Management Information System for Water Supply and Sanitation Agencies: The need for Strengthening

Annexures

UNDP/World Bank RWSG-SA

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Proceedings of the Seminar
Abbottabad, November 4-5, 1992

Annexures

Annex I

CONCEPTUAL FRAMEWORK FOR THE DEVELOPMENT OF MIS FOR WATER SUPPLY AND SANITATION AGENCIES

Background Paper

for the

Seminar on Management Information System

for
Water and Sanitation Sector Agencies

Abbottabad
November 4-5,1992

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TABLEOF CONTENTS

CONCEPTUAL FRAMEWORK FOR THE DEVELOPMENT OF MIS FOR WATER SUPPLY AND SANITATION AGENCIES

K. M. Minnatullah

1. INTRODUCTION

A basic element to planning at all levels of human endeavor is the acquisition and maintenance of an adequate information base with which decisions in the development of national plans can be made. Even in agencies where considerable statistical data exists, they scantily provide the essential information for decision making at various levels of planning and programming. Often gaps in such information are widened by the perception and fact that less resources are to be wasted in collecting data, inadequate and slow processing and improper documentation, resulting into a system which does not efficiently serve the decision-making process in planning, programming and management.

MIS aids management in decisions. Decision making, including the process leading up to the decision can be termed as planning, and management can be defined as the planning and control of physical and personnel resources of an organization in order to reach the desired objectives.

An information system is an interaction of manpower, method and equipment for generating data, which can be effectively used for planning and managing projects, as well as monitoring and evaluation of the same during the later periods.

The components of any information system essentially consists of **Input, Processing, Storage, Output** and **Feedback**. Fig. 1, illustrates the framework of such a general system.

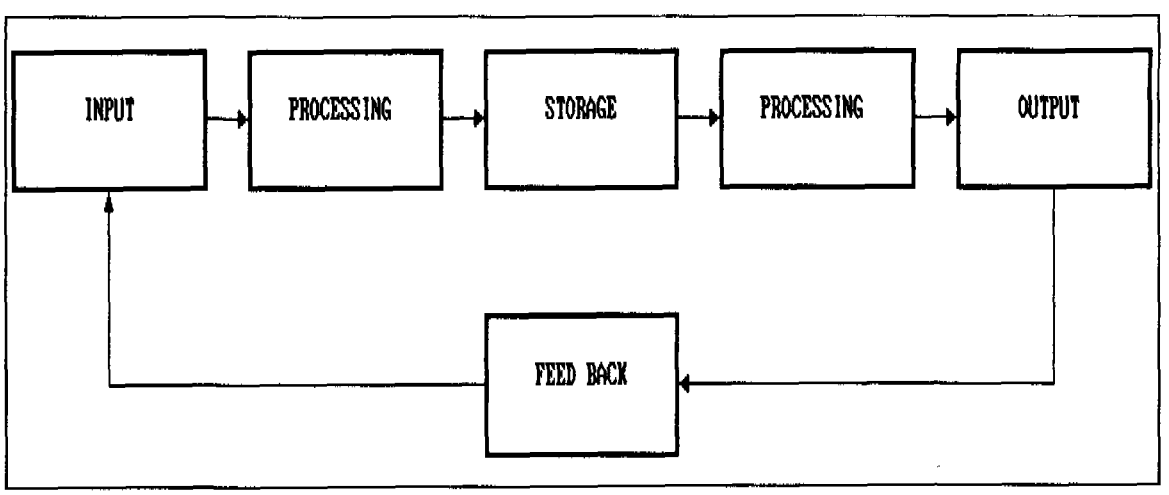


Fig. 1- Framework of a General Information System

Unfortunately the data that is available in office files of an enterprise does not become an information to a manager. Data becomes information only when it is presented in an appropriate form to a person who can use it and it is made available at the right time.

Water supply organizations in Pakistan have undergone and are likely to expand several fold in the near future. With increasing complexity in handling an enormous amount of data, an efficient management-oriented, computer-based information system is essential today to fulfill the organization's objectives.

2. MANAGEMENT LEVELS

Though the line of demarcation is not absolute, the following layers of management are distinct:

TOP MANAGEMENT, consisting of the heads of the organizations or their major departments. Its function is to determine the short and long-range objectives of the organization, the physical monetary and personnel resources to realize these objective, and the policies and strategies that best utilize these resources.

MIDDLE MANAGEMENT, includes managers reporting to the department heads. As with department heads, members of middle management have relative degrees of significance. It is middle management's job to acquire and control the necessary resources in order to implement the objectives.

OPERATING MANAGEMENT, includes managers or supervisors who report to middle management and constitutes the operating level of management. If middle management is concerned with the overall aggregate of functions and activities, then operating management is concerned with more finite and specific activities like project implementation, monitoring of construction, operation and maintenance etc.

3. CHARACTERISTICS OF MIS

The characteristics of MIS are the first step in understanding the potential impact on the organization's operations. These characteristics are:

3.1 Management Oriented

This is the most significant characteristics of MIS. The system is designed from the top down. The "top down" approach does not imply that the system will be geared to providing information directly to top management; rather, the system development starts from an appraisal of management needs and the overall business objective of the organization.

3.2 Management Directed

Management should be involved for continued review and participation to ensure that the implemented system meets the specifications it is designed for.

3.3 Integrated

Integration, in the sense intended here, means taking a comprehensive view or a complete picture look at the interlocking subsystems that operate within an organization.

3.4 Common Data Flows

The common data flow concept supports several of the basic tenets of system analysis - avoiding duplication, combining similar functions and simplifying operations wherever possible.

3.5 Heavy Planning Element

Management information systems do not occur overnight; they take from 3 to 5 years and longer to get established firmly within an organization. Therefore a heavy planning element must be present in MIS development. So the MIS designer must have the future objectives and needs of the organization firmly in mind.

3.6 Subsystem Concept

The breakdown of MIS into meaningful subsystems sets the stage for the phasing plan. This subsystem analysis is essential for applying boundaries to the problem, thus enabling the designer to focus on manageable entities that can be assigned and computerized by selected systems and programming teams.

3.7 Central Data Base

Data base is defined as "a collection of interrelated data stored together without harmful or unnecessary redundancy to serve multiple applications; the data are stored so that they are independent of programs which use the data; a common and controlled approach is used in adding new data and in modifying and retrieving existing data in the data base. The data is structured so as to provide a foundation for future application development." In other words this characteristic means that the system should gather data once, properly validate it, and place it on a central file that can be used by any subsystem, and periodically updated.

3.8 Computerized System

It is possible to have a MIS without being powered by a computer, but most people would agree that the computer is the sine-qua-non of medium-and large-scale information systems. As organizations strive to reap the fruits of economies of scale, all resources including the human inputs have to be increased. As the volume of data in files increases, traditional manual clerical methods of keeping files become increasingly **cumbersome, inefficient, time consuming** and **costly**. An integrated computerized system will relieve the manager from routine, clerical and analytical work. The manager will be able to concentrate on other problems, with all the needed information generated by the system.

Some advantages of a computerized system are:-

1 mass storage of data;
2 periodic automatic reports;
3 data storage is done in a fashion which reduces redundancy;
4 expansion accommodated without much problem;
5 stored data can be shared;
6 data integrity can be maintained;and
7 rapid data processing.

In the past the use of computer at top-level management for decision making has been limited due to the following two characteristics of the computerized system, since the information requirement of top level decision making are usually unstructured and dynamic in nature:

a) computer systems are inflexible, and
b) the users' requirement has to be well defined.

However with the advancement in computer software, it is possible to design a data base system which is flexible and easy to maintain. The time to produce ad-hoc reports can decrease from days or weeks to a matter of minutes. Fig. 2, illustrates the components of a computer based information system.

