement of facts describing aspects that are not dependent on the personal feelings of the observer.

In contrast, subjective information is an individual’s description of his or her mental picture about the fact. Information on height, length, shape, colour and other physical features is objective information, but to say that the car is beautiful is subjective judgment of the person making the statement.

Objective information is usually quantifiable and verifiable and describes something that is known. Subjective information is generally not quantifiable or verifiable. Though subjective information is not quantifiable and verifiable, organisations can, and must try to develop some approximate measures for some important variables in the company that are primarily subjective in nature. One of the most popular of such techniques for quantification is the IQ (Intelligence Quotient) for measuring intelligence of individuals.

### 3.7 Managerial Tasks and Functions

In executing work in organisations, managers undertake different types of tasks such as:

- Organising
- Planning
- Decision-making
- Monitoring
- Evaluating and Control

An MIS needs to provide support for all these management tasks. Many companies now offer readymade software to support such specific management tasks.

For example, DSS (Decision Support Software) are available to facilitate decision making using different decision-making algorithms. Expert systems go a step beyond the DSS to further reduce the need for personal judgment and expertise of managers in decision-making.

EIS (Executive Information Systems) are designed to help executives to obtain a variety of information quickly and easily to support them in their monitoring work.

The whole of MIS is a system that supports all the tasks of management. MIS itself is now being expanded to the concept of Knowledge Management (KM) systems that address total information acquisition and creation, preservation, and usage need of an organisation. Thus, MIS itself is a subsystem of KM.

Business has to perform many different functions such as:

- Procurement
- Manufacturing
- Marketing
- Projects
- Finance and
- Human Resources Management
An MIS must provide support for each of these functions. Some of the input data required to provide information may be common and care needs to be taken to avoid duplication of data capture. In the early days of computer-based systems, business function level information systems that catered to a single functional department of a firm, or part of such a department were the only feasible ones.

Early systems of this kind were report driven. They produced routine scheduled reports (for example, quarterly sales broken down by various standard categories), and exception reports – alerts about noteworthy situations like significant budget overruns or unusually high or low inventories. On-demand, more customisable reporting facilities arose later, as computing systems became more interactive. Now a variety of readymade software is available to support MIS for specific functions or parts of it. Some softwares also cover more than one function. Some of the most commonly available softwares addressing specific functions includes software systems like Accounting and Finance, ERP (enterprise resource planning), CRM (Customer relation management), project management, and SCM (supply chain management).

3.8 Content and Presentation of Information

In the previous section we tried to understand the management information requirement of managers in terms of the purpose for which information is used. In this section we will examine different types of information based on the way the information is analysed and presented, and what the information describes. Managers at different levels and different functions use information with some common ways of analysis and presentation. The main types of management information based on these criteria include the following:

3.8.1 Summaries from Routine Operations

Operational staff needs continuous and detailed information on the operations they are controlling. Managers need only a summary of operational data, example the total output figure for the day, the week, or the department. It may also be qualitative, example in monitoring quality control. An MIS must therefore accept the detailed information and aggregate it. The degree of aggregation is proportional to the level of the manager. Managers of different areas of the enterprise need different selections of aggregated data.

3.8.2 Information on Exceptional Events

For routine enterprise operations, aggregated data indicating quantities and qualities of outputs need to be supplemented by details of any exceptional occurrences. Within an MIS the boundaries of “normal” are specified, and the MIS is set to report occurrences outside these limits. For example, an agricultural research MIS might have a report listing all those research Management Information System activities for which the planned end date has passed but which are still active.

3.8.3 Ad hoc Information

Delivery of the two sorts of information described above can and normally should be largely automated. But the MIS also needs to be able to meet specific questions that cannot be anticipated. For ad hoc requirement, managers usually require information that can be quickly analysed and presented in different ways. This can be achieved by a flexible system such as those based on Excel spreadsheet with facility for what if analysis.

3.8.4 Time Series Information

An MIS is largely concerned with the present and the future. But often there is value in comparing the present with the past. The MIS therefore needs to be able to store previous data and readily compare today’s performance with selected periods from the past.

3.8.5 Comparative External Information

While an MIS is focused primarily on the processes within the enterprise, valuable insight can often be gained from data from other institutions in the same type of business in the same country or from other countries. This data may be of direct interest in itself, adding to the corporate knowledge of the institution, or it may be used in comparison with information from within the organisation to judge performance. Such external information may help to establish “norms” for use in planning and performance assessment.
3.8.6 Contextual or Environmental Information
The context or environment in which an organisation operates usually has a number of effects on the organisation’s performance. Information from an organisation’s environment that can usefully influence management decision making and that is available needs to be identified, captured, and presented on a regular basis. It is important to be selective in deciding what to include in an MIS.

3.9 How Information Supply is Initiated?
The supply of information available to managers may be initiated in any one of the following four ways:

- Periodic scheduled reports
- Exception reports
- Demand reports and responses
- Push reports

Periodic scheduled reports are initiated according to a pre-specified format or provided on a scheduled basis. These reports generally have predefined formats. Exception reports are produced only when exceptional conditions occur. These reports may or may not have a pre-designed format. Exceptional reporting helps to reduce information overload on managers. Demand reports and responses are made available as and when demanded by managers. These are ad hoc reports with no fixed schedule for preparation. These reports generally do not have fixed format. Push reports are generated at the discretion or initiative of the sender. The initiator of the report may send such a report to more than one recipient at a time. Such reports may be sent to a networked PC over the corporate intranet.
Summary

- The purpose of an MIS is to provide the required information to managers in an organisation to support and facilitate their work.
- Operational management is largely the function of lower levels of managers who makes decisions that affect day-to-day operations.
- The purpose of operational management information is to support the normal operations of the organisation.
- Operational management information is generally extracted out of internal business transactions data, with only limited use of external data.
- Tactical management is largely the responsibility of middle level managers.
- The upward flow of information is from the lower level of the organisation to the upper levels – from subordinates to their managers.
- Downward flow of information is from the upper level of the organisation to the lower levels – from managers to their subordinates.

References


Recommended Reading

Self Assessment

1. __________ management is largely the function of lower levels of managers who makes decisions that affect day-to-day operations.
   a. Operational
   b. Tactical
   c. Strategic
   d. Functional

2. __________ management covers the middle management activities of operational planning and control.
   a. Operational
   b. Tactical
   c. Strategic
   d. Functional

3. __________ management undertakes tasks such as plan working capital, schedule production, formulate budgets, and make short-term forecasts.
   a. Operational
   b. Tactical
   c. Strategic
   d. Functional

4. __________ planning are the top-level management activities concerned with matters such as business objectives, policies, strategies and long term plans.
   a. Operational
   b. Tactical
   c. Strategic
   d. Functional

5. __________ is concerned with reducing costs of performing a job, or making the task of performing the job easier.
   a. Improving efficiency
   b. Improving effectively
   c. Transformation
   d. Managerial tasks

6. Which of the following statements is true?
   a. Linked tasks are performed by individuals or groups but their work affects or is affected by others, for example, collecting past performance and environmental data for the preparation of five year financial projections.
   b. Isolated tasks are performed by individuals or groups but their work affects or is affected by others, for example, collecting past performance and environmental data for the preparation of five year financial projections.
   c. Collaborative tasks are performed by individuals or groups but their work affects or is affected by others, for example, collecting past performance and environmental data for the preparation of five year financial projections.
   d. Organisational tasks are performed by individuals or groups but their work affects or is affected by others, for example, collecting past performance and environmental data for the preparation of five year financial projections.
7. Which of the following statements is true?
   a. Isolated tasks involve interaction of more than one individual or groups, for example, developing and agreeing on targets for five year corporate plans.
   b. Organisational tasks involve interaction of more than one individual or groups, for example, developing and agreeing on targets for five year corporate plans.
   c. Collaborative tasks involve interaction of more than one individual or groups, for example, developing and agreeing on targets for five year corporate plans.
   d. Linked tasks involve interaction of more than one individual or groups, for example, developing and agreeing on targets for five year corporate plans.

8. Which of the following statements is true?
   a. Improving effectively is concerned with reducing costs of performing a job, or making the task of performing the job easier.
   b. Improving efficiency is concerned with reducing costs of performing a job, or making the task of performing the job easier.
   c. Transformation is concerned with reducing costs of performing a job, or making the task of performing the job easier.
   d. Tactical planning is concerned with reducing costs of performing a job, or making the task of performing the job easier.

9. Which of the following statements is true?
   a. Improving effectively involves changing the basic way of doing business.
   b. Strategic planning involves changing the basic way of doing business.
   c. Tactical planning involves changing the basic way of doing business.
   d. Transformation involves changing the basic way of doing business.

10. Which of the following statements is true?
    a. Comfort information informs about current situation or achievement levels that are tuned to expectations.
    b. Warning information informs about current situation or achievement levels that are tuned to expectations.
    c. Status information informs about current situation or achievement levels that are tuned to expectations.
    d. Planning information informs about current situation or achievement levels that are tuned to expectations.
Chapter IV
Importance of Software and Hardware in MIS

Aim
The aim of this chapter is to:

- explain overall capabilities and working of computer systems
- determine role of software in computer systems
- enlist various categories of softwares used in computer systems, along with their use

Objectives
The objectives of this chapter are to:

- explain essential features of computer systems
- enlist the types of computer systems
- describe importance of software application in management

Learning outcome
At the end of this chapter, you will be able to:

- understand the role of software and hardware in MIS
- comprehend the components of hardware and purpose served by them
- identify various types of software and programming languages used in MIS
4.1 Introduction

Nowadays the booming technology has taken deep roots in every field. It is impossible for anyone to imagine a world without high computing environment.

In management field computer plays a vital role directly or indirectly. At all the 3 levels of management, i.e. operational level, middle level and high level broad use of computers is made. Computers can broadly be divided in two, the hardware and software.

Hardware is a physical device that one can touch and see. Software is code and instructions that tell a computer and/or hardware how to operate. This code can be viewed and executed using a computer or other hardware device.

4.2 Computer Hardware Basics

- Hardware refers to the physical equipment used for information processing, including systems in these equipments used for accepting input data for processing and generating output information to be supplied for information.

- Traditional equipment like typewriters, visible index systems, slide rules and calculators are all examples of hardware used in information systems. But the most important class of information processing hardware today is computers.

- The communication systems also rely heavily on computers for effective, speedy, and economical operation. Earlier transmission of message was done by traditional methods like hand written letters or face to face communication. But with the advance technologies communication is much easier with the help of emails, telephones, fax etc.

4.2.1 Importance of Computers

- In any organisation managers are the one who take decisions. Decisions are taken on the basis of the information they have in hand.

- Computers can store a huge amount of information and maintain security. Managers need basic understanding of computer systems to be able to access information, interact with employees and take decisions.

- Managers also need to understand larger computer systems operated by the IT department, to participate effectively with the IT people in developing ways to use them more effectively to support their operational as well as management functions.

- They need a good understanding of capabilities and limitations of computers to decide wisely on using computers in operations they manage.

4.2.2 Essential Features of Computers

- With the advancement in technologies there are computers which are smaller than a palm. There are also super computers which need large buildings for storage.

- Computer is equipment that has information based on a set of data and processing instructions that are stored within the equipment.

- Once data and processing instructions are fed in the computer, it can be instructed to start the processing, and it will perform the operation on its own and determine the desired output.

- A computer system consists of two broad subsystems – hardware and software. Computer hardware is the physical part of a computer, including the digital circuitry, as distinguished from the computer software that executes within the hardware.

- The hardware of a computer is infrequently changed, in comparison with software and data, which are “soft” in the sense that they are readily created, modified or erased on the computer.

