UNIT 15 MANAGEMENT INFORMATION SYSTEM

Structure

15.0 LEARNING OUTCOME

After reading this Unit, you should be able to:

- Appreciate the relevance of information in public systems management
- Understand the evolution and framework of Management Information System
- Explain the structure of Management Information System; and
- Appraise the Management Information System in public services.

15.1 INTRODUCTION

In recent times, a great emphasis is being put on public management systems' effectiveness and efficiency in service delivery, ostensibly under pressure from increasing public aspirations and demands.The enforceability of accountability is gaining currency and the stakeholders are increasingly becoming vocal. Consequently, the tasks of public service managers are under greater scrutiny. They have to respond to challenges efficiently and take judicious decisions. Information is a critical factor in decision-making. Sound managerial decisions are not made in vacuum. They are to be made with awareness of general conditions, competition, public policies and above all with adequate knowledge of management information. In modern world information has become an important resource.

In this Unit, an attempt is made to equip the learners with with the knowledge of the processes, techniques and tools that form the basis for Management Information System (MIS). Moreover, an effort is made to make the learners understand the utility

of the technique of MIS to plan and control the organisation's activities and also in the policy arena.

15.2 RELEVANCE OF INFORMATION

Information in an organisation is the collection of expertise, experience and database that individuals and workgroups use for discharging their responsibilities. It is produced and stored by individual minds, or implicitly encoded and documented in organisational processes, services and systems. It is required for better planning and control. Shammon and Weaver (1949), define information as "the amount of uncertainty that is reduced when a message is received". Public service managers need information to

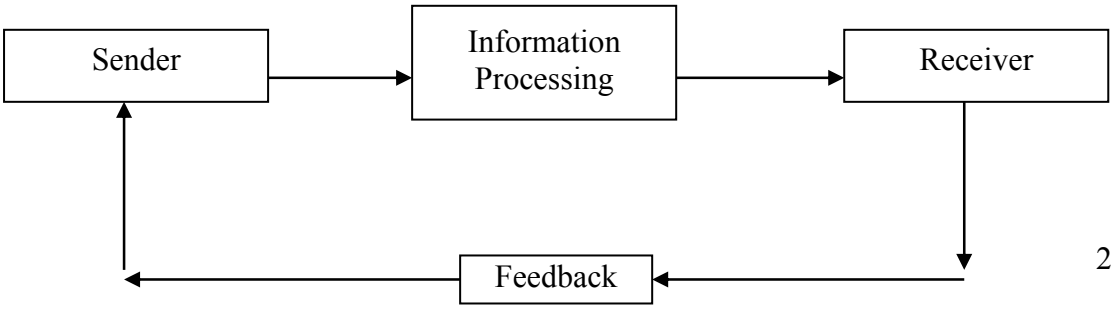
- Decide the mission and objectives of the organisation
- Determine the plan of action for achieving the objectives of the organisation
- Implement the plans and programmes
- Evaluate the performance; and
- Facilitate feedback, to enable the modification of plans / programmes if required.

It is pertinent to mention here that importance of information has been recognised ever since the emergence of the discipline of public administration. Taylor had emphasised collecting information through studies to find out the 'one best way' to do things. Simon in his treatise focused on 'designing'- one of the activities of 'decision-making', which was related to finding as many alternatives as possible so that a rational decision could be taken. It again depended on the knowledge of the decision maker derived from the information. Moreover, in the absence of models, people tend to rely on simplistic "rules of thumb" in decision making and fall prey to a variety of common mistakes. These errors can be minimised with training and experience. It is by now, clear that we need organised means to evaluate data and make decisions.

WHAT IS INFORMATION?

Information is knowledge derived from data that is placed within a context. It is a message, something to be communicated from the sender to the receiver. The view of information as a message came into prominence with the publication in 1948 of an influential paper by Claude Shammon, "A Mathematical Theory of Communication." This paper provided the foundations of information theory.

In many organisations, the information used to solve problems, to direct actions and to make decisions, together with any lessons learnt, are lost in the 'noise' of a turbulent environment (Vasconcelos *et al*, 2003). It is something that inhibits the flow of communication or creates misunderstanding. In addition, information may be geographically distributed and stored in a variety of different representations, e.g. tacit knowledge in peoples' minds and structured information in databases. In the communications discipline, a message is information which is sent from a source to a receiver. The following diagram explains the system.