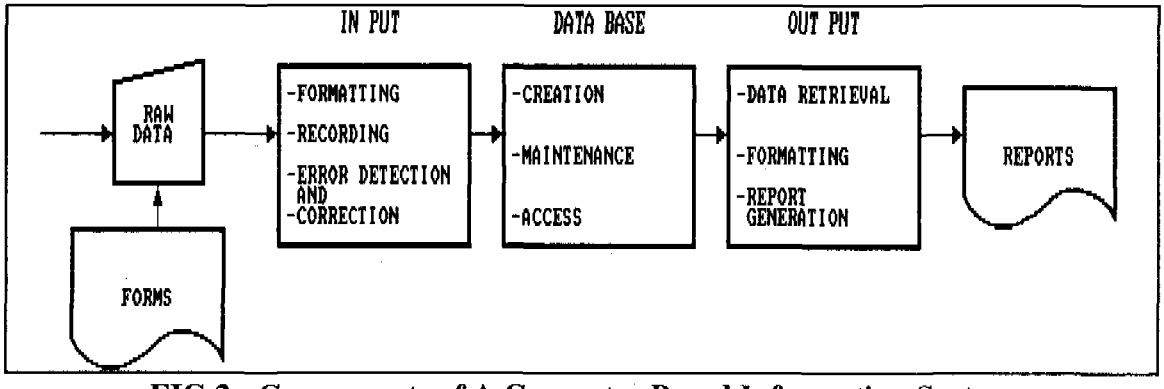


FIG 2: Components of A Computer Based Information System

4. PLANNING PROCESS OF A WATER SUPPLY ORGANIZATION AND ITS NEED FOR INFORMATION

4.1 Overview

In order to develop an efficient MIS to facilitate decision-making at various levels, an understanding of the planning process of a water supply organization is extremely important, without which there is a danger of:

a) Useless information being collected; and
b) Essential information not being collected.

Any water supply organization planning process would generally conform to the following criteria:

a) Planning of water supply programs should be formulated as part of an overall socio-economic development plan;

b) The level of sophistication of the planning of a water supply program should be appropriate to the level of development;

c) The involvement of potential users in planning is essential;

d) Planning is a continuous task, based on a decision-making process that may beimproved with the improvement in the information system;

e) The information system should also be improved gradually as the planning process development might require more extensive use of information;

f) The planning process is part of the permanent activity at each management level of the water supply organization.

Appropriate selection of the type and quantity of information needed for making decisions at each executive level will depend upon the adequacy and efficiency of the information system.

It is also necessary to differentiate and carefully define the various water supply systems Planning Process. The following basic definition are proposed:

PROJECT PLANNING: Detailed planning of individual projects including feasibility studies, preliminary reports, design plans and specification, cost estimates, amortization schedules, income and expense projections and operation

and maintenance plans. Including participation of potential users at all stages.

PROGRAM PLANNING: Planning of a group of water supply projects for a region or a province to achieve predetermined objectives. The plan may include overlaying policies, broad engineering and institutional considerations relating to current program status, technical constraints and design standards, manpower requirements, economic considerations, program priorities and other factors.

SECTOR AND NATIONAL PLANNING: Inclusion of additional sectors i.e. social sectors, electrification, communications, commerce etc., together with provincial or national water supply programs.

4.2 The Process of Water Supply System Planning

Considering that there can be no unique process of planning applicable to all agencies, the following planning outline has been prepared from various sources to develop a general process:

i) Analysis of existing situation: The first step is to analyze the existing facilities in terms of:

a) Service provided by water supply organizations, such as:- population covered, level of service (per capita consumption, degree of treatment etc.), extent of utilization of existing capabilities in different systems, demand and willingness of service by the community.

b) Corresponding results, such as: time saving, convenience, indirect/ direct commercial benefit, health of the community as measured by mean expectancy of life, infant mortality, diarrhoeal incidence etc.

c) Economic and financial features in terms of : "per capita" income."per capita" expenditure and revenue on water supply programs; pattern of financial investment; government contributions; assistance from financial institutions and community contribution; financial and economic operation of the services;

d) Legislation and institutional situation: Existing laws, organization structures, statutory boards, corporations etc.

e) Identification of causes: responsible for the progress and lack of progress, involves critical evaluation of the existing services and statement of problems caused by external factors.

ii) Present trend of the problem: Study of the selected parameters to assess the trends of the problem without interventions:

- population growth;
- percentage of coverage;
- community participation;
- health indicators;
- quantities and qualities;
- impact on other sectors i.e. industrialization ; and
- others

iii) Identification of current technical and administrative organizations and their activities: agency name; type (national, regional, local); area of jurisdiction; function and activities; source and amount of funds; organizational structure; and human resources.

iv) Determination of issues related to policies and priorities: national, provincial and local development policies; Policies, plans and legislation of other governmental programs related to water supply system; national, provincial and local water supply system policies, plans and legislation.

v) Setting of target objective: Review of established goals, strategy and identification of constraints.

vi) Engineering design strategies: Information needs for typical engineering planning and provincial or national planning are: Water resource:- surface water; and ground water. Engineering information by type of facilities:- standard of quality, quantity and level of services.; design criteria; classical and innovative design; unique conditions of terrain, material, manpower etc.

vii) Program design strategy: Existing technical solution by type of facilities:- construction: cost, time, coverage (population area); operation maintenance and revenues: cost, performance; unit costs; alternative technical solutions by type of facilities; local participation.

viii) Analyzing constraints to the development of strategies: financial constraints; physical, e.g. geographical constraints; material constraints; manpower constraints; socio-cultural and community attitudes; institutional set-up.

ix) Estimating resources required and benefits anticipated: financial resources; physical (natural and manmade); manpower and organization.

x) Finalization of national or provincial plans, including the water supply programs: approval of national, provincial plans by appropriate authority; preparation of local plans on the basis of provincial plans for implementation.

xi) Periodic review: in the light of the progress in implementation of planned projects and programs, with necessary adjustments after feedback from information system.

5. CONSIDERATIONS IN DEVELOPING THE INFORMATION SYSTEM

5.1 Planning the Strategy:

The following steps are proposed for developing or upgrading the water supply information system.

a. Understand the planning design, implementation, operation & maintenance, monitoring, rehabilitation, cost recovery and any other related process;

b. Identify the type of information available or which can be developed;

c. Analyze the decision process and determine information needs for different decisions;

d. Determine the hierarchy and sophistication to be achieved;

e. Establish the institutional framework to provide and manage the information;

f. Determine the resources to carry out the information system functioning;

g. Determine how the information system can get its product to the user in a form that she/he can use;

h. Develop the technical aspect of the system including:

- Accumulation of information;
- Evaluation of information;
- Documentation of information; and
- Dissemination of information;

5.2 Development of Technical Aspects

This portion of the systems development deals with the detailed aspects of the **accumulation, evaluation, documentation,** and **dissemination** of information.

This task involves the determination of **what** information is collected, **how** it is collected, **by whom** it is collected and **when** it is collected. It involves **how** the information is stored and **where** the information is stored. It involves specifying **who** evaluated the information and **how** it is evaluated. It also involves documenting **where** the raw information is stored, documenting **where** the intermediately processed information is stored, and determining **what** type of documentation is to be used for processed information.

It further involves determining who will disseminate the information, to **whom** it will be disseminated and in **what** form it will be disseminated.

5.2.1 Characteristics of Information

It is important to remember the general characteristics of data which give rise to classes of problems. Briefly these are:

a. RELEVANCE: To assess the benefits, priority, value, desirability, usefulness etc. of the data being gathered.

b. RELIABILITY: Collecting information not "reliable" or doubtful needs considering the worth of collecting it. Users might not use such information once they believe that the information is not reliable.

c. ACCURACY: Where possible the estimate of errors and the type of errors known to be in the database should be provided and recorded along with the data.

d. AUTHORSHIP: Where possible information on the source of data including author, date and condition of collection should be provided.

e. CONSISTENCY: To ensure the consistency of related data where gathered from different sources or at different times. Care should be taken to set and maintain standards for definitions, units used etc. so that users can get consistent data.

f. STABILITY: Data which will be out of date before its proper assimilation and presentation is not worth the expense of gathering and storing.

g) COST OF GATHERING AND KEEPING: To establish measures of cost of gathering and storing information, to decide on what to gather.

h) CONFIDENTIAL INFORMATION: Consider the need for some kind of authorization to the users, to establish who can have access to which data, and level of confidentiality of the data.

i) OPERATIONAL DATA: Where possible to make use of data gathered and used by other agencies or departments.

5.2.2 Type of Information

To distinguish different types of information for reasons of storage and processing or computerization, i.e.

- Textural information
- Fixed length information
- Variable length information
- Encoded information
- Non formatted information

In general the less formatted the information, the harder it is to computerize.

5.2.3 Organization of Information

In setting up an information system, care should be taken to internally organize the information featuring the definitions, form structure and retrieval of information.

5.2.4 Storage of Information

Information may be stored in a wide variety of ways in this modern technological era. The most favorable option todate is direct transfer to the computer database through terminals, stored in direct access storage devices and backup tapes.

The consequence of loss, theft, fire etc. should be considered in storing the information. the system should be designed so that information can be updated easily and without destroying previous information. Modern systems also have features of the data storage area maintenance, database analysis and compression, increasing data storage area size as well as data base backup and recovery facilities.