- The computer must be able to receive the data and instructions to be stored within it. The computer also needs capability to give out the information resulting from processing in a usable form.
• If data and information cannot be fed in the computer, it cannot do any processing; and if it cannot give out the results of processing to the user there is no purpose served by processing.
• Basic computer has three essential features. An input facility to accept input data, a central processing unit to store data, and an output facility to give/supply required data or information.
• Here we have not mentioned any separate facility to input or store the processing instructions, because the facility for these is common with that for data to be processed.
• In addition to having a memory within the CP, a computer today has secondary data storage facility. The difference between the memory within the computer and secondary storage is that the contents of the memory are totally controlled within the CP as per the requirements of the processing being done.
• The part that stores and processes the data is called the central processor (CP). This central processor also controls or manages operations of all other components of the computer.

4.2.3 Components of Computers
Based on the essential features of computers described in the above paragraph, we can identify the following distinct components of a computer.
• CP (Central Processor)
• Secondary Storage
• Input Devices
• Output Devices

All the components of the computer other than the CP are called computer peripherals. The nature, variety, and performance characteristics of the CP and different types of peripherals are discussed in the following sections.

4.2.4 Types of Computer Systems
Following are the types of computer system:
Central processor
CP (Central Processor) is the heart or the brain of a computer system that does the actual processing. The power or capacity of the computer is in terms of speed of processing and the kind and number of other computer components it can support.

Central processing unit
A central processing unit (CPU) is the component in a digital computer that interprets computer program instructions and processes data.

A CPU that is manufactured as a single integrated circuit is usually known as a microprocessor.

Primary memory
Another part of the computer is the main or primary memory which comes in two principal varieties: Random Access Memory or RAM and Read-Only Memory or ROM.
• RAM can be read and written to anytime the CPU commands it, but ROM is pre-loaded with data and software that never changes, so the CPU can only read from it.
• ROM is typically used to store the computer’s initial start-up instructions.

Secondary storage
• Secondary data storage is designed to hold much more data than is feasible to store in the primary storage of the computer.
There are three reasons for not storing all the data in computer memory.

• The internal memory of the computer is designed for very fast storage and retrieval of data. This requires memory systems that are more expensive per byte stored.

• As the size of the internal memory is increased; the storage and retrieval speed also goes down.

• The internal memory gets completely wiped off when power supply is cut off. Thus all the internal memory is temporary.

Input devices

• All computers need to be fed with some external data for which some input device is needed. Similarly some output device is needed to get the data or information out of the system.

• Computers use a variety of input and output devices. Some of these can be used as both input and output devices.

• We will discuss these devices which can be used for both the purposes as part of input devices. Devices which are used only for output will be discussed in the next section.

4.3 Computer Software Basics

• A software, or program, enables a computer to perform specific tasks, as opposed to the physical components of the system or the hardware.

• This includes application software such as a word processor, which enables a user to perform a task, and system software such as an operating system, which enables other software to run properly, by interfacing with hardware and with other software or custom software made to user specifications.

• In computers, software is loaded into RAM and executed in the central processing unit. At the lowest level, software consists of a machine language specific to an individual processor.

• In practical terms, a computer program might include anywhere from a dozen instructions to many millions of instructions for something like a word processor or a web browser. A typical modern computer can execute billions of instructions every second and nearly never make a mistake over years of operation.

• Errors in computer program are called bugs. Sometimes bugs are kind and do not affect the usefulness of the program, in other cases they might cause the program to completely crash.

4.4 Importance of Software Application in Management

• In operational level of any organisation there are thousands of transactions to be performed daily. The transactions carried out help to improve the routine business activity and affect the overall performance of any organisation.

• The transactions may include calculations, summarising or sorting of data. Most of the organisations have automated computer systems for handling their transactions. The use of computers drastically increases the speed at which the transactions occur and provide greater accuracy. The main advantage is that the computers can be programmed and changed from time to time with change in activities.

• The middle level management benefits the most by the use of computers and automated systems. The computer helps the manager to take crucial decisions and helps in solving problems.

• With computers the manager can take better decisions and can draw conclusions with help of precise data in no time. Preparing daily reports in graphical format makes it easier for the manager. The rise and the falls in employee’s performance can be easily traced with several automated systems.

4.4.1 Programming Language

From the moment you turn on your computer, it is running programs, carrying out instructions, testing your ram, resetting all attached devices and loading the operating system from hard disk or CD-ROM.
Each and every operation that your computer performs has instructions that someone had to write in a programming language. These had to be created, compiled and tested- a long and complex task.

In other words a program is written as a series of human understandable computer instructions that can be read by a compiler and linker, and translated into machine code so that a computer can understand and run it.

### 4.4.2 Types of Software

Practical computer systems divide software into three major classes: Systems Software, Programming Software and Application Software, although the distinction is arbitrary, and often blurred.

- **System software** is a generic term referring to any computer software which manages and controls the hardware so that application software can perform a task. It is an essential part of the computer system. It includes operating systems, device drivers, diagnostic tools, servers, windowing systems, utilities and more. The purpose of systems software is to insulate the applications programmer as much as possible from the details of the particular computer complex being used, especially memory and other hardware features, and such accessory devices as communications, printers, readers, displays, keyboards, etc.

- **Programming software** usually provides tools to assist a programmer in writing computer program and software using different programming languages in a more convenient way. The tools include text editors, compilers, interpreters, linkers, debuggers, and so on.

- **An Integrated Development Environment (IDE)** merges those tools into a software bundle, and a programmer may not need to type multiple commands for compiling, interpreter, debugging, tracing, etc., because the IDE usually has an advanced graphical user interface, or GUI.

- **Application software** allows end users to accomplish one or more specific (non-computer related) tasks. Application software or Applications are what most people think of when they think of software. Typical applications include industrial automation, business software, educational software, medical software, databases, and computer games.

- **Businesses** are probably the biggest users of application software, but almost every field of human activity now uses some form of application software. It is used to automate all sorts of functions.
Summary

- Hardware refers to the physical equipment used for information processing, including systems in these equipments used for accepting input data for processing and generating output information to be supplied for information.
- Computer is equipment that has information based on a set of data and processing instructions that are stored within the equipment.
- Once data and processing instructions are fed in the computer, it can be instructed to start the processing, and it will perform the operation on its own and determine the desired output.
- CP (Central Processor) is the heart or the brain of a computer system that does the actual processing.
- A central processing unit (CPU) is the component in a digital computer that interprets computer program instructions and processes data.
- Secondary data storage is designed to hold much more data than is feasible to store in the primary storage of the computer.

References


Recommended Reading

Self Assessment

1. ________________ usually provides tools to assist a programmer in writing computer programs and software using different programming languages in a more convenient way.
   a. Programming software
   b. Application software
   c. System software
   d. Primary memory

2. ________________ is a generic term referring to any computer software, which manages and controls the hardware so that application software can perform a task.
   a. Programming software
   b. Application software
   c. System software
   d. Primary memory

3. The ________________ management benefits the most by the use of computers and automated systems.
   a. top level
   b. middle level
   c. lower level
   d. shop floor

4. Errors in computer program are called ________________.
   a. virus
   b. worms
   c. bugs
   d. conflicts

5. All computers need to be fed with some external data for which some ________________ is needed.
   a. input device
   b. output device
   c. process
   d. function

6. Which of the following statements is true?
   a. Application software allows end users to accomplish one or more specific tasks.
   b. System software allows end users to accomplish one or more specific tasks.
   c. Programming software allows end users to accomplish one or more specific tasks.
   d. Application software allows end users to accomplish only one task.

7. Which of the following statements is true?
   a. Bugs do not affect the usefulness of the program.
   b. Sometimes bugs are kind and do not affect the usefulness of the program.
   c. Bugs always affect the usefulness of the program.
   d. Bugs are good and help in the processing work.
8. Which of the following statements is true?
   a. Secondary data storage is designed to hold much more data than is feasible to store in the primary storage of the computer.
   b. Primary data storage is designed to hold much more data than is feasible to store in the secondary storage of the computer.
   c. Secondary data storage cannot hold more data than the primary storage of the computer.
   d. Primary data storage can hold only as much data in the secondary storage of the computer.

9. Which of the following statements is true?
   a. Traditional equipment like typewriters, visible index systems, slide rules and calculators are all examples of hardware used in information systems.
   b. Equipment like typewriters, visible index systems, slide rules and calculators are all examples of software used in information systems.
   c. Equipment like typewriters, visible index systems, slide rules and calculators are all examples of software and hardware used in information systems.
   d. Equipment like typewriters, visible index systems, slide rules and calculators are all examples of software used in operating systems.

10. Which of the following statements is true?
    a. Managers need basic understanding of computer systems to be able to access information, interact with employees and take decisions.
    b. Managers need basic understanding of computer systems to interact with employees and take decisions.
    c. Without the knowledge the computer systems the managers can access information from the computers.
    d. Computer system is only helpful to the managers and not to all the employees in an organisation.
Chapter V
Communication and Computer Networks in MIS

Aim

The aim of this chapter is to:

• explain the roles and benefits of communication in MIS
• enlist different types and arrangements of networks linking computer data interchange
• state the features and capabilities of Internet and how it is being used in business

Objectives

The objectives of this chapter are to:

• enlist different components of computer network
• state different types of network
• explain the use of satellite, radio and wire based communication

Learning outcome

At the end of this chapter, you will be able to:

• identify different modes of communication between computers and characteristics of each
• understand role and benefits of communication in MIS
• identify the different components of computer network
5.1 Introduction
Communication means exchange of ideas from one person or place to another. Individuals mostly communicate by speaking. They also communicate using various forms of recorded information such as written documents, pictures, audios and videos. In all these cases the medium must be physically accessible by the recipient of the information. Thus, either the physical medium containing the information must be transported to the recipient or the recipient must come to the medium.

The widely used system for this type of communication is the postal system with its worldwide network. Much faster and economical communication is possible using telecommunication systems. Initially, communication of information to be fed to computers or generated by them was also by physical transfer of data storage media such as printed documents, punched cards, tapes and floppies. To some extent this is still used in a limited way. However, it is more convenient, fast and economical to use telecommunication for the exchange of information between computers.

Telecommunication is the transmission of data by electrical means which may originate in alphabetical, numerical or pictorial form, from one place to another. It is used to exchange data between different computer systems and parts of it. Networks of communication systems allow them to share peripherals, data and program.

Many technologies have been applied to the office to improve business communication and information processing. These include network of computing facilities offering services like distributed processing, hardware facilities sharing, data transfer, e-mail, voice mail, and video conferencing.

5.2 Development of Telecommunication
Following are the various communication systems:

Wire based communication systems
An early milestone in telecommunications was the laying of a trans-Atlantic submarine telegraph cable in 1865. It could transmit 12 words per minute (128 bits per second), which may be compared with recent transmission rates. Voice transmission came in 1876 with Graham Bell’s discovery of the telephone. Submarine telephone cables appeared only in the 1950s. Now a days they comprise optical fiber; recent trans-Atlantic cables provide 5 GB per second on each of four fibers per cable and carry 300,000 simultaneous speech conversations.

Technology was invented to encode (modulate) data into sound based signals the telephone network could carry. The data would be converted (demodulated) back into bits at the other end. A modem is used for this modulation and demodulation of digital data.

Radio communication
Radio communication dispenses with the need for a wire connection. Shortwave radio has long been used for point-to-point communication in special projects, but this provides connection only to one or a few other sites. In recent decades, the short-wave radio has been used in various new ways to provide access to the public telecommunications system through mobile (“cellular”) phones, satellite communications and packet radio.