The nature of information, as evident from this figure is as follows:

i. Information as a pattern

Information is any represented pattern. This view assumes neither accuracy nor directly communicating parties, but instead assumes a separation between an object and its representation, as well as the involvement of someone capable of understanding this relationship. The quantity of information is totally distinct from its medium.

ii. Information as a sensory input

Information is any type of sensory input. It receives the input and transforms the input into information. Often it is abstract.

iii. Information as an influence which leads to a transformation

Information is any type of pattern that influences the formation or transformation of other patterns. Systems theory at times seems to refer to information in this sense, assuming that information does not necessarily involve any conscious mind, and patterns circulating (due to feedback) in the system can be called information.

Characteristics of Good Information

Good information must be

a) pertinent

b) timely

c) accurate; and

d) certain

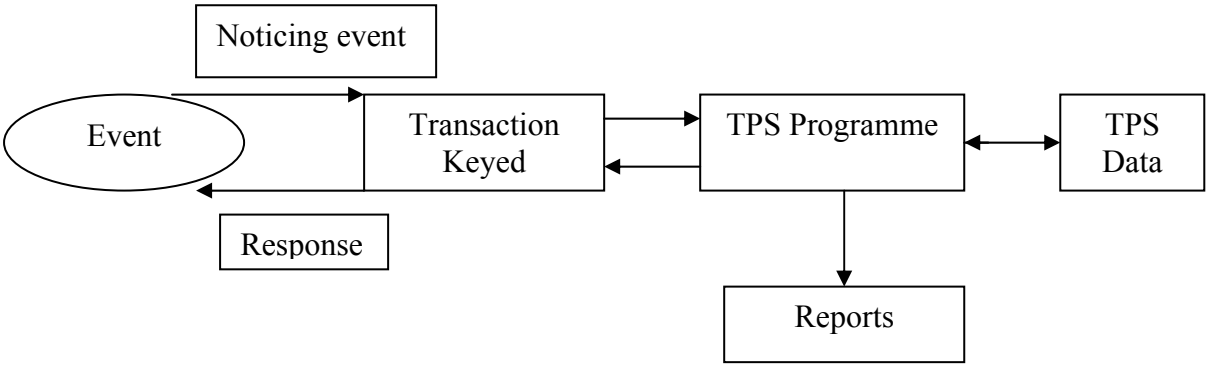
15.2.1 Types of Information Systems

There is need for effective information systems to be put in place. An information system has been described as "a system consisting of the network of all communication channels used within an organisation". Kroenke (1992), puts forth the following fundamental types of information systems.

i) Transaction Processing System (TPS)

These support day-to-day operations and help organisation to conduct its operation and keep track of its activities. The TPS programme generates two types of output. It sends messages back to the operator terminal and it generates printed documents. On-line Transaction Processing Systems is a type of TPS. On-line interactive systems or simple on-line systems involve a direct connection between the operator and the programme.

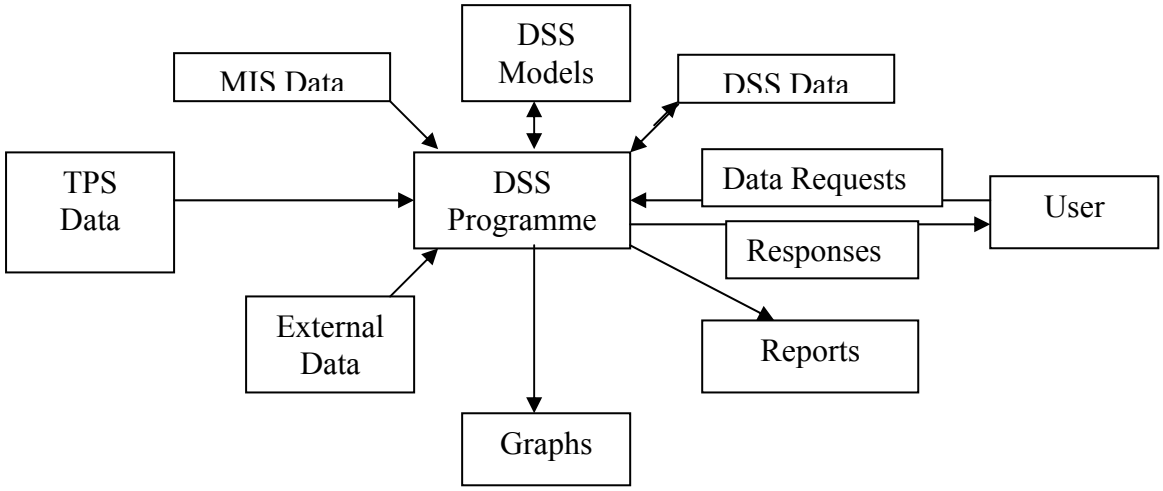
Architecture of TPS



ii) Decision Support Systems (DSS)