5.2.5 Sources of Input of Information

To collect the information, the system should have access to a variety of sources. The information system should collect such information from these sources as directed by the input requirements.

The following organizations may be potential sources of information for the water supply organization information system; they are the Census Bureaus, Health Organizations, Financial bodies, Public Works Agencies, Water Resource Agencies, Economic development Agencies, Educational and Institutional Agencies and Private Organizations.

5.2.6 Collection of Information

Facilities for collecting information should be built at various levels in the system determined by the hierarchical level of management. A full blown information system would have data collection forms that will have to be initialized at local levels to collect basic and operational information as well as at the higher levels to obtain relevant information.

5.2.7 Personnel

To develop and run an information system would call for recruitment and posting of personnel to operate the system. Such additional personnel are needed at national and provincial as well as district and subdistrict levels. At local level, supervisors with additional training in information collection i.e. filling up of forms, will be sufficient.

The modern day application packages enables the development of a database system that needs a minimum of system personnel for its operation. A manager with little knowledge of the language could retrieve data with the help of menu from the database within a couple of days after familiarization with the system.

5.2.8 Training

Manpower development programs should be integrated with the development of the information system. This would call for three types of training:

1. For personnel responsible for the operation of the system. Their training should involve:

   - preparation and use of forms;
   - evaluation of information collected ;
   - methods of documentation; and
   - methods of dissemination.

2. For staff members of water supply organization:

   At local and lower regional level to collect local level information. Their training will center around general topics as to the need of the information, its use and the procedure of filling the forms.

3. For staff members who will be the recipients of the information from the information center:

   These members will need to know what information is forthcoming, in what form they will receive it and what is stored in the system, so that they could initiate special ad-hoc studies to provide specialized input to their activities.

5.2.9 Coordination with Other Agencies

The information system should not function in isolation, rather it should maintain a close liaison with national planning agencies or other departments of governments and draw upon their resources to the extent possible, thereby avoiding duplication.

5.3 Information Needs

The first step in developing an information system is to determine the information needs of the organization. The very first question that an analyst needs to answer is:

What information is to be collected?

Broadly the information needs for a water supply program can be categorized as the following:

- data on geographic, demographic, health, availability of energy and resources, transportation means, touristic and historic locations.
- data on design population, type and capacity of source, estimated cost etc. required during the preparatory and design stage of project.
- data on project under construction i.e. date of commencement, expected date of completion, funds allocated during the current fiscal year, etc. and similar other information necessary to monitor construction progress of the project.
  Detail technical data on source, treatment requirements, design criteria, treatment, distribution, pipes & pumps.
- data on accounting, chemicals, pipes, pump requirements, water quality surveillance, staffing and similar information necessary during the

operation of the project.

- data on financial and accounting necessary for project monitoring during the preparatory, construction, and operation phases.
- data on the categories of staff at different levels of the management hierarchy.
- data needed for monitoring and evaluation.
- data needed for future systems expansion of completed projects, its stock/ inventory needs, manpower and training for new projects to be started in the following year.
- data necessary for the dissemination to the public during construction and operation of the projects.

Information needs at different levels in the management hierarchy varies according to the domain of authority of each level. Some information is required at the operational management level, while other types are needed at the middle or top management. Similarly some data must be collected at the lowest level while others may be available at the regional or central level. In the context of the South Asian situation, information flow in the management hierarchy of any water supply organization has been observed to follow a vertical path, with information collected at local level being passed to the next higher level, with little or no horizontal flow.

Certain information items are important for the design phase of a project; others are important during construction while still others are important during operation. Some information are to be stored for a long time while some need frequent updating.

Considering all such factors influencing the information process, the following functional headings are suggested:

1. General Information;
2. Information Required During Preparatory and Design Stage;
3. Technical Information;
4. Construction Monitoring Information;
5. Operation and Maintenance Information;
6. Financial and Accounting Information;
7. Institutional and Administrative Information;
8. Information on Planning Needs;
9. Information needed for Monitoring and Evaluation; and
10. Public Information.

5.4 Setting Priorities and Level of Sophistication

It will not be possible or desirable to accumulate, evaluate and document and disseminate all type of the information discussed. Therefore, it becomes necessary

to develop a system for determining priorities for the collection and also the sophistication of the information to be collected.

Priority refers to **what** information will be accumulated, evaluated, documented and disseminated. Sophistication refers to the **how much** and in **what detail** will the information be accumulated, evaluated, documented and disseminated.

The following factors enter into the decision process regarding the priority and sophistication to be chosen:

- Country size and water supply organization in the country;
- State of development;
- Nature and type of the information and its evaluation;
- Life of the Information; and
- Financial and manpower constrains of the information system.

5.5 Data Collection and Input Design

A bad data collection technique can cause more time wastage than can ever be saved by even the most elegant programming. Lack of proper data collection process will almost certainly increase the number of errors entering the system.

In designing the input system the following considerations should be made:

1) To minimize the volume and amount of input data;
2) To ease the task of Key-punchers; and
3) To provide an effective and easy data validation and correction procedures with the source documents.

5.5.1 Collection Procedure of Water Supply System Data

It has been mentioned earlier that, in the context of most water supply organizations in the developing countries, information about the water supply situation is collected at the local level and generally passed to the regional and central level immediately above, with little or no horizontal flow of information.

The frequency of collection of information also varies with the items of information for each organization. It is however essential that no matter at which level the information is collected or used, the procedures, forms, tables etc., used should be compatible with each other.

Keeping in mind all these factors the data collection forms should be designed and formatted to be filled out mostly by the personnel at the regional and local level and subsequently forwarded to the information center at the central level.

Detailed instructions describing the process of filling the forms should be contained in a User-manual to be developed by the system.

5.5.2 Design of Data Collection Forms

The information needs of the management were identified in the pervious chapter. Based on the analysis and review of the existing information system the following consideration should be taken into account in designing the data collection forms:

1. The forms should contain all the information required by the top, middle and operational managements as the case may be.

2. The forms should be designed in such a way that data items of similar nature are grouped together.

3. Identification and categorization of data according to the frequency (month, year) as well as the location of data entry.

4. Development of a coding scheme so that the storage and the retrieval from computer for processing and reporting becomes easy.

5. The data entry method should be consistent with the filling of forms to enable easy transfer to the computer.

Primarily forms may be classified into categories consistent with the functional grouping of the information items of the water supply organizations.

Strictly speaking some of these forms are required to be completed only once during any changes occurring at project i.e. extension, increase in service area, new projects started, machines, pipes vehicles etc. increase or decrease.

With the implementation of the system all the agency needs to complete these forms. Subsequent filling will be required in case of updating the information.

5.5.3 Coding Scheme

Coding is important in data base because it provides an abbreviated and unique key to identify a record. It can provide a check so that the right record is operated upon. It also saves storage space.

6. STRATEGY FOR THE DEVELOPMENT OF MIS

Considering the fact that every organization has its own information system, the following strategy could be adopted in developing/strengthening the information system:

1. Form a Task Force/Steering Committee to facilitate the development and operationalization of the information system.

2. Review of existing materials and familiarization with the work done to date by the existing information system.

3. Detailed review of the existing data and information inflow system and their processing. Ascertain the type, amount, and system of data collection and their relevance to the future needs.

4. Identification of the critical information required, but not available at present, for decision making.

5. Identify various routine information needs of the Ministry; P&D and other GOP agencies and ESA's.

6. Assessment of current institutional arrangements to organize and coordinate the flow ofinformation with different ESA's and other sectoral agencies, based on which a standardized data collection, processing, and report generation system may be developed.

7. Prepare a project concept paper on the basis of the findings from the foregoing and in accordance with the guidance provided by the task force on management information system.

8. Present the draft concept paper for review and comments from task force, other heads of management, and revise and finalize the paper through formal discussions with the task force.

6.1 Methodology

Discussions sessions with the Managers at different level including chief engineer, superintending engineers of various circles and the executive engineers of various divisions, sub-divisional engineers, assistant engineers, administrative, financial and other support organizations:

i. The information needs of the various circles and divisions etc;
ii. The processes of collection of information;
iii. The advantages and shortcomings of these processes as perceived by the

respectiveheads of these circles and divisions; and

iv The information demands made upon these circles and divisions by the chief engineer's office; MLGRD; other ministries; sectoral agencies; and the ESA's.