Cellular systems allow an individual to connect to the public telephone system by means of a hand-held mobile phone, which transmits to and receives from a local short-wave radio base station. Base stations are distributed regularly so that a person is always within range of one. The range is usually a few kilometers, which makes the system suited to well populate areas.

A mobile-phone user can in principle speak with any fixed-line telephone user or any other mobile phone user. As a user moves for example with a car, bus, or train, the system automatically switches the user’s mobile phone to successive base stations.
Satellite communications

Satellite communications enable a person to make telephone calls, send emails, fax and connect to the internet from anywhere. Some units are as small as a briefcase, weigh only 3.9 kg, and connect to a laptop or desktop computer to provide all these services, at a data transmission rate of 64 kbps. Potentially they offer an alternative to poor local telephone and Internet services, but at the time of writing, cost, particularly usage charges, limit their use for NARS.

Satellite communications are of various types. The first to become available made use of “geostationary” satellites. These rotate around and with the Earth every 24 hours and therefore remain above the same point on the Earth’s surface, at an altitude of some 36,000 kilometers. Each such satellite therefore has its own “footprint” of the Earth’s surface, in which two-way traffic flows between it and ground stations. They lie on the equatorial plane and three satellites can cover the world, excluding the Polar Regions. The user connects to a geostationary satellite by means of a portable short-wave radio transmitter with a parabolic reflector aimed at the satellite.

Low Earth Orbit (LEO) satellites orbit the Earth several times per day, at a much lower altitude, typically 780 km. At this closer distance smaller transmitter-receivers can be used, in the form of a hand-held phone with a small antenna, though these may weigh 300–500 grams compared with the 150 grams or so for a cellular phone.

Medium Earth orbit (MEO) satellites orbit the Earth at an altitude of around 10,000 km. In one configuration, 10 satellites are distributed equally between two planes, each inclined at 45 degrees to the equator and at right angles to the other, to provide complete, continuous overlapping coverage of the Earth’s surface. Each satellite will circle the Earth approximately once every six hours.

5.3 Elements of Communication Systems

Following are the basic requirements for working of a communication system:

- A sender (source) which creates the message to be transmitted
- A medium that carries the message
- A receiver (sink) which receives the message

In data communication four basic terms are frequently used. They are:

- Data: A collection of facts in raw forms that become information after processing.
- Signals: Electric or electromagnetic encoding of data.
- Signaling: Propagation of signals across a communication medium.
- Transmission: Communication of data achieved by the processing of signals.

5.4 Computer Network

A computer network is an interconnection of various computer systems located at different places. In computer network two or more computers are linked together with a medium and data communication devices for the purpose of communicating data and sharing resources. The computer that provides resources to other computers on a network is known as server. In the network the individual computers, which access shared network resources, are known as workstations or nodes.

Computer Networks may be classified on the basis of geographical area in two broad categories.

5.4.1 Local Area Network

Networks used to interconnect computers in a single room, rooms within a building or buildings on one site are called Local Area Network (LAN). LAN transmits data with a speed of several megabits per second (106 bits per second). The transmission medium is normally coaxial cables.
LAN links computers, i.e., software and hardware, in the same area for the purpose of sharing information. Usually LAN links computers within a limited geographical area because they must be connected by a cable, which is quite expensive. People working in LAN get more capabilities in data processing, work processing and other information exchange compared to stand-alone computers. Because of this information exchange most of the business and government organisations are using LAN.

**Characteristics of LAN**
- Every computer has the potential to communicate with any other computers of the network
- High degree of interconnection between computers
- Easy physical connection of computers in a network
- Inexpensive medium of data transmission
- High data transmission rate

**Advantages**
- The reliability of network is high because the failure of one computer in the network does not effect the functioning for other computers.
- Addition of new computer to network is easy.
- High rate of data transmission is possible.
- Peripheral devices like magnetic disk and printer can be shared by other computers.

**Disadvantages**
- If the communication line fails, the entire network system breaks down.

### 5.4.2 Wide Area Network

The term Wide Area Network (WAN) is used to describe a computer network spanning a regional, national or global area. For example, for a large company the head quarters might be at Delhi and regional branches at Bombay, Madras, Bangalore and Calcutta. Here regional centers are connected to head quarters through WAN. The distance between computers connected to WAN is larger. Therefore, the transmission medium used is normally telephone lines, microwaves and satellite links.

**Characteristics of WAN**

**Communication facility**

For a big company spanning over different parts of the country the employees can save long distance phone calls and it overcomes the time lag in overseas communications. Computer conferencing is another use of WAN where users communicate with each other through their computer system.

Remote data entry is possible in WAN. It means sitting at any location you can enter data, update data and query other information of any computer attached to the WAN but located in other cities. For example, suppose you are sitting at Madras and want to see some data of a computer located at Delhi, you can do it through WAN.

**Centralised information**

In modern computerised environment you will find that big organisations go for centralised data storage. This means if the organisation is spread over many cities, they keep their important business data in a single place. As the data are generated at different sites, WAN permits collection of this data from different sites and save at a single site.

**Examples of WAN**

**Ethernet**

Ethernet developed by Xerox Corporation is a famous example of WAN. This network uses coaxial cables for data transmission. Special integrated circuit chips called controllers are used to connect equipment to the cable.
The Arpanet is another example of WAN. It was developed at Advanced Research Projects Agency of U. S. Department. This Network connects more than 40 universities and institutions throughout USA and Europe.

### 5.4.3 Difference between LAN and WAN

- **LAN** is restricted to limited geographical area of few kilometers. But **WAN** covers great distance and operate nationwide or even worldwide.

- In **LAN**, the computer terminals and peripheral devices are connected with wires and coaxial cables. In **WAN** there is no physical connection. Communication is done through telephone lines and satellite links.

- Cost of data transmission in **LAN** is less because the transmission medium is owned by a single organisation. In case of **WAN** the cost of data transmission is very high because the transmission medium used is hired either telephone lines or satellite links.

- The speed of data transmission is much higher in **LAN** than in **WAN**. The transmission speed in **LAN** varies from 0.1 to 100 megabits per second. In case of **WAN** the speed ranges from 1800 to 9600 bits per second (bps).

- Few data transmission errors occur in **LAN** compared to **WAN**. It is because in **LAN** the distance covered is negligible.

### 5.4.4 Network Topology

The term topology in the context to communication network refers to the way the computers or workstations in the network are linked together. According to the physical arrangements of workstations and nature of work, there are three major types of network topology. They are star topology, bus topology and ring topology.

#### Star topology

In star topology a number of workstations (or nodes) are directly linked to a central node. Any communication between stations on a star LAN must pass through the central node. There is bi-directional communication between various nodes. The central node controls all the activities of the nodes. The advantages of the star topology are:

- It offers flexibility of adding or deleting of workstations from the network.

- Breakdown of one station does not affect any other device on the network.

The major disadvantage of star topology is that failure of the central node disables communication throughout the whole network.

#### Bus topology

In bus topology all workstations are connected to a single communication line called bus. In this type of network topology there is no central node as in star topology. Transmission from any station travels the length of the bus in both directions and can be received by all workstations. The advantage of the bus topology is that

- It is quite easy to set up.

- If one station of the topology fails it does not affect the entire system.

The disadvantage of bus topology is that any break in the bus is difficult to identify.

#### Ring topology

In ring topology each station is attached nearby stations on a point to point basis so that the entire system is in the form of a ring. In this topology data is transmitted in one direction only. Thus the data packets circulate along the ring in either clockwise or anti-clockwise direction. The advantage of this topology is that any signal transmitted on the network passes through all the LAN stations. The disadvantage of ring network is that the breakdown of any one station on the ring can disable the entire system.
5.5 The Internet

The Internet is a network of networks. It is a worldwide collection of networks, communication protocols, and software applications. Millions of computers all over the world are connected through the Internet. Computer users on the Internet can contact one another anywhere in the world. It is emerging as a low-cost means of information sharing between almost any two computers that are connected to the public telephone or other telecommunication system. It is very much similar to the telephone connection where you can talk with any person anywhere in the world.

In Internet, a huge resource of information is accessible to people across the world. Information in every field starting from education, science, health, medicine, history, and geography to business, news, etc. can be retrieved through the Internet. One can also download program and software packages from anywhere in the world. Due to the tremendous information resources the Internet can provide, it is now indispensable to every organisation.

There are two main ways of communicating through the Internet. First, any connected computer may send and receive e-mail to any other. Second, significant numbers of large computers act as hosts (called servers) for large repositories of information on a wide range of topics. The owners allow these servers to be accessed by the public using the telephone system to transmit requests for data into the server and transmission of the requested data back to the inquirer.

Benefits of using networks

Networks can be used to provide the following benefits to an organisation.

- **Sharing peripherals**: Some peripherals such as printers may be required by individual users only occasionally. It is possible to economise on cost of such peripherals by sharing them with more than one computer. Networking makes such peripheral sharing possible very conveniently. Users from each computer or network terminal can use the shared peripheral as if it is connected directly to his or her computer.

- **Sharing data storage and processing power**: Multiple users may use a common database and/or require powerful computing facilities. Frequently it is possible achieve economy by connecting multiple computers with limited capacity to larger central systems. Networking in this situation also ensures that all the users have the same set of data, which helps to avoid errors and confusion.

- **Sharing applications**: Some applications, by their basic nature, need to be operated by multiple users. For example, a Indian Railway’s passenger reservation systems allows passengers to reserve their seats from any one of the thousands of booking counters distributed across the length and width of India. The only way to run such applications is to link all such users through a computer network system.

- **Cost**: When multiple users operating from different computers need to use the same software, it is possible to economise on software cost by installing multi-user software in a network. The cost of a single copy of multi-user is usually more than a single user version, but less than the cost of multiple copies of a single user system.

- **On-line capture of data**: Many computer systems involve capturing data at source as a part of on-line transaction processing. For example, a small microcomputer may be installed at a retail outlet checkout counter for billing purpose, and data from this may have to be fed to another computer that handles other applications such as inventory control and accounting. Usually there is more than one location from which such data is to be captured, and all these need to be connected to a common system. Even when the number of such data captures locations is one; it may not be possible to install the main computer at the data capture location.

- **Speedy and economical transfer of data**: Networking permits the transfer of large volumes of data between computers linked through networks. When the linking between computers involves laying of exclusive communication links, the cost can be quite high for long distance systems, but with leased communication links, particularly the internet system, such communication has also become very economical.
Summary

- Communication means exchange of ideas from one person or place to another.
- Satellite communications enable a person to make telephone calls, send emails, fax and connect to the internet from anywhere.
- In computer network two or more computers are linked together with a medium and data communication devices for the purpose of communicating data and sharing resources.
- Networks used to interconnect computers in a single room, rooms within a building or buildings on one site are called Local Area Network (LAN).
- In bus topology, all workstations are connected to a single communication line called bus. In this type of network topology.
- In ring topology, each station is attached nearby stations on a point to point basis so that the entire system is in the form of a ring.

References


Recommended Reading

**Self Assessment**

1. An early milestone in ______________ was the laying of a trans-Atlantic submarine telegraph cable in 1865.
   a. telecommunications
   b. communications
   c. computer networks
   d. signaling

2. ______________ communication dispenses with the need for a wire connection.
   a. Wire based
   b. Radio
   c. Satellite
   d. Network

3. ______________ communications enable a person to make telephone calls, send emails, fax and connect to the internet from anywhere.
   a. Wire based
   b. Radio
   c. Satellite
   d. Network

4. ____________ is a collection of facts in raw forms that become information after processing.
   a. Data
   b. Network
   c. Communication
   d. Signals

5. ____________ are electric or electromagnetic encoding of data.
   a. Radio
   b. Network
   c. Communication
   d. Signals

6. Which of the following statements is true?
   a. Signaling is propagation of signals across a communication medium.
   b. Radio communication is propagation of signals across a communication medium.
   c. Satellite communication is propagation of signals across a communication medium.
   d. Network communication is propagation of signals across a communication medium.