These are interactive computer based facilities for assisting decision making in less structured environments. DSS differ from TPS or MIS in that they do not always support an ongoing process. Often DSS are created to solve particular problems on an ad hoc processing basis and are not needed on a regular basis.

Architecture



Source: Kroenke (1992)

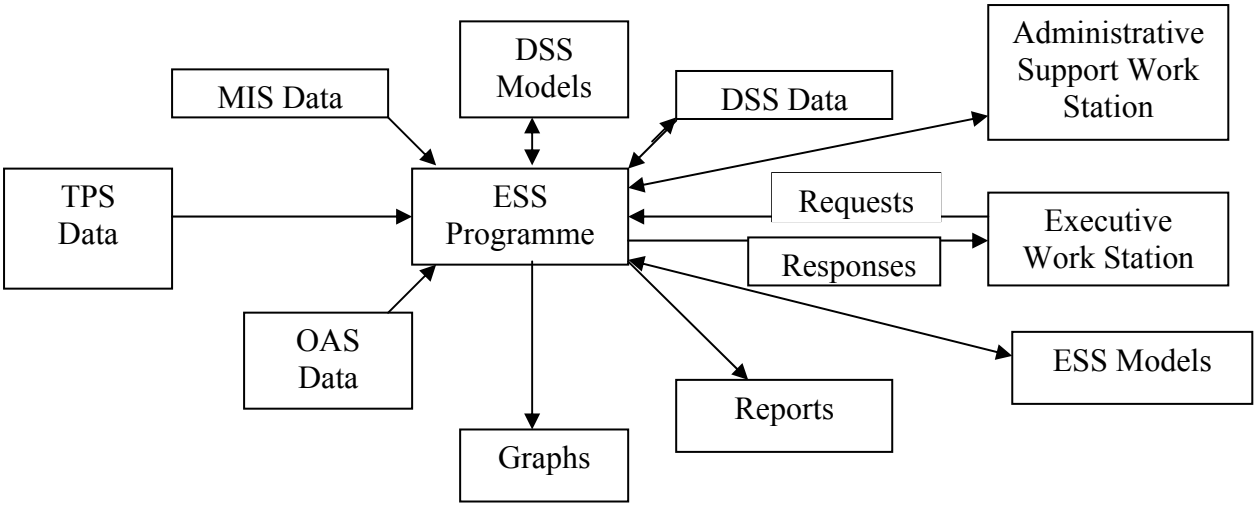
iii) Office Automation Systems (OAS)

OAS are information systems that create, store, modify, display and communicate the information Computers, internet, facsimile machines, electronic bulleting boards etc. are part of OAS. There are various models and as such a generic architecture is not possible.

iv) Executive Support Systems (ESS)

The information systems that support the information needs of senior executives are called ESS. They summarise and present data at the highest levels of aggregation. Usually they involve presentation of reports in standard formats, often involving graphics as shown below:

Architecture



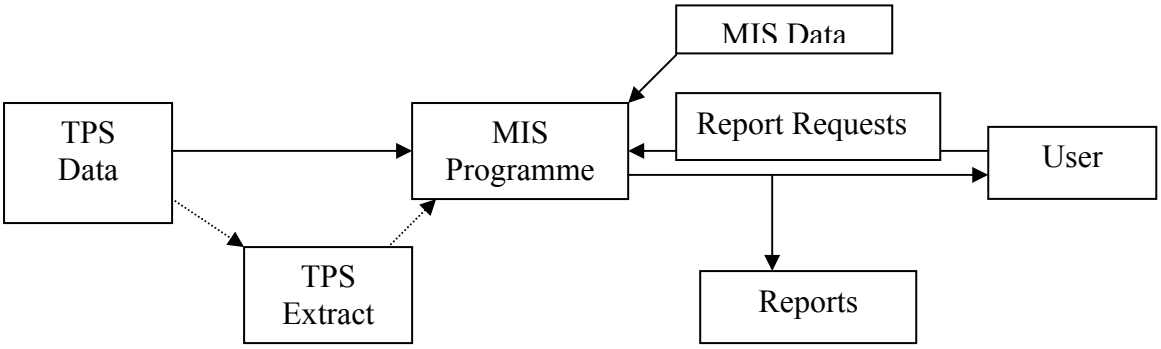
Source: Kroenke (1992)