Collection and study of the different forms used in data collection from the field level; and for transmitting information to the various offices; other sectoral agencies; P&D and to the different ESA's.

Study of the appropriateness of the existing organizational structure to assess:

i. The efficiency of information flow that this structure can support;

ii. How amenable this structure will be to possible alterations, if required, to support an information flow system of a higher efficiency;

iii. What will be the optimum MIS that may be practically incorporated within the existing organizational structure without unduly straining its stability; and

iv. A proposal for a feasible phased implementation program of a comprehensive MIS including reorganization of the institution to sustain the MIS operation.

6.2 Functions of a Water Supply Agency

The functions of a water supply agency for example may be classified into three main categories:

i. On the basis of objectives;
ii. On the basis of the area of activities; and
iii. On the basis of timing of the activity.

6.2.1 Objectivewise functions

The objectivewise functions may be divided into the following three areas:

i. Rural water supply and sanitation;
ii. Urban water supply and sanitation; and
iii. Drainage & Solid Waste Management.

6.2.2 Activitywise functions.

The area of activities may be divided into three parts:

i. Project based;
ii. Regular; and
iii. Special

6.2.2a Project based functions

Planning and designing of the rural water supply system;
Implementation of the rural water supply system through:

i. Shallow handpump tubewells;
ii. Deepset handpump tubewells;
iii. Mechanized piped system; and
iv. Spring source with piped system.
(Some of these systems may have treatment plants)

Maintenance of the rural water supply systems;
Rural sanitation;
Health education;

Designing and planning of the urban water supply systems;
Piped water supply to the urban areas through:

i. Deep Tubewells, Infiltration galleries;
ii. Water treatment plants;
iii. Water distribution network;
iv Storage reservoirs;
v. Pumping stations; and
vi. Overhead reservoirs

The maintenance of the urban water supply systems are usually taken over by the municipalities. The water supply organization may however continue to monitor the performance of these to ensure proper running and maintenance of the systems and provide feedback to the provincial and national governments.

Supervision and monitoring of the physical and financial status of ongoing projects;

Urban sanitation through twin-pit pour flash toilets; and

Urban drainage in municipalities.

6.2.2b Regular functions

Internal administrative and financial functions;

Preparation of Annual Development Plans (ADP) and budgets; and obtaining government approval for those;

Releasing the budgeted and sanctioned funds from the ministry and distribution of the funds through the territorial divisions;

Maintaining an inventory of machinery; equipment; and spares required in the installation and maintenance of water supply and sanitation systems;

Post implementation monitoring of water supply and sanitation projects;

Maintaining liaison with the bilateral and multilateral External Support Agencies (ESA's);

Periodic reporting to the P&D, ministry and to the various sector agencies and ESA's;

Preparation of background planning documents for the national five-year plans.

6.2.2c Special functions

Act as an advisor to the ministry regarding water supply and environmental sanitation policies;

Act as an advisor to the municipalities regarding the maintenance of projects which were implemented and subsequently handed over to the municipalities;

Monitor the activities of the municipalities regarding adherence to public health and environmental standards of the water supply and sanitation projects maintained by them;

Training of the users/caretakers of rural water supply and sanitation projects in the day to day running, maintenance, and repair of the installations;

Training of the municipality staff and mechanics in the maintenance and repair of the implements of the urban water supply and sanitation project; and

Training of engineers in the design, installation, maintenance, and management of water supply and sanitation systems.

6.2.3 Timewise finctions

The activities according to the span of time may be classified into four types:

- Future planning;
- Ongoing projects;
- Completed projects; and
- Continuing and routine jobs.

6.2.3a Future planning

- Identifying need areas for taking up future projects; and
- Preparation of PC, ADP etc.

6.2.3b Ongoing project based jobs

- Planning and programming of the job on the basis of the Annual development Plan (ADP);

- Coordinating the logistic, financial and administrative activities with the External Support Agencies;

- Monitoring of the physical and financial progress of projects; and

- Implementation and commissioning of projects.

6.2.3c Completed project based jobs

- Post implementation monitoring of the project;

- Maintenance, rehabilitation and possible upgrading of the project; and

- Where the project is handed over to another agency on completion, e.g. to the municipality; carry on a monitoring role to provide feedback to the supervising agency and to the govt. planning machinery, ministry, so that the project may run at optimum efficiency, and for future planning purposes.

6.2.3d Continuing and routine jobs

These are the same as the regular and special jobs described in sections 6.2.2b and 6.2.2c.

6.3 Preliminary considerations

The strengthening of the information system for water sector agencies will require the careful development of an information gathering and information processing system using currently available techniques; and keeping in view the real needs at different levels of the organization. The adoption of computer technology will greatly facilitate the development and utilization of this system. However, it must always be borne in mind that **computer technology is not the system itself, nor a substitute for it, but rather the provider of the tools for the system to run efficiently.**

The adoption of a new or advanced system and technology requires that the process goes through the following stages:

i. The potential user groups have to first agree that they are going to accept the new system and the accompanying technology. This is the acc**eptance stage.**

ii. The potential user groups will then have to agree that they are going to move away from the existing system. This is the a**daptation stage.**

iii. The potential user groups will then have to become first acclimatized at using the new system and then they will have to achieve confidence in and mastery over the system. This is the **acclimatization stage.**

Each of the above stages has to run for certain time periods in their natural course to be successfully completed. It is also necessary that one stage may not be initiated before its preceding stage has been crossed substantially. Thus it is suggested that any MIS should be developed in three phases, briefly discussed below.

Agency should engage the services of experts (systems consultants) to develop the computer software for the MIS. The agency should also have on its payroll capable systems managers who will coordinate and monitor the activities of the consultants.

Because of the acclimatization required for the successful adoption of the computerized MIS, it is suggested that a modular approach be taken in developing the software for it. This is described in greater detail in the following section.

The information flow in the existing system and the proposed three phases of development of the MIS are shown graphically in Figs. 3, 4, 5 and 6.

6.4 The first phase of development of the MIS.

Referring to the existing information flow system in Fig. 3 once again, the field level data reach the offices of the concerned sub divisional engineers, where these are sometimes consolidated and sometimes straightaway despatched to the offices of the territorial executive engineers. It is here that the data receive their first level of processing, which mainly consists of consolidation and verification. The new set of data thus generated is the first level processed data. There may be one or more stages of processing where the first level processed data are consolidated to various degrees to give rise to the second, third, and maybe fourth level processed data. The information contained in these latter are used directly or in consolidated form by the Circles, the Chief Engineer's office, P&D, and the MLGRD.

The existing system seems to have worked well so far and therefore there is a high level of acceptance built up already for it. It is mainly because of the increase in the volume of data that the system has slowed down or appears to be failing. Thus the proposed MIS should aim at relieving this burden of data waiting to be processed without structurally altering the existing system. This is the best way to achieve a quick acceptance.

It is a common adage that information is power. If the position of any department is noticeably shifted from the existing information flow path, it may quite naturally feel that its position in the command chain has also been shifted to that extent. Thus, with the above considerations it is proposed that in the first phase of its development and implementation, the proposed MIS should appear as shown in Fig. 4 and elaborated below.

The features of the MIS in this phase will be:

i. The field level reports will continue to be sent to the respective divisional offices,but in a computerized and in some cases revised format.

ii. The divisional offices will do the first level processing of the data, on a computer based system.

iii. The agency will make available the requisite hardware, software, and data entry people to the divisions for doing the first level processing of the incoming data.

iv. The information output of the divisions will consist of a mix of printed reports and disk data which will be sent to the Computer cum MIS department located at Headquarters.