7. Which of the following statements is true?
   a. Satellite is communication of data achieved by the processing of signals.
   b. Transmission is communication of data achieved by the processing of signals.
   c. Ring topology is communication of data achieved by the processing of signals.
   d. LAN is communication of data achieved by the processing of signals.
8. Which of the following statements is true?
   a. In star topology data is transmitted in one direction only.
   b. In bus topology data is transmitted in one direction only.
   c. In ring topology data is transmitted in one direction only.
   d. In LAN data is transmitted in one direction only.

9. Which of the following statements is true?
   a. In WAN a number of workstations are directly linked to a central node.
   b. In ring topology a number of workstations are directly linked to a central node.
   c. In bus topology a number of workstations are directly linked to a central node.
   d. In star topology a number of workstations are directly linked to a central node.

10. Which of the following statements is true?
    a. LAN links computers, i.e., software and hardware, in the same area for the purpose of sharing information.
    b. WAN links computers i.e. software and hardware, in the same area for the purpose of sharing information.
    c. Communication network links computers i.e. software and hardware, in the same area for the purpose of sharing information.
    d. Satellite communication links computers i.e. software and hardware, in the same area for the purpose of sharing information.
Chapter VI
Support Models and Knowledge Management

Aim
The aim of this chapter is to:

- explain the models of computer processing commonly used in business
- explain the features of the processing models
- describe the advantages of processing models

Objectives
The objectives of this chapter are to:

- explain models of computer processing
- describe the advantages and limitations of processing models
- elucidate the features of processing models commonly used in business

Learning outcome
At the end of this chapter, the students will be able to:

- understand models of computer processing
- identify advantages and limitations of processing models
- describe the features of processing models commonly used in business
6.1 Introduction
A computerised MIS uses different processing modes and techniques to provide a wide range of support to managers. By processing modes, we refer to the different computer systems operations, while techniques focus on the nature of information and analysis to provide support to managers in specific ways.

To be able to select and use various processing modes appropriately for their different MIS needs, managers need to know what these modes and techniques are, what their main features are, how to use them, and their advantages and limitations.

6.2 Transaction Processing Systems
Transactions are events or activities that take place during the management and operation of an organisation. Receipt of a material against a purchase order placed is an operational transaction. Similarly, a manager approving the leave of a subordinate is a management transaction. All primary business operations consist of transactions such as a sale at a store, preparing a cheque, receiving material in store, and authorising a leave application.

Performing these transactions require input data, at the same time the transactions generate output data, which is used for other transactions and for updating the records in the company. These records serve as input data for other operations and for the management information system. Also the transaction may require generation of some document or other output.

A computerised system used for providing input information for the transaction, capturing the output data created, or generating the required document is called a transaction processing system (TPS). A TPS collects and stores information about transactions and controls some aspects of transactions.

A TPS is a basic business system:
- serves the most elementary day-to-day activities of an organisation
- supports the operational level of the business
- supplies data for higher-level management decisions
- is often critical to the survival of the organisation
- mostly for predefined, structured tasks
- can have strategic consequences (e.g. airline reservation system)
- usually have high volumes of input and output
- provides data which is summarised into information by systems used by higher levels of management
- need to be fault-tolerant

6.3 Online Analytical Processing (OLAP)
In the sections above we have discussed the transaction processing systems which are used for operations as well as management transactions. In addition to transaction processing, MIS include other types of processing such as:
- Planning
- Decision making
- Monitoring
- Analysing
- Controlling

Typically the control action of managers involves in input to the system involving change in plans or decisions, which are based on monitoring and analysis of the actual situation and performance as compared to planned. Thus we may say that planning and decision itself involves analysis.
The systems of analysis can be of two types:

- In the first type, the nature of analysis is fairly well defined and can be performed as per pre-determined algorithms.
- There is another type of processing that is not so well defined and a manager may need to understand and analyze a situation examining it from different angles.
- Computer systems support this type of analysis using a processing system called on-line analytical processing system (OLAP). It enables managers and analysts to interactively examine and manipulate large amounts of detailed and consolidated data from many perspectives. When performed along a time axis, helps analyze trends and find patterns.

### 6.4 Decision Support System (DSS)

To succeed, companies need information systems that can support the diverse information and decision-making needs of their managers and business professionals. The type of information required by decision makers is directly related to the level of management and the amount of structure in the decision situations. We can broadly classify management decisions as:

- Structured
- Unstructured
- Semi-structured

Structured decisions involve situations where the procedures to be followed can be specified in advance. Unstructured decisions involve situations where it is not possible to specify most of the decision procedures in advance. Semi-structured decisions can be specified in advance, but not clearly enough to lead to a definite recommended decision using a totally pre-specified decision process.

Managers judgment plays a vital role in decision making using DSS. Additional information requirements may be identified as decision-making progresses. In DSS, the user must be able to request report by defining their content and format. The data needed to produce these reports may originate from many different files or databases.

**Advantages of these systems are:**

- They can be and are very flexible in terms of the kinds of data and constraints they can handle.
- They often are the best solution to decision problems that have very complex constraints and few possible solutions.
- DSS tries to go beyond simple reports, combining information from a database with relatively sophisticated analytical techniques, with a view to helping make some potentially complex or difficult decisions.

### 6.5 Executive Information System (EIS)

Executive information systems (EIS), also called “Enterprise Information Systems” or “Executive Support Systems” (ESS), may be regarded as a specialised kind of DSS to meet the information needs of senior management such as:

- Performance measures of critical factors
- Descriptions of current key problems
- Highlights of the things in which senior management is most interested
- Detailed reports of subordinates’ performance

**Features typical of a good EIS include:**

- Aggregates of a wide range of organisation data
- Reports of “actual versus planned” actions,
- Clear graphics
• Easy access to key internal and external information
• tailored targeting of the critical success factors of the individual executive

**Advantages of EIS**
• Increased speed of problem identification and decision making
• The extent of analysis in decision making
• It was originally developed to provide top executives with immediate, easy access to information about the firm’s “critical success factors”.

EIS are used by top level management. At the strategic level, the typical decision is unstructured. Often there is no specific question but rather a series of undefined situations executives may face. These executives require summarised, historical information gleaned from all other levels of the organisation, coupled with large amounts of external data gathered from many sources. ESS provides executives information in a readily accessible, interactive format.

### 6.6 Groupware

Groupware is an information system designed to enable groups to work together electronically. Groupware increases productivity by supporting teamwork and shifting the workflow from paper to electronic means of communication.

Though definitions differ, “workgroup computing” usually refers to everything involved when a group of people use computers to collaborate toward a common goal. Success involves many complex organisational factors that go far beyond choosing the best software to buy. Groupware is a broad category that covers everything from sophisticated electronic-mail packages to entire office automation suites.

Some popular groupware applications are:
• Group authoring
• Calendaring and scheduling conference
• Information sharing
• Project tracking
• Workflow management

Groupware can be conceived to help a face-to-face group, or a group that is distributed over many locations. Furthermore, a groupware system can be conceived to enhance communication and collaboration within a real-time interaction, or an asynchronous, non-real-time interaction. For a product to be considered Groupware must allow people to
• Communicate electronically
• Facilitate the management of their common database used by a group

### 6.6.1 Group Decision Support System

Group Decision Support Systems (GDSS), also called “Enterprise Collaboration Systems”, are a specialised kind of groupware that are more decision-oriented, and focused on helping a group solve a problem or reach a solution. However, subsets of groupware functionality can be found in GDSS. It is an interactive computer-based system used to facilitate the solution of unstructured problems by decision makers working together as a group. Basic elements of GDSS are
• Hardware
• Software and
• People
Hardware includes the physical layout of the meeting room(s) and the electronic hardware, like electronic display boards, audiovisual and computer equipment.

The software includes tools for
- brainstorming
- organising ideas
- gathering information
- ranking and setting priorities and
- other aspects of collaborative work

People include the participants, including a trained facilitator and support staff for the system.

GDSS assist collective decision-making through enhanced group collaboration and creativity, time saving, improved solutions, and social leveling. GDSS results in several benefits including
- a high degree of commitment for project implementation and
- better management of conflict

Users reported improved ability to address planning problems and greater productivity than in ordinary team working, partly through greater opportunity to voice opinions.

6.7 Barcode System

Barcode system is a computer coding system that uses a printed pattern of lines or bars to identify products, mail and packages, customer accounts, and the like. A barcode is a machine-readable representation of information in a visual format on a surface. Originally barcodes stored data in the widths and spacing of printed parallel lines, but today they also come in patterns of dots, concentric circles, and hidden in images.

Barcodes are read by optically scanning the printed pattern and using a computer program to decode the pattern. In a linear barcode system, the code itself contains no information about the item to which it is assigned but represents a string of identifying numbers or letters. When the code is read by an optical scanner linked to a computer, the computer can provide and record information about the item, such as its price or the quantity sold, from and to databases.

The North American Universal Product Code (UPC) uses a set of two dark (usually black) and two light (usually white) bars of specified thicknesses to represent 12 numbers; the similar European Article Numbering Code (EAN), which is now the international standard, has 13 numbers. The dark bars may be from one to three units wide and the light bars from one to four units. For registration purposes two one-unit dark bars are placed at each end and in the middle. Each item is assigned a unique numeric code, which is printed as a barcode on the item’s packaging. So called two-dimensional (2D) barcodes permit the encoding of information about an item in addition to an identifying code.

In a 2D barcode, two axes, or directions, are used for recording and Readings the codes and the bar size is reduced, increasing the space available for data in the way that a column of words improves on a column of letters. Some 2D codes do not use bars at all, such as the United Parcel Service’s hexagon-based Maxi code.

6.7.1 Barcode Applications

Barcodes are used wherever physical objects including documents need to be tagged with information that is to be processed by computers. Instead of typing strings of data into a terminal, the operator only has to display the code to a barcode reader. They also work well in fully automated environments, such as baggage routing at airports.
The data contained in a barcode varies with the application. In the simplest case, an identification number is used as an index in database where the complete information is kept. The EAN-13 and UPC codes commonly found on retail articles work this way.
Summary

- Computerised MIS uses different processing modes and techniques to provide a wide range of support to managers.
- Transactions are events or activities that take place during the management and operation of an organisation. Receipt of a material against a purchase order placed is an operational transaction.
- Typically the control action of managers involves input to the system involving change in plans or decisions, which are based on monitoring and analysis of the actual situation and performance as compared to planned.
- Structured decisions involve situations where the procedures to be followed can be specified in advance. Unstructured decisions involve situations where it is not possible to specify most of the decision procedures in advance.
- Semi-structured decisions can be specified in advance, but not clearly enough to lead to a definite recommended decision using a totally pre-specified decision process.
- Groupware is an information system designed to enable groups to work together electronically.
- Group Decision Support Systems (GDSS), also called “Enterprise Collaboration Systems”, are a specialised kind of groupware that are more decision-oriented, and focused on helping a group solve a problem or reach a solution.
- Barcode system is a computer coding system that uses a printed pattern of lines or bars to identify products, mail and packages, customer accounts, and the like.