v) Management Information System

In this Unit, we are focusing on Management Information System (MIS). Conceptually, MIS is a level above TPS. It is not concerned with day-to-day operations, but rather with the management of activities that do support operations. MIS are typically computer based information systems, that are used within an organisation. Peter Keen (1978), defines MIS as "the effective design, delivery and use of information systems in organisations." MIS has much larger perspective and is not intended solely for managers. It includes all the people in the organisation and the structure and design of the organisation as well. The goal of MIS is to enable managers to make better decisions by providing quality information. The following table illustrates the kind of information required for different levels of decision making.

Decision Level	Description	Type of Information
Strategic	Long-term outlook, competitive advantage	External events, competing agencies, financial, quality, tends
Tactical	Improving operations with restructuring organisations	Cutting expenditure, forecasts, revenues
Operations	Day-to-day actions to keep the organisation functioning	Transactions, accounting, human resource management, inventory

The three levels of decisions vary in the type of information they need. Whereas the first two are largely concerned with unprogrammed decision making, the third one is to a large extent programmable. Apparently, the role of leadership in deciphering information remains crucial.



Source: Kroenke (1992)

15.3 MANAGEMENT INFORMATION SYSTEM: EVOLUTION AND FRAMEWORK

It is being envisaged that a world is emerging in which executives would be supported (guided) by operations research staff employing computers to do sophisticated modeling, simulation, and analysis. Initially, there were two strong trends in the use of computers in organisations: the one was the automation of transaction processing and routine reporting; and the other was the use of computers to support analysis and decision-making. The combination was termed Management Information System to emphasise the second role. Prior to 1965, it was very expensive to build large-scale information systems. In the late 1960s, a new type of information system became practical i.e.model-oriented DSS or management decision systems. In 1966-67, Scott Morton had studied how computers and analytical models could help managers make a key decision. In 1974, Gordon Davis, a Professor at the University of Minnesota, published his influential text on Management Information System. He defined a Management Information System as, "an integrated, man/machine system for providing information to support the operations, management, and decision-making functions in an organisation".

In 1979, John Rockart of the Harvard Business School published a ground breaking article in the Harvard Business Review that led to the development of Executive Information System (EIS) or Executive Support Systems (ESS). By the late 1970s, a number of researchers and companies had developed interactive information systems that used data and models to help managers analyse semi-structured problems. In the early 1980s, academic researchers developed a new category of software to support group decision-making (Gray, 1981; Huber, 1982; Turoff and Hiltz, 1982).

In 1978, development of an EIS called Management Information and Decision Support (MIDS) System began at Lockheed-Georgia. In 1990s, DSS built using relational database technologies, were highly promoted.

15.3.1 Evolution of Management Information System

The evolution of MIS can be discussed in two parts.

i) First Generation MIS

The first generation MIS involved the capture of information and experience so that it was easily accessible. An alternate term was "knowledge capture". Managing this capture allowed the system to grow into a powerful information asset. Technology had primacy in this phase. Accordingly, MIS was an issue of information storage and retrieval. It used ideas derived from systems analysis and management theory. It typically involved developing sophisticated data analysis and retrieval systems with little thought as to how the information they contained would be developed or used. This led to organisations investing heavily in technological fixes that had either little impact or a negative impact on the way in which knowledge was used.

Under the influence of econometric standards, managers treated information as if it were a commodity, forgetting that information is not a commodity but a process. Learning and doing became a 'black box' that was not really subject to management; the best that could be done was to make tacit knowledge explicit. Its failure to provide any theoretical understanding of how organisations learn new things and how they act on this information meant that first generation MIS was incapable of managing knowledge creation.

ii) Second Generation Management Information Systems

Faced with the theoretical and practical failure of first generation techniques to live up to its promise, theorists began to look more closely at the ways in which knowledge is created and shared. At the same time there was a realisation that organisations are capable of learning, and so a link grew between learning theory and management. At the same time hierarchical models of organisational structure were replaced by more organic models, which found effective organisations as capable of bringing structural change in response to their environment.