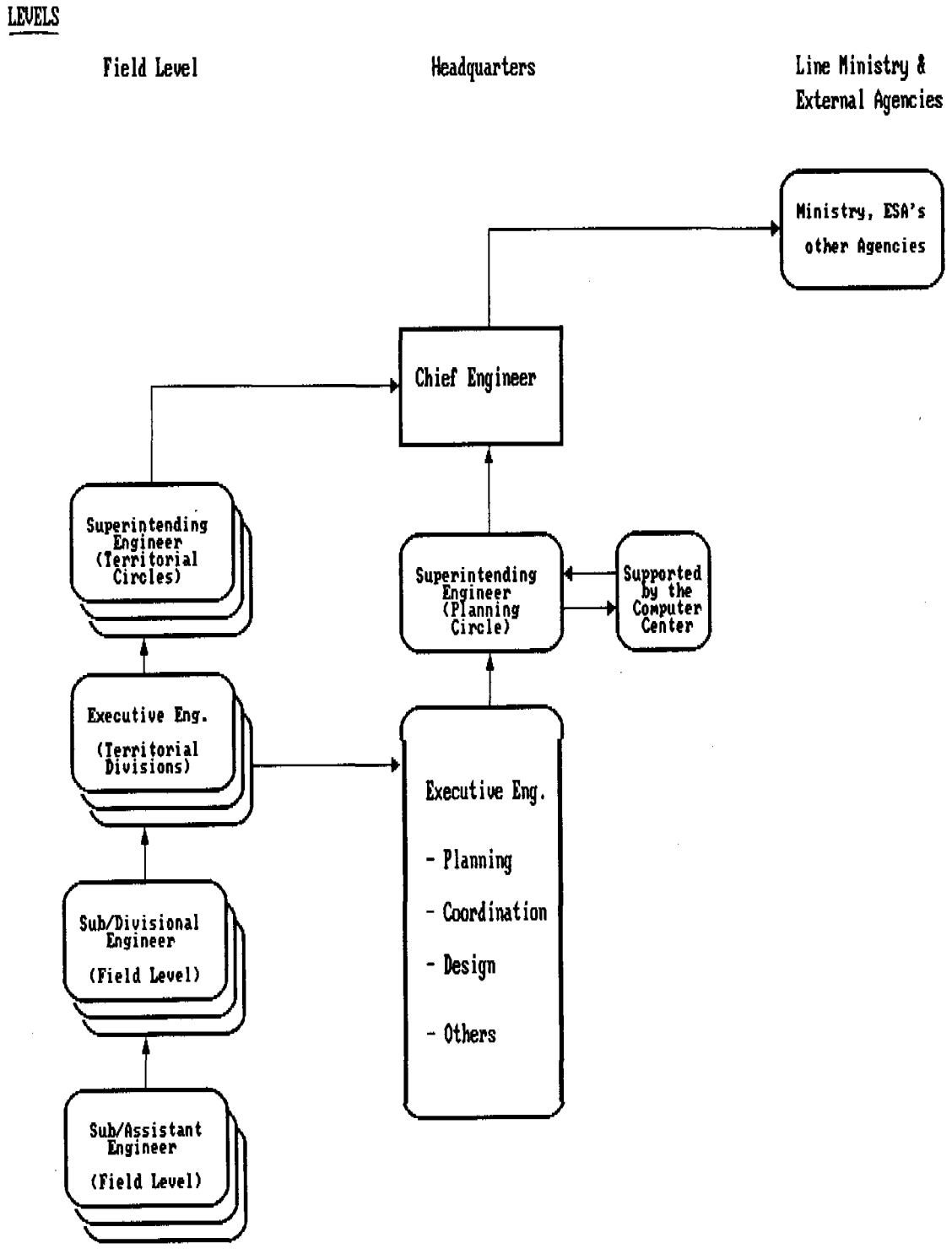


Fig: 3 - Existing Information Flow in Typical Sector Agency

v. The Computer cum MIS department will:

- Do the secondary and other level processing to produce reports which the management may require from time to time. It is expected that the data processing in this department will mainly consist of consolidation and rearrangement of the first level processed data.

- Perform the functions of the archivist of all data received and generated by it. Historical and background data, which are sometimes badly needed for decision making, will thus be available with this department within a reasonable time and in usable format.

- Provide feedback to the field level personnel as a control mechanism to ensure accuracy, timeliness, reliability, integrity, and completeness of the data received from them. The feedback will also consist of the state of attention that the field level data has received; and of an analysis of the performance of the field level institutions in relation to their routine jobs and to the projects undertaken by them.

- Advise the field level personnel about new data transmittal formats that may be introduced from time to time, or of changes of the existing formats, and of the correct way of presenting data in these new or modified formats. It will also explain to them the rationale behind using a certain reporting format; the rationale behind using a certain format at the Headquarters level which affects the field level institutions; and so on.

- The system will be initially based on microcomputers operated in the stand alone mode located in the offices of territorial and operative superintending engineers and executive engineers.

6.5 The second phase MIS.

The acclimatization period for the first phase MIS is expected to be between **one and two years.** Once the personnel in the functional divisions and in the MIS department become adept at using the system, and as information flow becomes more streamlined, there should be a readiness to move all the processing jobs to a centralized location.

At this stage all the computers and the data processing personnel could be moved to the MIS department. While the modular information subsystems will

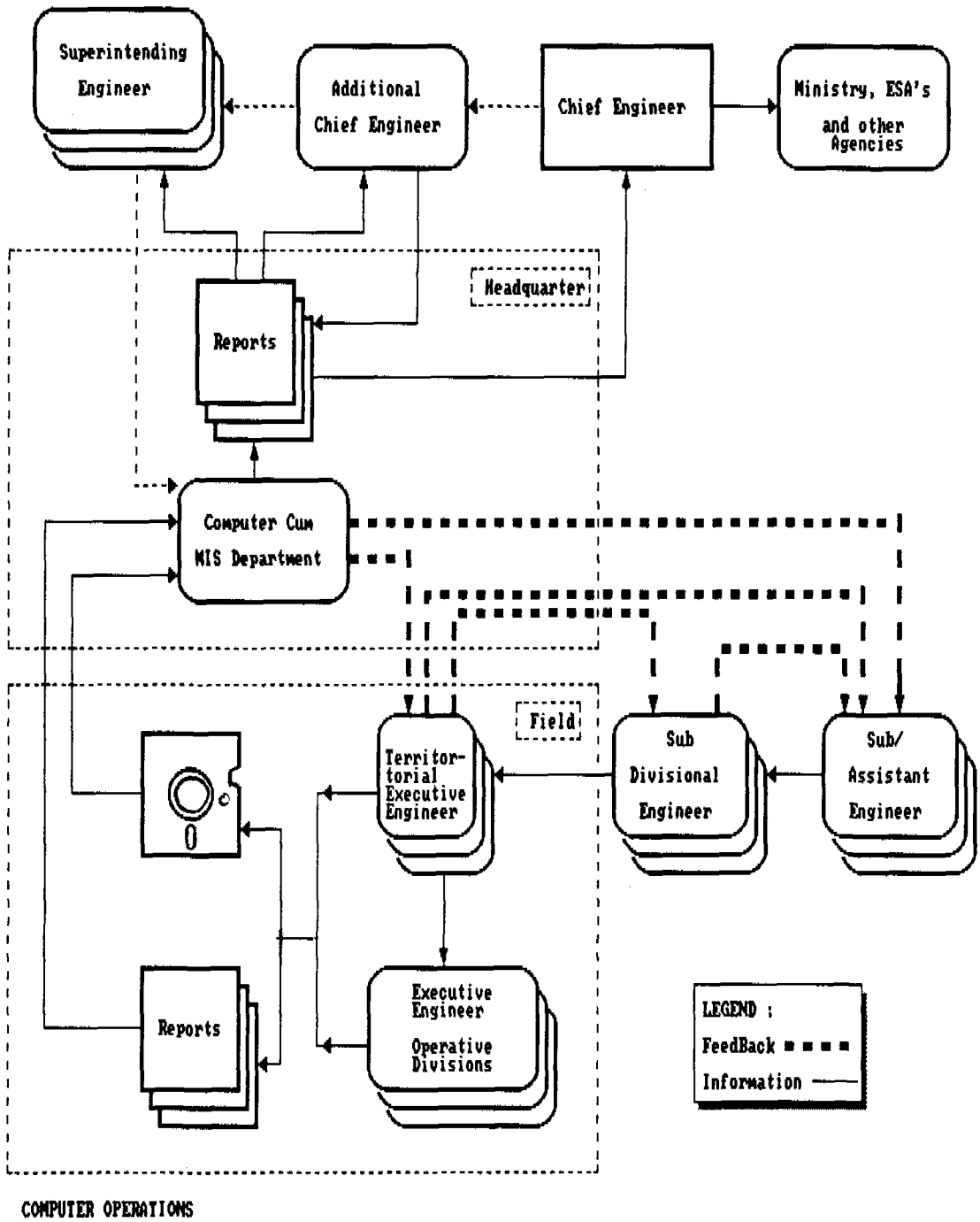


Fig: 4 - Information Flow in The First Phase of The MIS

essentially remain in separate computers, all the data can however be placed on a server disk and accessed through local area network (LAN). Alternately, under a multiuser (UNIX/XENIX) operating system a more direct approach will be possible through an appropriate setup.