References


Recommended Reading

Self Assessment

1. __________ are used wherever physical objects including documents need to be tagged with information that is to be processed by computers.
   a. Barcodes
   b. GDSS
   c. DSS
   d. OLAP

2. __________ assist collective decision-making through enhanced group collaboration and creativity, time saving, improved solutions, and social leveling.
   a. Barcodes
   b. GDSS
   c. DSS
   d. OLAP

3. __________ increases productivity by supporting teamwork and shifting the workflow from paper to electronic means of communication.
   a. Barcodes
   b. GDSS
   c. DSS
   d. Groupware

4. __________ can be conceived to help a face-to-face group, or a group that is distributed over many locations.
   a. Groupware
   b. GDSS
   c. DSS
   d. OLAP

5. Manager judgment plays a vital role in decision making using ____________.
   a. Barcodes
   b. GDSS
   c. DSS
   d. OLAP

6. Which of the following statements is true?
   a. DSS tries to go beyond simple reports, combining information from a database with relatively sophisticated analytical techniques, with a view to helping make some potentially complex or difficult decisions.
   b. EIS tries to go beyond simple reports, combining information from a database with relatively sophisticated analytical techniques, with a view to helping make some potentially complex or difficult decisions.
   c. OLAP tries to go beyond simple reports, combining information from a database with relatively sophisticated analytical techniques, with a view to helping make some potentially complex or difficult decisions.
   d. GDSS tries to go beyond simple reports, combining information from a database with relatively sophisticated analytical techniques, with a view to helping make some potentially complex or difficult decisions.
7. Which of the following statements is true?
   a. A computerised system used for providing input information for the transaction, capturing the output data created, or generating the required document is called as On-line Analytical Processing
   b. A computerised system used for providing input information for the transaction, capturing the output data created, or generating the required document is called as transaction processing system.
   c. A computerised system used for providing input information for the transaction, capturing the output data created, or generating the required document is called as Decision Support System.
   d. A computerised system used for providing input information for the transaction, capturing the output data created, or generating the required document is called as Executive Information System.

8. Which of the following statements is true?
   a. OLAP can be conceived to help a face-to-face group, or a group that is distributed over many locations.
   b. DSS can be conceived to help a face-to-face group, or a group that is distributed over many locations.
   c. GDSS can be conceived to help a face-to-face group, or a group that is distributed over many locations.
   d. Groupware can be conceived to help a face-to-face group or a group that is distributed over many locations.

9. Which of the following statements is true?
   a. EIS increases productivity by supporting teamwork and shifting the workflow from paper to electronic means of communication.
   b. GDSS increases productivity by supporting teamwork and shifting the workflow from paper to electronic means of communication.
   c. Groupware increases productivity by supporting teamwork and shifting the workflow from paper to electronic means of communication.
   d. DSS increases productivity by supporting teamwork and shifting the workflow from paper to electronic means of communication.

10. Which of the following statements is true?
    a. GDSS are used wherever physical objects including documents need to be tagged with information that is to be processed by computers.
    b. DSS are used wherever physical objects including documents need to be tagged with information that is to be processed by computers.
    c. EIS are used wherever physical objects including documents need to be tagged with information that is to be processed by computers.
    d. Barcodes are used wherever physical objects including documents need to be tagged with information that is to be processed by computers.
Chapter VII

Business Process and Design Development Processes

Aim

The aim of this chapter is to:

- explain the basic processes performed by each business functions
- enlist the basic principles of systems concept including components, characteristics and different types of systems
- elucidate the nature and impact of control process within the systems

Objectives

The objectives of this chapter are to:

- explain the nature of business functions
- elucidate the use of systems approach in designing MIS
- examine the basic principles of systems concept

Learning outcome

At the end of this chapter, you will be able to:

- understand the basic processes performed by business functions
- recognise the nature and impact of control process within the systems
- identify the basic nature of information systems using the systems concept
7.1 Introduction

Business processes followed in any establishment are determined by a combination of its basic business requirements and technologies available for handling these requirements. Technology has shaped the way of doing business for ages. Business aided by technology has improved and grown, and in turn created a need for new methods of doing business.

MIS is a type of information system that exists in organisations and supports its management activities. To design, install and operate effective MIS in organisations, we need some understanding of both, management processes and information system. In this chapter we will concentrate on understanding the basic nature of information systems. We will start by discussing the systems concept, which is used to understand, analyse, design, and document information systems.

7.2 The Basic Business Processes

To understand the basic processes that exist in any business, we can classify them into the following broad categories:

- Basic business decision making
- Buying
- Converting or processing the inputs to the business into goods/services for sale
- Selling
- Support functions

7.2.1 Basic Business Decision Making

A business has to make many basic decisions affecting the overall character of the business and its performance. Major of these decisions involve design and selection of alternative policies, objectives, strategies, etc., affecting the total business. These are described below.

Business structure and boundaries

There is a chain of activities and organisations from basic raw materials to the final products and services delivered to the end user. Each business must decide the part it wants to play in the supply chain and its relationship with other channel partners. It must also decide its internal organisation structure.

Missions and objectives

These represent aspirations of the organisation in broad terms like, size, growth rate, market leadership, and major competitive strength. It also covers overall company policies to which all activities within the organisation must conform.

Products / Services to be offered

The business must define the basic product and service it will provide to its customer. Marketing wisdom tells us to define our products broadly in terms of the need it fulfils. This is very important for

- long-term performance
- growth
- even existence of the company

But this is not sufficient for guiding the company in the short and medium term. We need to be more specific about the kind of product and the total product range. One important aspect of this decision is the extent of customisation for individual customers. New models of selling and manufacturing processes have now made it possible to offer customers a very wide choice of products and at the same time achieve economies of mass scale production.
Markets to be covered
We can define markets using geographical boundaries or other market segmentation criteria. Market coverage is important not only for the total size but also for many other factors like product design, selling processes, after sales service requirements and logistics. Internet has greatly influenced the capabilities of the companies to redefine their markets. With the global reach of Internet, companies can reach customers anywhere on the globe at the same cost and time irrespective of distance. On one hand this will assist large corporations to grow even bigger. On the other hand it enables new small business enterprises to develop and prosper by enabling them to reach various niche markets spread all over the world.

Internet makes market segmentation based on social, cultural, personality, and other similar factors much more important not only because of the global reach but also because of its ability to cater to products, services, and sales communication that are customised to individual needs.

Plans and strategies
Here we are referring to plans and strategies covering the total business. In addition to this there will be functional plans and strategies affecting some limited functions and activities. Overall corporate plans and strategies cover the actions required to achieve the organisation’s missions and objectives. It will cover aspects like total business budgets and targets, expansion and diversification plans, and business transformation initiatives (such as BPR).

Conversion processes
Conversion process is the core of the activities of a business carried out internally. It will cover activities like production, quality inspection, maintenance, logistics, and after sales service. A business needs to take a decision on the basic design of these processes. Conversion processes need to be matched with the overall business objectives and strategies. For example, implementation of the mass customisation concept in the National Bicycle Company to offer customers a wider choice of products involved making changes in the sequence of manufacturing operations also.

Business processes
In addition to the physical conversion processes, a business needs to decide the processes of interaction with outsiders and within the business. Planning, monitoring and control of operations are also a part of these business processes.

7.2.2 Buying and Selling Activities
Buying and selling are two sides of common business processes. It involves communication outside the boundaries of the business. Digital information and communication technology has impacted these activities the most by way of opening entirely new ways of conducting new businesses. Popularly these new business models are referred as common businesses. This hides the fact that not all .com businesses handle all the activities and most of the businesses should not even try to conduct all their buying and business activities through the Internet at least not with the current state of availability of IT technology and business model.

7.2.3 Conversion
Conversion includes all the activities performed within the company to convert purchased goods to supply goods and services to customers. Main conversion activities include:

- Production
- Quality inspection
- Maintenance
- Logistics
- After sales service
- Design
- Capacity creation
7.2.4 Support Functions
Support functions aim at improving the efficiency and effectiveness of other activities such as buying, selling, and conversion. These include:

- Human resources
- Administration
- Accounts
- Finance
- Legal and secretarial
- IT Services
- Corporate Planning and projects
- Research and development
- Knowledge Management

7.3 Systems Concept
This concept is used by management and IT personnel to understand the existing processes within an organisation, to develop improved processes, and to design and develop MIS to support and facilitate them. This process of examining a business situation with the intent of improving it through better procedures and methods is called “Systems Analysis and Design”.

The systems approach in business was introduced in the 1960s. The concept is based on the idea of synergism that is, the whole is greater than sum of its parts. In a synergistic system, the collective effect of the whole system is more than the sum of effect of individual part of the system taken separately. This means that in a synergic system the sum of all output produced by a synergistic system is more than the sum of inputs consumed by it. Just like in an effective team, the output produced by the team is more than the sum of outputs that each member of the team can produce independently.

7.3.1 Control of Systems
A part of the output of a system may be fed back to it as input. This is called feedback. The purpose of feedback is to determine how a system is performing and guide action on improvement of system performance. These actions intended to improve system performance are called control actions. The concept of control is very important for the management of any enterprise.

It is particularly important for MIS. Control in a system enables it to become self-regulating, that is, to adjust its design and operation to improve its performance in the light of past experience as well as changes in the environment.

Systems need to be regulated to ensure that they continue to serve their purpose in spite of variations in the environment and other problems faced. Depending upon the nature of the system, this control can be self-regulated or may need to be imposed from outside. Systems that cannot be regulated in this way are destined to stop or perish sooner or later. We can identify systems with varying degrees of self-regulation.

The basic control process in a system with minimum self-regulation has the following features:

- Determining goals and standards to be achieved by the system
- Monitoring the output of the system as compared to the goals and standards
- Feeding back information to the system as an input
- Initiating changes in the process to bring the output back in line with goals and standards when it is out of control
7.3.2 System Performance Standards

In developing self-regulated systems, we can use many different types of parameters. The more common ones of these can be classified in the following broad categories.

**Efficiency**
It is a measure of what is produced divided by what is consumed, or the ratio of output versus input. Another way of measuring efficiency is cost per unit output. Efficiency can be measured for total inputs and outputs or for their selected different components. For example, efficiency of a subsystem of MIS for credit control may be measured as cost of operating the information expressed as percentage in reduction in outstanding as a result of this system.

**Productivity**
It measures output per unit of input. For example, the number of pages printed per month by a printer.

**Effectiveness**
It measures the extent to which a system achieves its goals. It can be computed by dividing the goals actually achieved by the total of the stated goals.

**Customer service**
It measures the extent to which customer requirements in terms of parameters like, speed, promptness, and reliability have been met. For example, a company may set standards that specify that the annual report for the company must be prepared within one week of close of the financial year.

7.3.3 Systems Approach

We use these concepts of systems to help us to understand how organisations work. To understand how different people or sub-units within the organisation interrelate to each other in the process of performing the work intended to achieve the organisational objectives. Particularly, the systems approach is very helpful in understanding how companies plan and control their work. We also use the systems concept to design and describe the working of organisations including its management information systems. Organisations consist of many business systems each having the features of general systems discussed earlier.

The subsystems within an organisation can be identified according to various criteria such as the following:

- Functions such as purchase, production, marketing, design, finance, and HRM Levels of management such as top, middle and supervisory level.
- Nature of activities such as planning, control, and operations.
- Nature of resources handled: for example, finance, material, capital equipment, people and information.
- The systems approach enables us to get a bird’s eye view of complex organisational systems and, at the same time, take care of smaller details focusing on increasingly lower levels of subsystems. It focuses our attention on the relationships among components rather than cause-and-effect chain of isolated events. The systems approach provides a common framework to a team of people to.
- Identify and establish objectives of an organisation and its various activities.
- Identify the various important component functions and activities within the organisation.
- Understand and define the interrelationship between these components. In particular it helps to identify the dependencies of these components in terms of inputs required from each other.
- Clearly understand the existing processes in the organisation and assess their impact on the performance of other subsystems as a total organisation.
- Consider the totality of its relationships with its environment including how the organisation is impacted by organisational factors, and how in turn it impacts the environment.
- Easily describe and evaluate alternate or revised processes to replace the existing ones.
- Document improved processes to aid in their implementation and operation.
Summary

- Business processes followed in any establishment are determined by a combination of its basic business requirements and technologies available for handling these requirements.
- MIS is a type of information system that exists in organisations and supports its management activities.
- A business has to make many basic decisions affecting the overall character of the business and its performance.
- Internet makes market segmentation based on social, cultural, personality, and other similar factors much more important not only because of the global reach but also because of its ability to cater to products, services, and sales communication that are customised to individual needs.
- Conversion includes all the activities performed within the company to convert purchased goods to supply goods and services to customers.