The second generation knowledge management gives priority to the way in which people construct and use knowledge. It derives its ideas from complex systems, often making use of organic metaphors to describe knowledge growth. It is closely related to organisational learning. It recognises that learning and doing are more important to organisational success than dissemination and imitation.

15.3.2 Characteristics of Management Information System

Some of the important characteristics of modern MIS are given below:

1) MIS is management oriented, where the management concerns all the employees of the organisation. The system is designed from top to bottom. The development of the system starts from the appraisal of organisational needs and its objectives.

2) The management actively directs, reviews and participates in the system development efforts to ensure that the implemented information system meets the requirements of the organisation.

3) An integrated system and MIS are not synonymous. However, the integrated concept is a necessary characteristic of MIS.

4) Due to the integrated nature of MIS, it is prudent to capture relevant data close to the source where the event occurs and use it throughout the functional areas. The common data flow concept supports several tenets of systems analysis avoiding duplication, combining similar functions and simplifying necessary functions wherever necessary.

5) MIS needs to be planned carefully and it evolves in due course of time.

6) While the integrated approach makes it appear a single entity, it is broken down into desirable sub-systems.

7) MIS should be developed with the flexibility so that future changes in the organisational needs may be accommodated in the system.

8) MIS includes every type of systems that gives information, whether it is formal or informal system (Srivastava, 2004).

15. 4 STRUCTURE OF MANAGEMENT INFORMATION SYSTEM

Management information system is a system designed by an organisation to collect and report information on a programme, and which allows managers to plan, monitor, and evaluate the operations and the performance of the whole programme. To be successful, an MIS initiative must address both the 'hard' knowledge in databases and the 'soft' knowledge in people's minds (Hildreth and Kimble, 2000). MIS addresses these problems by providing a mechanism to capture, retain and distribute knowledge assets within and between organisational agents (e.g., employees and information systems). Information has several phases namely identification, acquisition, development, dissemination, use and preservation of knowledge (Abecker *et al*, 1998).

Components of Management Information System

There are five components of MIS.

Hardware

This includes the physical equipment used in computing the data.

Software

This comprises the set of instructions that control the hardware.

People

In the early days of introduction of computers, the people directly involved in MIS tended to be programmers, design analysts and a few external users. Today almost everyone in the organisation is involved with the information system

Procedures

These are instructions that help people use the systems. They include items such as users manuals, documentation and procedures to ensure that backups are made regularly.

Databases

These are collections of related data that can be retrieved easily and processed by the computers. Data is a statement accepted at face value. Raw data are numbers, characters, images or other outputs from devices to convert physical quantities into symbols in a very broad sense. Data Flow Diagrams (DFDs) help in representing information systems. They are designed to show how systems are divided into smaller portions and to highlight the flow of data between those parts. The basic elements of a DFD are:

1) *External entities*- These are some components in the environment that communicate with the system.

2) *Process*- In a DFD, a process is an activity that involves data. There are two important rules involving processes. First, a process cannot invent data, which means every process must have at least one flow of data entering it. Second, a

process cannot be a black hole- every process must transfer data somewhere else.

3) *Data Store*- A data store or file is simply a place to hold data for a length of time. It might be a filing cabinet, a reference book or a computer.

4) *Data Flow*- The data flows represent the inputs and outputs of each process or sub-system.

A MIS structure may be discussed in terms of three separate but related classifications:

Operating Elements: The components of MIS make available all the relevant information on the needs basis. These process transactions, maintain master files, produce reports and process interactive support applications.

MIS Support for Decision Making: MIS forms the basis of the decision making.

MIS Structure based on Organsational Activities: The MIS structure is concerned with all the activities of the organisation. We shall be explaining the structure of MIS with the help of the following case study.

15.5 MANAGEMENT INFORMATION SYSTEM IN PRACTICE: A CASE STUDY

An example of a governmental programme being implemented throughout the country may illustrate the various concepts discussed above. Swarna Jayanti Shahri Rozgar Yojana (SJSRY) is a Government of India scheme for urban poverty alleviation. Launched in December 1997, it covers all the urban areas in the country and the sharing of expenditure is in the ratio of 75:25 between centre and the states. It subsumed the earlier existing three urban poverty alleviation programmes, The remaining balances with the state governments became the opening balance for the states for the programme.