A more elegant and efficient approach may be suggested by certain structural changes that the agency may expect to effect in its management of projects by adoption of a zonal concept of project management. In this concept, a package project comprising of different components viz. water supply, sanitation, drainage, and solid waste management may be taken up by each zone and will be managed by the zonal project director. Tailoring the second phase of the MIS to this setup, from the point of view of systems design and maintenance, will make it more efficient and effective.

It is thus envisaged that during the second phase the field level personnel will send in their data directly to the zonal project offices or the existing circles. It is not known how much autonomy the project offices may enjoy, but an autonomous and independent information collection and processing system, constructed along the lines of a centralized MIS, can be set up in each of the zonal offices/circles. This approach will have the power of an all-encompassing information management system, while it will have the added advantage of being more compact and light weight than a truly centralized MIS. Thus this approach is expected to be quite efficient and successful.

The zonal offices/circles will send consolidated and fully processed data to the MIS department at the Headquarters. Facsimile machines may be needed at the zonal offices/circles and at Headquarters for faster despatch of reports. The MIS department at Headquarter will thus have all the necessary information at its disposal without being burdened with the responsibility of collecting the data from the field level, verifying it, and then doing the first and second stages of processing on that data. This department will therefore be more free to design and use flexible and variable reporting formats for customized processing of the available information to fulfill the requirements of reporting at the ministerial level and on a country wide basis.

The MIS department will also provide feedback to the zonal offices/circles and the zonal offices/circles will provide feedback to the field level personnel. Their information flow system in the second phase of the MIS is shown in FIG. 5

The advantages of this system will be:

i. Better control;
ii. Faster processing;
iii. Better data integrity;
iv. Less amount of processing;

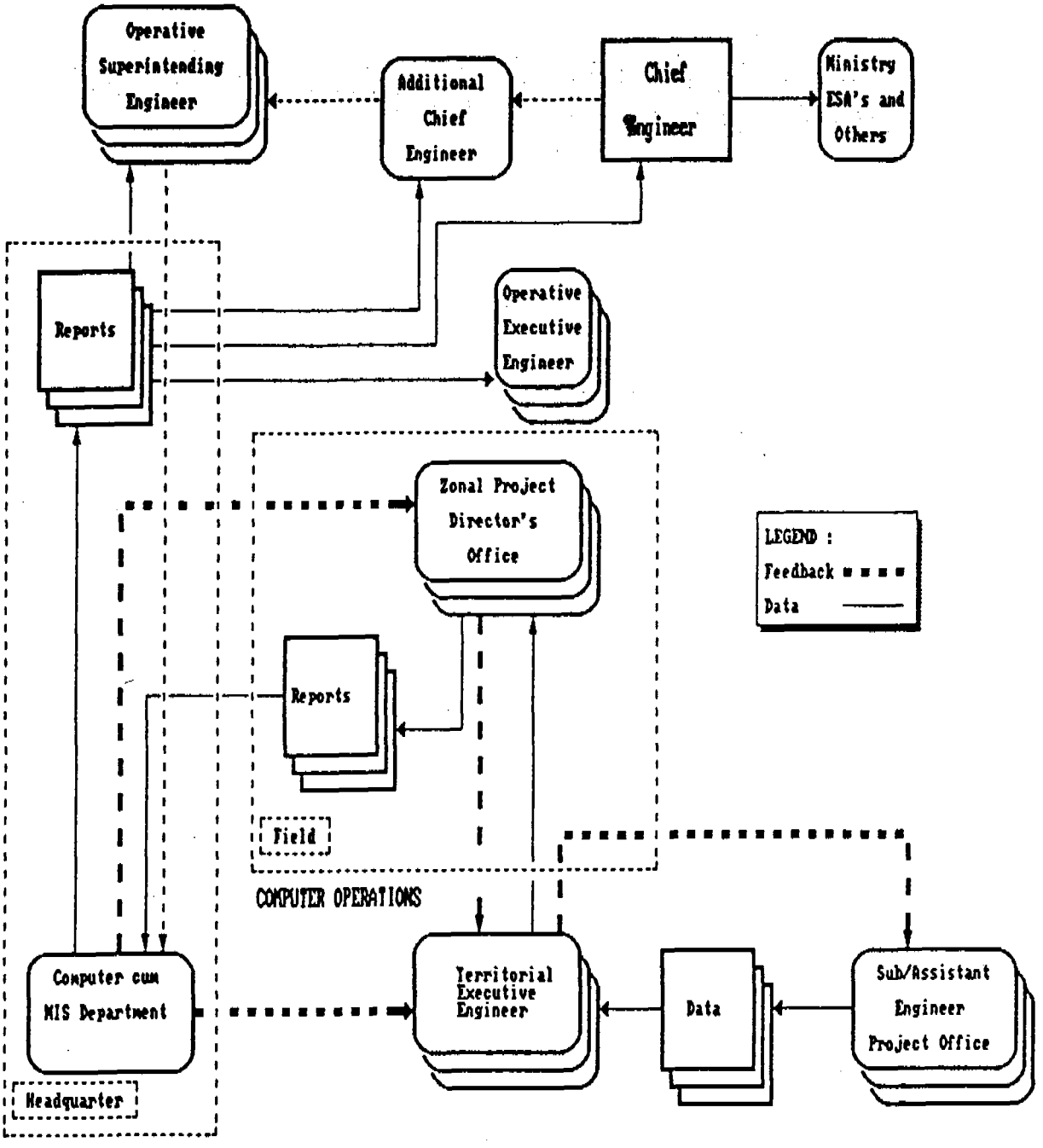


Fig: 5 - Information Flow in The Second Phase of The MIS

v. Less volume of intermediate data;
vi. More flexible report generation capacity;
vii. Responsibility for timely and correct information; and
viii. Will require less personnel.

6.6 The third phase MIS.

By the time the second phase MIS is between two to three years old, we can expect the following improvements in the technological environment:

i. Telecommunication will become more dependable;

ii. The organizational users of small computers will move from microcomputers to multiprocessor based systems;

iii. The volume of information will increase and the flow of information will be faster;

iv. Organizational people will become more confident in handling electronic dataprocessing (EDP) concepts. Consequently this will reduce the demand for redundant data; and

v. The technical staff will become better skilled and more oriented towards using computers in their professions.

Therefore in the third phase a centralized information management system has been proposed, equipped with multiprocessor based computers at the zonal level and minicomputers at the headquarters. At this stage it is envisaged that the field level personnel themselves will be using computer terminals, which will be connected through the telecommunication system to the zonal/circle and Headquarters computers.

Contrary to phases 1 and 2, when the transmittal medium for both the data and the reports will be essentially paper (Figs. 4 and 5), in phase 3, most of the hard copy transaction could be eliminated. The field level personnel will send in data from their terminals, and they will also receive their feedback from the zonal office/ circles and the MIS department through those terminals. The management people will also receive most of their reports through their terminals, hardcopies being used mostly when the information is to be sent outside the system, and for other record keeping. The information flow system in the third phase MIS is shown in Figure 6.