References


Recommended Reading

Self Assessment

1. ____________ is important not only for the total size but also for many other factors like product design, selling processes, after sales service requirements and logistics.
   a. Markets coverage
   b. Objective
   c. Service to be offered
   d. Strategy

2. The ____________ is very helpful in understanding how companies plan and control their work.
   a. control system
   b. system performance standard
   c. system approach
   d. system objective

3. ____________ includes all the activities performed within the company to convert purchased goods to supply goods and services to customers.
   a. Buying and selling activities
   b. Support functions
   c. Conversion
   d. Business decision making

4. ____________ process is the core of the activities of a business carried out internally. It will cover activities like production, quality inspection, maintenance, logistics, and after sales service.
   a. Conversion
   b. Buying and selling activities
   c. Support functions
   d. Business decision making

5. Planning, monitoring and control of operations are also a part of these ____________.
   a. business processes
   b. buying and selling activities
   c. support functions
   d. business decision making

6. Which of the following statements is true?
   a. Productivity measures output per unit of input. For example, the number of pages printed per month by a printer.
   b. Business process measures output per unit of input. For example, the number of pages printed per month by a printer.
   c. Business strategies measures output per unit of input. For example, the number of pages printed per month by a printer.
   d. Conversion measures output per unit of input. For example, the number of pages printed per month by a printer.
7. Which of the following statements is true?
   a. Productivity is a measure of what is produced divided by what is consumed or the ratio of output versus input.
   b. Efficiency is a measure of what is produced divided by what is consumed or the ratio of output versus input.
   c. Customer service is a measure of what is produced divided by what is consumed or the ratio of output versus input.
   d. Effectiveness is a measure of what is produced divided by what is consumed or the ratio of output versus input.

8. Which of the following statements is true?
   a. Customer service measures the extent to which a system achieves its goals.
   b. Productivity measures the extent to which a system achieves its goals.
   c. Efficiency measures the extent to which a system achieves its goals.
   d. Effectiveness measures the extent to which a system achieves its goals.

9. Which of the following is statements true?
   a. The system approach is very helpful in understanding how companies plan and control their work.
   b. The control system is very helpful in understanding how companies plan and control their work.
   c. The system performance standard approach is very helpful in understanding how companies plan and control their work.
   d. The system objective approach is very helpful in understanding how companies plan and control their work.

10. Which of the following is statements true?
    a. Conversion includes all the activities performed within the company to convert purchased goods to supply goods and services to customers.
    b. Buying and selling activity includes all the activities performed within the company to convert purchased goods to supply goods and services to customers.
    c. Business decision making includes all the activities performed within the company to convert purchased goods to supply goods and services to customers.
    d. Support functions include all the activities performed within the company to convert purchased goods to supply goods and services to customers.
Chapter VIII
Security and Ethical Issues

Aim
The aim of this chapter is to:

• enlist five moral dimensions of the information age
• explore moral dimensions of an information society
• evaluate the impact of information system and internet on the protection of individual privacy

Objectives
The objectives of this chapter are to:

• enlist key technology trends that raise ethical issues
• explain use of policies
• elucidate the importance of copyrights

Learning outcome
At the end of this chapter, you will be able to:

• identify security and ethical issues raised by information system
• understand impact of information system and internet on the protection of individual privacy
• identify how information system has affected everyday life
8.1 Introduction

Ethics refers to the principles of right and wrong that individuals, acting as free moral agents, use to make choices to guide their behaviors. Information systems raise new ethical questions for both individuals and societies because they create opportunities for intense social change, and thus threaten existing distributions of power, money, rights, and obligations.

Like other technologies, such as steam engines, electricity, the telephone, and the radio, information technology can be used to achieve social progress, but it can also be used to commit crimes and threaten cherished social values. The development of information technology will produce benefits for many and costs for others.

Ethical issues in information systems have been given new urgency by the rise of the Internet and electronic commerce. Internet and digital firm technologies make it easier than ever to assemble, integrate, and distribute information, unleashing new concerns about the appropriate use of customer information, the protection of personal privacy, and the protection of intellectual property. Insiders with special knowledge can “fool” information systems by submitting phony records, and diverting cash, on a scale unimaginable in the pre-computer era.

8.2 A Model for thinking about Ethical, Social and Political Issues

Ethical, social, and political issues are closely linked. The ethical dilemma one may face as a manager of information systems typically is reflected in social and political debate. Imagine society as a more or less calm pond on a summer day, a delicate ecosystem in partial equilibrium with individuals and with social and political institutions. Individuals know how to act in this pond because social institutions (family, education, organisations) have developed well-honed rules of behavior, and these are supported by laws developed in the political sector that prescribe behaviour and promise sanctions for violations. Now toss a rock into the center of the pond. But imagine instead of a rock that the disturbing force is a powerful shock of new information technology and systems hitting a society more or less at rest.

8.3 Five Moral Dimensions of The Information Age

The major ethical, social, and political issues raised by information systems include the following moral dimensions

Information Rights and Obligations
What information rights do individuals and organisations possess with respect to themselves? What can they protect? What obligations do individuals and organisations have concerning this information?

Property Rights and Obligations
How will traditional intellectual property rights be protected in a digital society in which tracing and accounting for ownership are difficult and ignoring such property rights are so easy?

Accountability and Control
Who can and will be held accountable and liable for the harm done to individual and collective information and property rights?

System Quality
What standards of data and system quality should we demand to protect individual rights and the safety of society?

Quality of Life
What values should be preserved in an information- and knowledge-based society? Which institutions should we protect from violation? Which cultural values and practices are supported by the new information technology?
8.4 Key Technology Trends that Raise Ethical Issues

Ethical issues preceded information technology. Nevertheless, information technology has heightened ethical concerns, taxed existing social arrangements, and made some laws obsolete or severely crippled. Information technologies and systems have also created new opportunities for criminal behavior and mischief. Some Challenges

- The doubling of computing power every 18 months has made it possible for most organisations to use information systems for their core production processes. As a result, our dependence on systems and our vulnerability to system errors and poor data quality have increased.
- The very same information systems that lead to high levels of productivity also create opportunities for abuse.
- Social rules and laws have not yet adjusted to this dependence.
- Standards for ensuring the accuracy and reliability of information systems are not universally accepted or enforced.

Advances in data storage techniques and rapidly declining storage costs have been responsible for the multiplying databases on individuals—employees, customers, and potential customers—maintained by private and public organisations. These advances in data storage have made the routine violation of individual privacy both cheap and effective. For instance, the major search firms like Google, America Online (AOL), MSN, and Yahoo! maintain detailed search histories on the more than 75 million people who use Internet search engines everyday and who generate more than 200 million searches each day. These huge collections of “consumer intentions” become the natural targets of private firms looking for market advantage, government agencies, and private investigators.

Think of all the ways one generates computer information—credit card purchases; telephone calls; magazine subscriptions; video rentals; mail-order purchases; banking records; local, state, and federal government records (including court and police records); and visits to Web sites to read Web materials, use search engines, and write blogs. Put together and mined properly, this information could reveal not only your credit information but also your driving habits, your tastes, your associations, intended purchases, political views, and interests. What you thought was private, in fact, can quickly become public. Companies with products to sell purchase relevant information from these sources to help them more finely target their marketing campaigns. The use of computers to combine data from multiple sources and create electronic dossiers of detailed information on individuals is called profiling.

8.5 Acceptable Behavior on the Networks: New Standards of Conduct

Cultural norms and values shape a society's definition of acceptable behavior. On-line standards of conduct are founded on the norms of the society in which a network is set, but these broader norms and values are often challenged by the character of human interaction in electronic networks.

- Networks stretch across societies that have different values and traditions. The computers that form them have capacities that allow people to do things they could not do before--and to do so with anonymity. Finally, the networks, new as they are, have their own social history, in which somewhat different norms have been formed.
- The people who have so far populated the virtual community have tended to value individuality, free expression and free exchange of information, anarchy and nonconformity more than other groups.
- Acceptable behavior on the networks, therefore, has slightly different standards. These may change as many more people join the networks. But, so far, the less conventional on-line standards of conduct have been zealously guarded by long-time network users.
- These users generally are people who have strong feelings about the shape of life on their various networks and about what shape it will take in the future.
- New users of the Internet and of various smaller networks should be aware that they are entering an unconventional social community.
- Issues of acceptable behavior in the networks include simple standards of civility to questions of rights and responsibilities in distributing information that have not yet been clarified in law.
8.5.1 Netiquette

Netiquette, or on-line civility, is a matter of common sense and of remembering the context of behavior. The Internet's emphasis on free expression, for instance, has meant that what might be considered rude elsewhere will often be tolerated on various networks in order to protect the principles of individual expression.

Groups discuss every conceivable subject, obscenities flow on some parts of the Internet, pornography flourishes. Some people make a game of verbally hassling one another. Rather than squashing individuality with broad regulations, system administrators have so far tended to referee or negotiate specific situations in which conflicts occur.

However, activities that would be questionable off the networks should be approached with some judgment and kept to the parts of the networks (in bulletin boards established for a specific purpose, for instance) where those who would be offended can avoid them.

Some activities that will offend
Specific activities that do offend most network users usually occur when the capacities of computers for allowing rapid, efficient communication and for giving access to other people's systems are misused. So, for instance, sending a rambling message to everyone with an e-mail address at the local state university is not considered appropriate even though computers make sending such a message relatively effortless. Unsolicited advertising is especially resented and will get an equally unsolicited reaction. In one case, a law firm's efforts to advertise over the Usenet prompted one young man in Norway to launch a cancel both, a message that automatically destroyed the firm's transmissions every time it sent out an advertisement. He was applauded by other Usenet participants, although his actions did raise concerns about wider use of arbitrary censorship.

Some simple guidelines to on-line civil behavior follow:

- In general, do not waste other people's time, be disruptive, or threaten.
- Do not take up network storage space with large, unnecessary files; these should be downloaded.
- Do not look at other people's files or use other systems without permission.
- When joining a bulletin board or discussion group, check the FAQ (frequently asked questions) file before asking questions.
- Remember that on-line communications lack the nuances of tone, facial expression, and body language. Write clearly. Try to spell correctly and to use good grammar.
- Add emoticons or expressive symbols--to clarify meaning.
- Do not SHOUT needlessly. Capital letters are the on-line equivalent of shouting.
- Use asterisks to give emphasis, but do so *sparingly*.
- Sign messages, and include an e-mail address when writing to strangers, just in case a message's header is lost.
- Personal attacks or complaints are called flaming. Be discriminate: flaming can turn into flame wars and disrupt discussion groups.
- People who become too obnoxious can be banned from a system or simply ignored. A "kill file" will automatically erase messages sent from a person who has become intolerable.