The Yojana has two components- urban self-employment (USEP) and urban wage employment (UWEP). There are three sub-categories of self employment component- micro credit for setting up own ventures (Subsidy), credit for groups of women known as DWCRA and the training of youths (Training) so that they can be gainfully employed thereafter. DWCRA members are also entitled for revolving fund as they are also expected to function as a Thrift and Credit Society (T&CS). A whole scheme of community organisations has been put in place for effective outreach.

Programme of this nature requires complete information about physical and financial performance of each urban area to be with the centre and state agencies. The centre only after assessing the performance may release the further funds. Similarly, states have to ensure effective utilisation of resources and monitoring of the implementation.

For the purpose, many formats have been developed to collect information, which then go on to create database for the programme. Some of the formats are given below:

Table 1.**QUARTERLY PROGRESS REPORT (QPR) ON SJSRY**

Name of the State/UT

CUMULATIVE REPORT FOR THE QUARTER ENDING

The report should be cumulative from the date of operation of SJSRY, i.e. from 1.12.1997 till the current quarter.

D	D	M	M	Y	Y	Y	Y

1. Fund Position

(a) Overall position of fund with the State for SJSRY as a whole (all components)

(Rs. in Lakh)

				Expenditure out of Unspent balance							
	Central Share received	State share actually released	Total fund (col. (1+2)	Central share	State share	Total	Central share (col. 1-4)	State share (col. 2-5)	Total share (col. 3-6)	Required state share against the central share	Required state share against the central Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Opening balance as on 1.12.1997 for unspent balance of old UPA programmes as on 30.11.1997											
1997-98											
1998-99											
1999-2000											
2000-2001											
TOTAL											

b) State of Central Fund received expenditure incurred (out of it) and utilisation certificates furnished in each financial year

(Rs. in lakhs)

		USEP (Sub-sidy)	USEP (Trai-ning)	DWCUA (Sub-sidy)	DWCUA (T&CS)	Infra-stru-cture support	Total (1 to 5)	UWEP	Commu-nity Struc-ture
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Opening* balance as on 1.12.1997	Amount received								
1997-98	Amount received								
	Expenditure								
	UCs furnished								
1998-99	Amount received								
	Expenditure								
	UCs furnished								
1999-2000	Amount received								
	Expenditure								
	UCs furnished								
1999-2000	Amount received								
	expenditure								
	UCs furnished								
	Amount received								
2000-2001	Expenditure								
	UCs furnished								
Total	Amount received								
	Expenditure								
	UCs furnished								

*i.e. amount transferred from Central funds of old Urban Poverty Alleviation Programmes
Note: Figures should include funds for Information, Education and Communication, Training and Administrative and Operative Expenses

c. Status of State share required, released and expenditure (out of it) in each financial year

(Rs. in lakhs)

		USEP (Subsidy)	USEP (Training)	DWCUA (Subsidy)	DWCUA (T&CS)	Infrastructure Support	Total (1 to 5)	UWEP	Community Structure
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
As on 1.12.1997	Amount received* Shortfall if any								
1997-98	Required Released Expenditure								
1998-99	Required Released Expenditure								
1999-2000	Required Released Expenditure								
1999-2000	Required Released Expenditure								
2000-2001	Required Released Expenditure								
Total	Required Released Expenditure								

*i.e. amount transferred from State share of fold UPA Programmes

Note: Figures should include funds for Information, Education and Communication, Training and Administrative and Operating Expenses.

Table 2: INANCIAL PERFORMANCE

(a) Subsidy (Central and State Share together) disbursed by banks w.e.f..

1.12.1997

USEP & ALLIED COMPONENTS								
Thrift and Credit societies						Training and Infrastructure Support		
Category	USEP Subsidy	DWCUA Subsidy	Lump sum Grant	Incentive Subsidy	Total	Amount Spent under USEP Training	Amount spent on support to Training Institutes	Total

Each urban area submits the above information to state agencies and which are further submitted to central ministry. While the grass root level, information is still not fed into the computers in many areas due to resource constraints, at the state and central levels this information is fed into the computer.

15.6 MANAGEMENT INFORMATION SYSTEM IN PUBIC SERVICES: AN APPRAISAL

As mentioned earlier, managing large scattered data, especially with public service delivery agencies in a vast country like India has several constraints. Let us discuss some of them

Field-mission information

Government projects and missions are often long term programmes. Since the public servants are often transferred frequently and have scarce time which is generally focused on bureaucratic/operational work, there is a great loss of knowledge and capital.