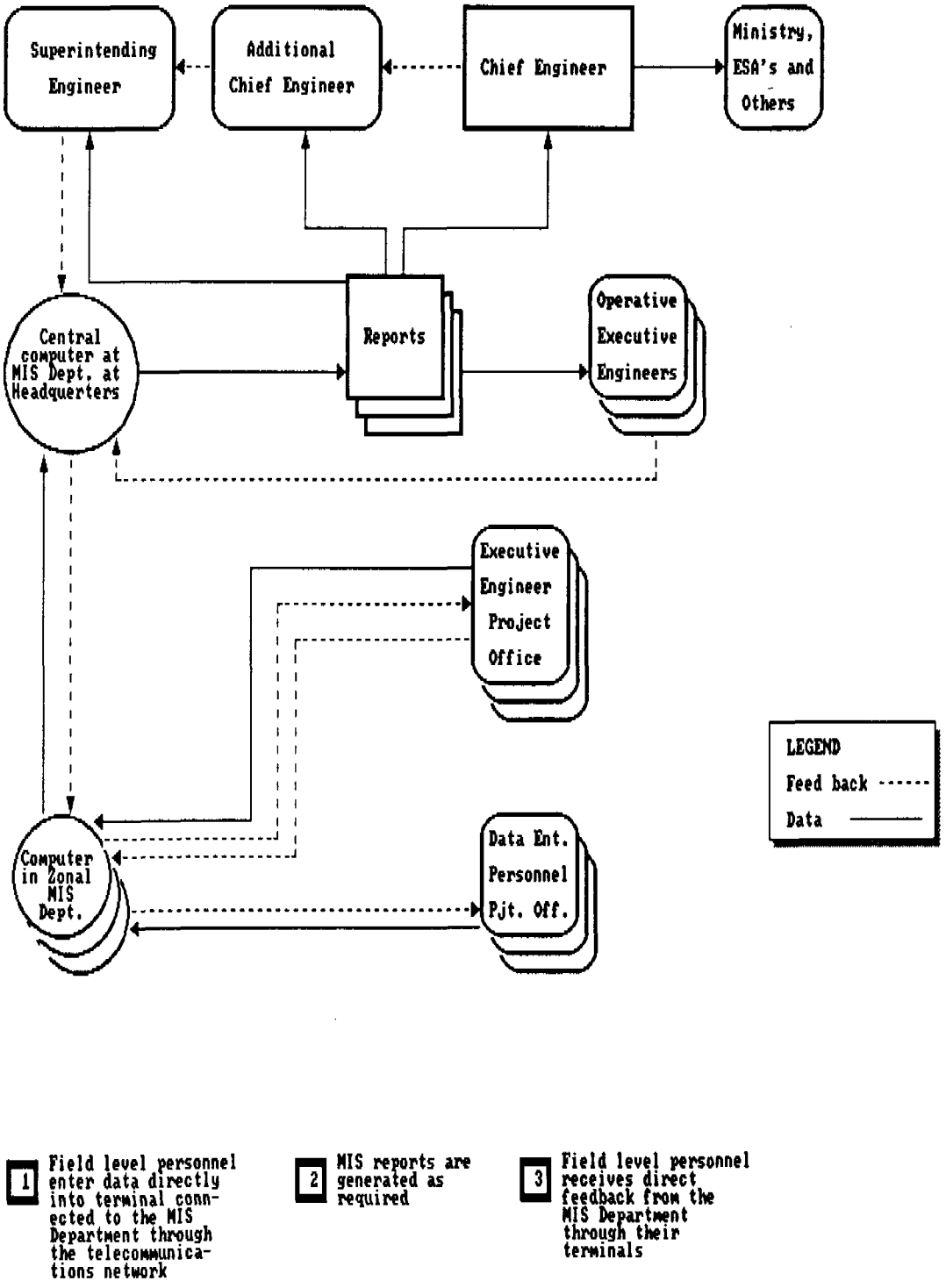


Fig:6 - Information Flow in The Third Phase of The MIS

6.7 Operating system and database engine

The foregoing part of this section we dealt with the upgrading of hardware platform, integrating the date and software, and gradual changeover from standalone to multiuser and remove accessed applications.

The operating system of choice in small computers in such cases has for quite some time been the UNIX or XENIX operating system.

The most widely used database management package in organization with an eye to expendability and upgrading has similarly been the ORACLE.

The reasons for recommending UNEX/XENIX are:

i. This is a multiuser, multitasking operating system.

ii. Most of the popular database, spreadsheet, and word processing programs run under this system.

iii. DOS and DOS applications can be run under this system.

iv. Computers which were previously used as standalone machines can be connected to this system as terminals, hence nothing is wasted.

v. It provides a high system-level security, so that unauthorized access of the system, or use of data and applications is prevented.

vi. It is available for a wide range of hardware platforms.

The reasons for recommending ORACLE are:

i. It is functional with both DOS and UNIX/XENIX.

ii. It is a multiuser database management system under UNIX/XENIX.

iii. It is available for all kinds of platforms, starting from microcomputers to RISC based systems to minicomputers and upto mainframe computers.

iv. Data and application generated in one platform can easily be ported to another platform.

v. Data residing in one platform can also be accessed from another platform.

vi. It provides an additional layer of applications-level security, so that data integrity is always assured.

vii. It can access and use data and applications generated in another system, including dBASE and Lotus 123. Therefore application and data already generated and in use under these packages remain usable under ORACLE.

viii. Development of powerful applications is easily accomplished under this package.

There are however other database management packages such as Ingress; Informix; Paradox and SCO-FoxBase which may also be reviewed for consideration.

7. PLAN OF ACTION FOR DEVELOPMENT OF THE FIRST PHASE

It is necessary to first answer the following questions so that we may determine how to go about developing the first phase of the MIS:

i How much time will be needed;

ii What institutional framework is required and what kind of personnel support can the agency provide internally itself during development of the MIS;

iii Logistic requirements;

iv What is the type and content of information required at different levels;

v What advisory/consultancy services will be needed from outside;

vi Budget;

vii Source of funding;

viii Procedures for initiation, launching, and implementation of the project; and

ix Institutional reorientation for the agency to move into the second phase MIS.

7.1 Time required

The following factors were considered in estimating the time required during the first phase of MIS:

i. Size of the undertaking;

ii. Ready availability of people, money and material, and how complex the procedures are for obtaining these;

iii. Extent of training required by the user of MIS at different levels; and

iv. Speed or readiness of the users to acclimatize themselves with the system.

The details of some of these factors may be worked out, however the answers to many of these questions will be known precisely only after the process has started. What may be said with certainty is that the first phase of the MIS will develop very gradually. One should not aim at having a full fledged MIS developed first and then implemented at one go. Rather, the components of the MIS should be developed independent of each other as separate modules, tested, and after all the components have been successfully developed, these could then be integrated into a full Management Information System. In this way whatever component of the MIS is developed at any point in time, its benefits will become immediately available to its potential users. In the above context an assessment is made as to how long it may take between the time work on the first phase starts and the time that the agency will be ready to take up the second phase. A fair estimation is that the implementation and full adoption of the first phase will take five **year.**

7.2 Institutional requirements for transition to the second phase.

The completion of the acclimatization phase will indicate that the agency is organizationally ready to start developing and implementing the second phase of the MIS. some of the mechanisms through which acclimatization can be ensured are:

i. Training.
ii. Feedback.
iii. Orientation.

7.2.1 Training

The successful implementation of a system involves that the users of the system become adept at maintaining the system. There will be occasions when the first phase MIS will require minor adjustments, modifications, and enhancements. The reporting requirements at the higher organizational level are comparatively flexible. If the personnel of the computer cum MIS department can modify the system to fulfill the changing requirements in reporting formats without seeking external help, it could be said that the agency has successfully assimilated the system.

The personnel involved with the maintenance of the system will therefore need to be trained in system analysis, system design, and software maintenance. It has already been suggested that the System Manager, the System Analyst, and the Programmer should either possess or undertake to obtain regular university education in their respective disciplines. In addition it should be the responsibility of the consultants who will develop the first phase of the MIS, to train the concerned personnel so that the latter may be able to maintain the developed system as well as the associated computer programs.

7.2.2 Feedback .

Each of the diagrams of the three phases of the proposed MIS provide for a feedback mechanism. The significance of feedback has been explained elsewhere. The feedback will be designed to e**nsure that the field level personnel are continuously kept informed:**

i. If the data sent in by them are **complete,** that is, their reports contain all the information that those are required to convey.

ii. If the data are **correct,** that is, the information contained in their reports are independently verifiable and conform to physical facts.

iii. If the data are **consistent,** that is, the information contained in their reports conform to the trend of progress as established through their earlier reports.

iv. If their **problems** and **requirements** which are certain to be communicated through their reports, are being **addressed** by their controlling officers and whether they can expect timely solutions to the same.

The feedback mechanism will thus foster the growth of a mutual reliance between different levels of the organization, and develop confidence that the new system really works. This will in turn develop a new and positive organizational culture which is essential for the transition to the second phase of the MIS.

7.2.3 Orientation

The factors enumerated in the Training and Feedback section will transform the behavior and thought patterns of the people directly involved in the information flow system, thereby orienting them towards a greater alignment with the system. In addition, the benefits occurred from the efficiency introduced by the system will spill over to the other caders and departments of the organization. Once every body in the agency and in the government become aware of — and accept — the positive impacts of the first phase of the MIS, there will grow an appreciation of

the necessity of the second phase of the MIS and a readiness towards its implementation. This orientation is what will determine when work on the second phase might commence and, more importantly, **whether it will be launched at all.**

7.3 Implementation Plan

The first phase of the MIS should be implemented in two stages. These are:

i. A **pilot stage** covering a period of two years.

ii. An **expansion stage** covering a period of three years.

7.3.1 The pilot stage

Scope: The system study, reporting format development, and computer program development, as proposed for the first phase in the earlier sections should be undertaken in this stage. However, instead of covering all the circles and divisions at one go, a representative operative circle, a representative operative division, and a representative territorial circle may be taken up for study and system development. The system developed and the experience gained in this circle and division would then be used in the expansion stage to extend and further develop the system into the rest of the circles and divisions.