8.5.2 Acceptable Use Policies

Different Networks have Different Policies

The networks that collectively form the Internet have different purposes, and they allow different kinds of traffic to pass through them. People who communicate across various networks must learn what they are allowed to do on each. Networks established for research and education, for instance, forbid most commercial activities. These restrictions now exist largely because research and education networks are supported with public funds. In the future, however, more and more of the Internet will be supported by private money.
Commercial uses will become a more prominent feature of the Internet
Many researchers who now use the Internet worry about the change from public to private support. They see commercial activities, especially advertising, as intrusions on the time and attention of people at work. The level of hostility toward such activities runs high, so how commercial and research or education uses will mix is not yet clear even as public funding becomes uncertain.

Written Policies Outline Permissions and Restrictions
Various networks have produced written statements outlining what sort of traffic they permit. Many simply state the purpose of the network in question and restrict users to that purpose. Most explicitly forbid disruptive, frivolous, illegal, and obscene communications, along with any form of harassment. Others simply try to balance free exchange of information, in the spirit of the Internet, with concern about unfair uses of what they have so freely provided.

8.5.3 Exporting Through the Networks
Export restrictions apply but clear guidelines are lacking
Electronic files can be sent around the world in seconds and without physical restriction, which might lead people to think that other restrictions on them do not exist. To make matters more complex, export restrictions vary for different destination countries. As a rule, the people transferring files over networks are responsible for knowing and applying legal restrictions.

Unfortunately, people sending files across national borders often are left without clear legal guidelines for specific situations because export law has not kept pace with the movement of information across electronic networks. Networks which allow people from remote locations to log-in and use information or computer systems stored on computers within the U.S. have created even more complex problems, and have left network operators with little clear guidance. There are, however, some general principles to follow.

Some General Principles to Follow
For the most part, information commonly and freely available from U.S. periodicals, books, conferences, libraries, or university courses falls under general license, which means it may be transferred to other countries without further permission. What is restricted in electronic information, which may include data, software, machine readable code, encryption code, and so on, is more difficult to define. The following examples, though hardly comprehensive, illustrate some of the difficulties encountered when export laws are applied to electronic networks.

8.5.4 Copyrights
Existing Law is challenged by Electronic Information Systems
Copyright is a set of exclusive rights granted by the law of a jurisdiction to the author or creator of an original work, including the right to copy, distribute and adapt the work. The fluidity of information on the networks has caused some confusion about how copyrights and intellectual property rights apply to electronic files. In the relatively small world of the original network users, an emphasis on free exchange of information and a common understanding of intellectual property allayed most potential conflicts over use of information. Now, as the networks grow larger and attract a broader range of people, some clarification of how electronic files may be used is becoming necessary.

The ease with which electronic files can be distributed and the nature of some electronic information create problems within existing copyright law: either the law does not address the peculiarities of electronic information or the law is too easily subverted by the ease with which files can be copied and transferred. Similar problems have arisen with photocopy machines, VCRs, and tape recorders. To make matters more complex, other countries may have different copyright laws, so information made available globally through a network may not have the same protections in other places.
Basic existing copyright principles should keep most network users on ethical grounds:

- Copyrights protect original works of authorship, including literary, musical, dramatic, graphic, audiovisual, and architectural works, and sound recordings.

- The law forbids unauthorised reproduction, distribution, performance, or display of works with copyrights. The general intent of the law is to protect the commercial value of a work.

- Having a copy of a work with a copyright does not mean that the holder also has the right to distribute, reproduce, perform, or display it.

- Copyrights apply to both published and unpublished work. Under the international Berne Convention on copyrights, which the U.S. signed in 1989, a copyright comes into effect from the moment a work is created and is fixed in some form of tangible expression.

- A copyright notice is not required for copyright protection. The only way a copyright can be invalidated is by explicit announcement by the author that copyright protections are waived.

- Copyrights do not apply to titles, short phrases, names, slogans, mere listing of ingredients, or works consisting entirely of unoriginal information (such as standard calendars).

- Copyrights do not extend to ideas, procedures, methods, systems, concepts, principles, discoveries, or devices; these must be patented for protection.

- Works in the public domain (those not extended copyright protections) include those created by an author who has been dead for at least 50 years, works created by the federal government, and works explicitly granted to the public domain.

- Complete international copyright protection does not exists. Works are subject to the laws of individual nations, although most nations have signed international agreements on copyrights.
Summary

- Ethics refers to the principles of right and wrong that individuals, acting as free moral agents, use to make choices to guide their behaviors.
- Information systems raise new ethical questions for both individuals and societies because they create opportunities for intense social change, and thus threaten existing distributions of power, money, rights, and obligations.
- Electronic files can be sent around the world in seconds and without physical restriction, which might lead people to think that other restrictions on them do not exist.
- Copyright is a set of exclusive rights granted by the law of a jurisdiction to the author or creator of an original work, including the right to copy, distribute and adapt the work.

References


Recommended Reading

1. ____________ refers to the principles of right and wrong that individuals, acting as free moral agents, use to make choices to guide their behaviors.
   a. Ethics
   b. Copyrights
   c. Netiquette
   d. Commercial norms

2. ____________ protect original works of authorship, including literary, musical, dramatic, graphic, audiovisual, and architectural works, and sound recordings.
   a. Ethics
   b. Copyrights
   c. Netiquette
   d. Commercial norms

3. ____________ or on-line civility is a matter of common sense and of remembering the context of behavior.
   a. Ethics
   b. Copyrights
   c. Netiquette
   d. Commercial norms

4. ____________ and values shape a society's definition of acceptable behavior.
   a. Ethics
   b. Copyrights
   c. Netiquette
   d. Cultural norms

5. ____________ can be sent around the world in seconds and without physical restriction, which might lead people to think that other restrictions on them do not exist.
   a. Electronic files
   b. Printed files
   c. Raw data
   d. Processed data

6. Which of the following statements is true?
   a. Netiquette or on-line civility is a matter of common sense and of remembering the context of behavior.
   b. Copyrights or on-line civility is a matter of common sense and of remembering the context of behavior.
   c. Ethics or on-line civility is a matter of common sense and of remembering the context of behavior.
   d. Cultural norms or on-line civility is a matter of common sense and of remembering the context of behavior.

7. Which of the following statements is true?
   a. Official uses will become a more prominent feature of the internet
   b. Private use will become a more prominent feature of the internet
   c. Non-commercial uses will become a more prominent feature of the internet
   d. Commercial uses will become a more prominent feature of the internet
8. Which of the following statements is true?
   a. Copyrights issues long preceded information technology.
   b. Ethical issues long preceded information technology.
   c. Cultural issues long preceded information technology.
   d. Privatisation issues long preceded information technology.

9. Which of the following statements is true?
   a. Copyright is a set of exclusive rights granted by the law of a jurisdiction to the author or creator of an original work, including the right to copy, distribute and adapt the work.
   b. Ethics is a set of exclusive rights granted by the law of a jurisdiction to the author or creator of an original work, including the right to copy, distribute and adapt the work.
   c. Cultural norms is a set of exclusive rights granted by the law of a jurisdiction to the author or creator of an original work, including the right to copy, distribute and adapt the work.
   d. Netiquette is a set of exclusive rights granted by the law of a jurisdiction to the author or creator of an original work, including the right to copy, distribute and adapt the work.

10. Which of the following statements is true?
    a. New users of the Internet and of various smaller networks should be aware that they are entering an unconventional social community.
    b. New users of the Internet and of various smaller networks should be aware that they are entering a conventional social community.
    c. New users of the Internet and of various smaller networks should be aware that they are entering an unconventional private community.
    d. New users of the Internet and of various smaller networks should be aware that they are entering an unconventional global community.
Case Study I

Information System in Restaurant

MIS: Information has always played an essential and important role in working and development of organisation and the need and importance of information has been growing at an accelerated pace over ages. Information is needed for people to work cooperatively. No cooperative work is possible without the use of information to exchange knowledge and understanding on various issues like work to be performed collectively.

Kamini Restaurant, Bangalore uses latest technology to maintain the information of each customer and each item sold. A waiter takes an order at a table, and then enters it online via one of the six terminals located in the restaurant dining room. The order is routed to a printer in the appropriate preparation area: the cold item printer if it is a salad, the hot-item printer if it is a hot sandwich or the bar printer if it is a drink. A customer’s meal check-listing (bill) the items ordered and the respective prices are automatically generated. This ordering system eliminates the old three-carbon-copy guest check system as well as any problems caused by a waiter’s handwriting. This also saves waiters time as well as customer’s time. When the kitchen runs out of food items, the cooks send out an ‘out of stock’ message, which will be displayed on the dining room terminals when waiters try to order that item. This gives the waiters faster feedback, enabling them to give better customer service.

This system also the saves the number of items sold and hence calculates the total sale achieved by the restaurant in a day. This also helps the restaurant to achieve information about the items which are in demand by customers. This helps management plan menus according to customers’ tastes. The system also compares the weekly sales totals versus food costs, allowing planning for tighter cost controls. In addition, whenever an order is canceled, the reasons for the cancellation are keyed in. This may help later in management decisions, especially if the cancellations of orders are consistently related to food or service.

Thus, Kamini restaurant has achieved great success in by achieving more and more number of customers everyday.

Questions
1. Explain the importance of information in management?
   **Answer**
   Information has always played an essential and important role in working and development of organisation and the need and importance of information has been growing at an accelerated pace over ages. Information is needed for people to work cooperatively. No cooperative work is possible without the use of information to exchange knowledge and understanding on various issues like work to be performed collectively.

2. How has information system helped Kamini Restaurant to achieve more customers?
   **Answer**
   This system saves the number of items sold and hence calculates the total sale achieved by the restaurant in a day. This also helps the restaurant to achieve information about the items which are in demand by customers. This helps management plan menus according to customers’ tastes. The system also compares the weekly sales totals versus food costs, allowing planning for tighter cost controls. In addition, whenever an order is canceled, the reasons for the cancellation are keyed in. This may help later in management decisions, especially if the cancellations of orders are consistently related to food or service.
3. How is the information system beneficial to Kamini restaurant?
   
   **Answer**
   
   Kamini restaurant has achieved great success in by achieving more and more number of customers everyday. This is because of the information system implemented by the restaurant.

4. Why is information necessary to deliver better customer service?
   
   **Answer**
   
   The system compares the weekly sales totals versus food costs, allowing planning for tighter cost controls. In addition, whenever an order is canceled, the reasons for the cancellation are keyed in. This may help later in management decisions, especially if the cancellations of orders are consistently related to food or service. The system also saves the number of items sold and hence calculates the total sale achieved by the restaurant in a day. This also helps the restaurant to achieve information about the items which are in demand by customers. This helps management plan menus according to customers’ tastes.
Case Study II

Management Information Systems for Bus Safety

Introduction
In this management information system (MIS), we have followed two fictitious bus operators, one large and one small, as they prepare their own MIS. This will highlight what your processes need to address in order to comply with the new safety regulations. You are encouraged to read the case studies in order to gain an understanding of the basic requirements in developing an MIS. You should then rework and cultivate the knowledge to suit your own business needs. Your MIS needs to be designed to complement and enhance your organisation’s safety culture.

Matters and information to be contained in the MIS of an accredited bus operator
There should be a flow of management for every system, here; in this system we have followed the following steps:

Bus Safety Policy
Our Bus Lines has developed a safety policy which defines the safety aims and objectives of the organisation. The policy articulates the organisation’s commitment to risk management, the development of a positive safety culture and continuous safety improvement. The safety policy has been approved by Our Bus Lines’ management team. The safety policy is reviewed every year by the management team. The review involves consultation with Our Bus Lines staff and any changes to the policy are submitted to the management team for approval. The safety policy is a controlled document, requiring the signature of the chief executive officer on behalf of the management team to take effect. The safety policy is displayed at various prominent locations around the organisation so it is available to staff, passengers and the public.