Some specific problems are:

a) Personalisation of the information resulting in non-accounted overheads moreover when field-missions are of greater lengths;

b) Loss of non bureaucratic/operational information (social and cultural) which is not referred in standard reports; and

c) Loss of information in mission team turnover.

Communication between the Field and the Main office

Governments have a multi-level knowledge management which goes, in the field, from usually the district administration to the state agencies. Often the central ministries are partners in the programmes. In various developmental projects,

international donor agencies are also stakeholders. Due to the presence of several local, state, national and international players, too much information is lost.

Some specific problems include:

a) A strict hierarchical top to bottom decision making, which works against a more participative approach to decision making built through local knowledge;
b) The autonomy of field agencies, which could lead, sometimes, to an information crisis in the management of the project or even a crisis in the agency itself; and
c) An absence of a communication platform accessible by levels of responsibilities for a timely and proper information flow and information register.

Communication between Different Agencies

Too often, several developmental agencies, work in the same area, without knowing about organisational purposes, projects and activities of each other.
Some specific problems are the absence of access to:

a) A map of previous agency interventions, if possible through purpose and projects
b) Simple and direct access to communication forums or to create one which could invite and congregate all the concerned agencies through purpose, project or activities in each field; and
c) Absence of best practices and databases of projects.

Communication between Service Delivery Agencies and the Beneficiaries
State agencies' relations with beneficiaries of the projects are not so easy and well defined as the project is formulated without sufficient participation of the beneficiaries. In addition, at the implementation phase, authorities are often more aware of the project purposes and activities than the ones the project will directly benefit. Interface between service delivery agencies and beneficiaries should be done probably moreover in a face-to-face basis. Nevertheless, knowledge management through web interface tools could be an asset because besides and beyond information concerning the project, beneficiaries should have a continuous possibility of taking positions in relation to it.

Some specific problems are:

a) Inadequate, non-participative analysis of the needs felt by a particular population in which the agency plans an intervention;

d) Inadequate participation or representation of the beneficiary community in the formulation and implementation of the project.

Communication between Service Delivery Agencies and Civil Society Organisations

Each individual and each organisation could be an active development actor and agent if it has the proper knowledge capital (understood as social, symbolic and, therefore, economic capital) to make a difference. This utopia could be built through a good

communication network between development agencies and civil society organisations. The problem is absence of efforts to involve individuals and organisations in order to effect a participative effort toward development, both in a local and in a global sense. A system needs to be developed to deploy information concerning basic capacity building of citizens and organisational intervention, and institutional support.

15.7 CONCLUSION

Decision making is an important activity of public systems management. It requires information of varied nature, putting it in the form of appropriate data and format that the organisation can use for its operations. New technologies in the present times are facilitating the collection, assimilation and retrieval of data in various forms and one such method is the management information system. MIS involves the physical equipment, relevant instructions, procedures, data bases and participation of people at all levels in organisations. There are practical problems in handling large quantum of data especially in public service organisations. This can be minimised through effective communication network, involvement of people at all levels and strengthening institutional mechanisms. Information is a key source and needs to be utilised as a critical input for effective decision making.

15.8 KEY CONCEPTS

Data

Data is a statement accepted at face value. Raw data are numbers, characters, images or other outputs from devices to convert physical quantities into symbols in a very broad sense.

Information

Information is knowledge derived from data/ data placed within a context. It is a message, something to be communicated from the sender to the receiver.

Information system

Information system is a system consisting of the network of all communication channels used within an organisation.

Knowledge Management

It refers to the process of collection, organisation, analysis and sharing of information, experiences and knowledge of individuals and groups in an organisation. It also involves making this information available to others in the organisation.

Organisational Learning

It is the organisation's capacity to improve the task performance through generating better knowledge, understanding and experience sharing. The capacity of organisation to acquire knowledge, skills and appropriate behaviour that helps in improving the performance can be considered as organisational learning.

Operations Research

It involves the use of mathematical models, statistics and other scientific methods and techniques in decision making pertaining to the operations of a system. It aims at optimising for improving organisational performance.

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15.10 ACTIVITIES

1. Visit any organisation, public or private and enquire about the management information system framework.

2. Collect information about the problems encountered in the use of MIS in any organisation.