My Bus
Sol Trader, who is the owner/operator of My Bus, has developed a safety policy which defines the safety aims for his business. The policy articulates his commitment to risk management, the development of a positive safety culture and continuous safety improvement. Sol reviews the safety policy every year as part of his business plan review prior to the end of the financial year.

Sample Bus Safety Policy – Large Operator
Our Bus Lines is committed to operating in a way that ensures there is minimum risk of injury to workers, passengers and the general public. The management team is responsible for the safety of the organisation and shall promote a climate in which all persons are attentive to risks and shall ensure that controls are in place to reduce risks so far as reasonably practicable. Our Bus Lines is committed to compliance with the Bus Safety Act 2009 (Vic) and Bus Safety Regulations 2010 (Vic). Our Bus lines will strive to continually improve safety performance levels by:

- identifying and assessing safety risks
- putting in place the controls and resources to reduce risks so far as is reasonably practicable
- making managers and supervisors responsible for implementing the relevant sections of the MIS and maintenance management system (MMS), and for developing standards and procedures for employees
- ensuring that all workers are trained in these standards and procedures and are committed to the Our Bus Lines safety policy and the safety of others
- monitoring and auditing against this safety policy and compliance with the MIS and MMS

Suggestions from the staff about how safety can be improved will always be appreciated and encouraged within Our Bus Lines. Our Bus lines have identified key safety performance targets to monitor the performance of this organisation, including:

- injuries
- defect reports
- customer complaints
Sample Bus Safety Policy – Small Operator
My Bus is committed to operating in a way that ensures there is minimum risk of injury to workers, passengers and the general public. As the owner and sole employee, I am responsible for the safety of the organisation. I will promote a climate in which all people are attentive to risks to safety and I will ensure that the appropriate controls are in place to reduce risks to safety so far as reasonably practicable. My Bus is committed to compliance with the Bus Safety Act 2009 (Vic) and Bus Safety Regulations 2010 (Vic). My Bus will strive to continually improve safety performance levels by:

- identifying and assessing safety risks
- putting in place the controls and resources to reduce risks so far as is reasonably practicable
- monitoring and auditing against this safety policy and compliance with the MIS and MMS

Suggestions about how safety can be improved will always be appreciated and encouraged within My Bus. My Bus has identified key safety performance targets to monitor the performance of this organisation, including:

- injuries
- defect reports
- customer complaints

Governance and Internal Control Arrangements
The management team of Our Bus Lines is made up of the following positions:

- chief executive officer (CEO)
- manager
- supervisor

The management team is elected annually at the Our Bus Lines annual general meeting. The management team reviews its standards and procedures on a regular basis at its monthly meetings in order to monitor the effectiveness of document control processes as well as other issues. Another standard agenda item at the committee meetings is the review of the risk register. The supervisor provides an update on the risk register at each meeting and aspects of the risk register are discussed by the management team. The manager provides the CEO and management team with appropriate safety information to assist them in their decision making. The management team is provided with copies of internal audits to give them sufficient knowledge about the level of compliance displayed by the organisation.

Internal Control Arrangements
The responsibility for implementing and maintaining the MIS at Our Bus Lines has been given to the manager. The overall management of operational safety is the responsibility of the supervisor, who has responsibility for applying risk management processes to maintain a safe operational and work environment. The major safety responsibilities and accountabilities within Our Bus Lines are set out in individual job descriptions.

Documented Safety Accountabilities and Authorities
Our Bus Lines has documented the job descriptions and safety relevant responsibilities for all job functions that complete bus safety work and had the position holder sign the document to signify they have read and understood their obligations. The manager of Our Bus Lines then holds the signed job descriptions on file. Our Bus Lines has developed job descriptions for depot managers, drivers and mechanics. Given that Sol Trader has no employees and runs the business himself, he keeps his Certificate of Accreditation as evidence of his sole accountability for the safety of his operation. Sol outsources the maintenance of his bus to a local mechanic. Sol advised the mechanic in writing of his safety obligation to maintain My Bus buses in accordance with the requirements of the My Bus MIS and MMS and provided the mechanic with copies. Sol has obtained a letter from the mechanic which confirms that the mechanic is aware of his obligations.
Sample Job Description: Depot Manager/Business Owner

Job Purpose:
The depot manager has overall responsibility for ensuring the bus service runs safely and for the implementation and monitoring of the organisation’s safety management system. To fulfil their safety responsibilities, depot managers:

- provide leadership on safety issues
- manage operations and staff to ensure that services are provided in a safe manner
- integrate safety requirements into the position descriptions, performance agreements and work plans of staff
- ensure effective communication processes are implemented across all functional areas
- involve staff in the development of safe work practices
- encourage staff to be aware of unsafe activities and to participate in identifying unsafe areas, including ideas about improvements and training
- ensure that information on safety issues is regularly communicated to staff
- ensure hazard management systems are in place and regularly reviewed and updated
- ensure staff are provided with the training and resources necessary to carry out their responsibilities safely
- monitor the performance of drivers and other staff to ensure duties are performed in a safe and professional manner
- report and, where appropriate, investigate incidents
- evaluate and audit operational and safety systems on a regular basis

Sample Job Description: Bus Driver

Job Purpose:
Drivers are responsible for operating buses in a manner which ensures the safety of themselves, their passengers and the public and in accordance with all safety relevant legislation and organisational requirements. To fulfil their safety responsibilities bus drivers:

- ensure the safety of passengers
- operate buses in accordance with relevant road laws, other applicable legislation and company policies
- advise the accredited bus operator of any safety issues discovered during the operation of the bus
- report all incidents and injuries, including completing accident report forms and incident reports, as required
- complete vehicle pre-departure checks
- report any damage, defect or repairs needed to the bus
- do not have any alcohol or drugs present in their blood or breath immediately before, or while, driving a bus
- immediately report any matters relevant to the currency of their driver’s licence or driver authority, including details of any criminal charges or offences
- immediately report all health issues or other issues that may affect their fitness to drive
- follow policies, procedures and safety instructions
- wear all personal protective equipment (PPE) as issued by the operator
- participate in training and staff meetings as required

Questions:

1. Which key issues are considered in this study to improve safety performance levels?
2. List the job responsibilities of a bus driver.
3. Give the job description of a depot manager.
Case Study III

An Information System Management Model

Introduction
Along with support in decision-making, the managerial information system serves as support to managers when making decisions. Decisions are frequently made in the purchase information system, based on information from the finance information system. More often than not, relevant information required in the purchase process is gathered from financial reports. This article presents cost effectiveness over a period of five years in the financial report analysis process, to that the hypothesis was set at the outset of the long term research, in 2008. Overall cost-effective coefficients for the period from 2005 until the end of 2008 were known, so that they were not taken into consideration when setting the hypothesis.

The hypothesis was set for the period from the beginning of 2009 until December 31, 2010. $H_0$ denotes null hypothesis, whereas $H_1$ is the mark for the alternative hypothesis. Hypothesis $H_0$ refers to a situation when the cost-effectiveness coefficient of the total business operation over the observed two years does not amount less than 1, when we take into account the data from financial reports of the observed company, that is, profit-and-loss account. $H_1$ is the mark for the alternative hypothesis when the total cost-effectiveness coefficient is under the threshold value of 1. The article has proved that, based on the sample (profit-and-loss account).

There is no reason to discard hypothesis $H_0$, that is, the total cost-effectiveness coefficient has not fallen below the tolerated threshold of 1. All the relevant information used by managers for making key decision ought to be protected, whether they are in digital or analog form.

Aims and tasks
The aim of this case study is to describe the manner of functioning of the information systems for managing purchases, finance and security in an organisation, and their interconnectedness. These systems are essential for efficient functioning of any organisation type, regardless of property type. The basic task of the purchase management information system is to obtain all the information required for acquiring resources and other capital goods in organisations following appropriate criteria. Just-in-time (JIT) information enables generating profit within purchase sub-processes.

The additional tasks of the acquisition process include cost-cutting when purchasing resources and capital goods, thus enabling efficient operation of the entire system. The article demonstrated possible threats to the organisation’s information systems, ways of protecting the information and retrieval of electronic data in the finance management information system. Within the finance management information system, the article will demonstrate a decision making support system, and indicators for measuring the progress flow in the information management information system. These three information system were taken into consideration due to the fact that are highly significant for overall management and administration, and because the purchase management is of key importance for seamless process flow in organisations. The information system is essential for recording events and changes in business, and analysing financial reports. The security management information system takes care of the protection of relevant and reliable information, and protection of electronic information of importance for the organisation.

Employed research methods
The research methods employed here include: case study, modelling (data flow diagram and business technology matrix), interview, measurement (determining the exact time), statistical methods (indexes), observation, perception, analysis (content analysis, business system analysis and other indicator system), which will be used for determining business objects, processes, events, information, documents and information system protection measures.

Purchase management information system and its significance
It is a well-known fact that an information system is a data image of processes from objective reality. The aim of any information system is to provide the system with all necessary and relevant information for seamless execution of processes and system administration. Purchase management information system is a complicated system enabling
communication of the company with its buyers and suppliers, keeping track of capital goods flow, all condition for monitoring business relationships, preparing and transferring data into the finance management information system, more precisely, into process accountancy. One cannot dispute the thesis that the purchase management system is the most important. It is used for gathering information required for seamless performance of all processes in organisations.

The purchase process and its sub-processes are used for purchasing or commissioning information, commodities, other capital goods, services and labour. One cannot dispute Vilim Ferišak’s (2006) thesis that profit is generated in purchase. Purchasing better capital goods at prices lower than their real value generates profit, and cuts purchase costs.

This is another piece of evidence that the purchase and finance management systems are closely connected (Fig. 1). Finance management information system is also very important, as it records all business events occurring in the organisation, and takes care of the availability of funds. Security management information system cannot function without finance management information system out of which it is financed, nor can the information management system function without security management information system which protects it constantly. Fig. 1 shows the interconnectedness of the above mentioned information systems and parts of the segments of information system (program segment, hardware) segment, organisation segment, human resource segment, network and data segments required for seamless operation of business processes.

(Source: http://www.ef.uns.ac.rs/mis/archive-pdf/2012%20-%20No1/MIS2012-1-2.pdf)

Questions:
1. What is the role of JIT?
2. What does the security management information system do?
3. What is the additional task of the acquisition process?
References


2011. 4 - Concept of Information - I, [Video Online] Available at: <http://www.youtube.com/watch?v=rNiycSmH0TA&playnext=1&list=PLSjNq8HUg5Tiov5TZjNLZxTVBqR8x&feature=results_main> [Accessed 13 August 2012].


Recommended Reading


Self Assessment Answers

Chapter I
1. a  
2. b  
3. c  
4. c  
5. c  
6. a  
7. d  
8. d  
9. a  
10. b

Chapter II
1. a  
2. b  
3. a  
4. d  
5. b  
6. a  
7. b  
8. b  
9. a  
10. c

Chapter III
1. a  
2. b  
3. b  
4. c  
5. a  
6. a  
7. c  
8. b  
9. d  
10. a

Chapter IV
1. a  
2. c  
3. b  
4. c  
5. a  
6. a  
7. b  
8. a  
9. a  
10. a
Chapter V
1. a
2. b
3. c
4. a
5. d
6. a
7. b
8. c
9. d
10. a

Chapter VI
1. a
2. b
3. d
4. a
5. c
6. a
7. b
8. d
9. c
10. d

Chapter VII
1. a
2. c
3. c
4. a
5. a
6. a
7. b
8. c
9. a
10. a

Chapter VIII
1. a
2. b
3. c
4. d
5. a
6. a
7. d
8. b
9. a
10. a