Methodology: Purchase of hardware and software, and consultancy for system study and development should be awarded through public tender under the supervision of a task force as proposed in the earlier sections. The firm which would be contracted for the consultancy should provide two consultants who would be attached full time with the agency and observe the govt. working hours. One of the consultants would work with the **operative circle** and **division,** and the other one with the territorial circle. The circles would each provide one counterpart, in the rank of at least an assistant engineer, to its respective consultants.

Logistics: Each of the circles and divisions included in the pilot stage would be equipped with:

i. Two microcomputers.
ii. One printer.
iii. One Uninterruptible Power Supply (UPS).
iv. Two desk for computer.
v. One printer stand.
vii. Tow filing cabinets.
viii. Consumable for one year.
ix. One air cooler with accessories.

The technical specifications for the listed items should be described. Regarding the costs it should be borne in mind that any change in the current taxation policy on computer hardware; peripherals; and accessories may significantly alter these prices.

7.3.2 Workplan for pilot stage

The consultants would study the information needs of the concerned circles, and divisions, and top management and the process by which these needs are being currently addressed. They would study in detail the computerized information subsystems already in existence if any, and evaluate the extent to which these subsystems may be integrated into the mainstream MIS that they would be developing.

The objective of the consultants would be to device a system which will adequately and efficiently address the information needs of the concerned circles, division, and the top management.

The consultants would design and introduce data reporting and data output formats for this stage of the MIS, develop necessary computer programs for processing data according to these formats, and provide for subsequent archiving of these data.

The consultants would engage in capacity building through trained manpower by training at least two personnel from each division in MIS and computer operations.

7.4 The expansion stage

The evaluation of the **pilot stage** will begin during the **second Year** of its tenure and will be concluded at the end of the stipulated two year period. Thus the second year is expected to be utilized more in testing and adjusting the system, while the first year should be devoted more to system study and design. The results of the evaluation may be placed before the task force, prospective ESA's, and the MLGRD so that a consensus may be obtained on:

i. success of the **pilot stage;**

ii. continuation of the work into the **expansion stage;** and

iii. funding for the **expansion stage.**

The expansion stage should accomplish the following:

i. The modules developed for the representative circles and divisions will be adapted to the other operative circles and division, with enhancements and modifications wherever necessary.

ii. The modules developed for the representative territorial circle will be similarly adopted by the other territorial circles and divisions.

iii. Additional logistic support will be procured for these circles and division according to the needs.

iv. **The expansion stage** is expected to continue for three years. Consultancy services for system expansion, system adaptation, and new systems development will be required during the first one to two years of this stage. It may be realistic to award the extended contract for consultant to the same firm who would be contracted for the **pilot stage**.

MIS of Planning and Development Department, Azad Jammu and Kashmir

Presentation by Dr. Irene B. WILSON,
chief technical adviser, UNDP Project PAK/88/031

I should like to take this opportunity to thank the organizing committee for inviting me to make this address.

I have divided this presentation into two main parts covering:

- General Introductory Issues concerned with Use of New Technology in handling information and the associated introduction of Information System for Managers in the public sector; specific issues to be considered in this seminar in respect of information systems for projects in the Water and Sanitation sector.

- A general outline of the MIS we have developed in the Planning and Development Department of AJ&K.

GENERAL INTRODUCTORY ISSUES

Why the new technology and Management Information Systems?

- no effective socio-economic development can take place without information of appropriate quality and frequency - this is the key to better decisions; the growth in complexity of public sector development management has identified this need and this objective

- the new technology, the micro computers and the even newer miniaturized micro-computers and associated and ever-changing software, offer opportunities and constraints; they provide the opportunity of doing old things in a much better way and they offer the opportunity to do new things; the major constraint of this new technology is that failure to access and use it appropriately will block access to a whole range of other new technologies

- with greater span of public administration and greater complexity of it, there is an inevitable increase in the cost of administration and no country can tolerate such an increase without jeopardizing the competitiveness of its economy

- MIS can provide improvement in productivity and improvement in the quality of decision-making; the operative word here is CAN as we will see in a minuteGovernment - whether it be Federal or Provincial in Pakistan - as the major producer and use of information has the major role to play in organizing information

BUT

Information and information system don't just suddenly appear and the assumption that existing sources are adequate in content, quality and frequency or that pushing buttons on a computer is all that there is to managing information for better decisions IS SIMPLY NOT TRUE

It would be misleading not to say that management information systems can be painful to design and implement; it would also be true to say that management information systems can be a pleasure to implement; the difference lies in good PLANNING AND MANAGEMENT of information systems.

Planning & Managing information systems

Planning Requires:

- quality information collected and maintained at intervals; but information costs money and information systems to use that information cost more so you have to be sure that the information IS GOING TO BE SUFFICIENTLY USED (provide analyses) TO JUSTIFY THE EXPENDITURE

- planning an information system therefore requires clear objectives and policies to IDENTIFY the system required and it also needs standardization of information by describing the field or fields of application e.g. if the same information has to be used for a lot of different purposes then all of these have to be thought through in advance.

- finally, planning a system requires attention to other existing information systems and other users of the system being designed; all too often we see information systems designed within and for ONE department without proper and due consideration given to SHARING.

Managing Requires:

- appropriately qualified staff to run and maintain the system; here we run into problems because of private sector competition, perception of computer posts as

low grade; professional in this field have to be accorded due respect and status and clear objectives and policies; there's also the never-ending problem of job descriptions currently, for example we could ask "WHY ASK FOR COBOL SPECIALISTS WHEN OPERATIONS ARE IN MICROS"

- a programme of training for staff at different levels, different types of users with varying needs

- procedures and practice in users of equipment have to be laid down; the question of privacy and protection for example has to be looked into

- equipment is such an extensive issue that I'm not going to cover this except to highlight the matter of maintenance, repairs and replacement which have to be taken into account and the Normal Budget planning looked at from the start

- changes in the organizational structure of the agency with the MIS and changes in departmental operating procedures accordingly; if these are not done then its like someone once said "an MIS without organizational and procedural changes is like installing a jet engine on a hand cart"

- changes in the attitude and understanding of managers; MIS is not low level nor is it to be left to junior people to do all the work. Managers need to understand the scope and limitations of the system to know HOW AND WHAT TO ASK FOR; managers resisting MIS will get lift behind in career terms or even worse, the department will start to be controlled by the computer staff

In summary

Introducing management information systems has to be planned and managed carefully along with the requirement that managers enter the process with a positive approach which must include seeing operators of the system as equal and valuable partners in it and not low grade operatives who are not part of the management team. Government needs to be aware of all of the various activities in this field for reasons of efficiency and effectiveness in sharing the content of information systems as well as laying down procedural and often legal guidelines.

ITEMS SPECIFIC TO THIS SEMINAR

In view of the increasing importance which must and, indeed, is being given to Social Development, and the start of major Water and Sanitation projects in AJK and the provinces, this is a crucial time to be looking at the question of management information systems in the departments concerned i.e. LG&RD and PHED.

Essentially the question of objectives of a management information system in these

departments has to be raised; project monitoring and evaluation have already been identified by the project. But the question of what other activities of these departments should be included has to be asked. Even from a P&D perspective, I can mention several matters:

- annual sector information required by the Statistics cell of P&D
- annual development programme information
- P&D monitoring which includes Annual Plans of Operation (APO's) and quarterly returns

As well as these, information on the operation and maintenance of the Water and Sanitation schemes is vital and then there are a range of other items; project and departmental accounts might be built into the MIS whilst mailing lists, correspondence and reports, just to mention a few items, will require to use computers.

In a few minutes when we look at the AJK project monitoring system, you'll have a chance to see what this contains and hear some of the progress to date. However, P&D has its own remit to monitor projects in a particular way and the P&D in AJK is currently the only P&D in Pakistan which is implementing a computerized project monitoring system but, with the assistance of the Dutch, NWFP and Balochistan will also soon be introducing such a system and UNDP will be funding a new programme in FPC, Sindh and Punjab which will coordinate with the AJK, NWFP and Balochistan initiatives to ensure compatibility of systems throughout the country.

In summary

The initiatives of this seminar to increase awareness in Water and Sanitation agencies of the need to set up an MIS and to set up M&E units in the concerned departments as well as provincial committees for MIS development is important and necessary. It is also hoped that we can leave Abbottabad with a clear idea of the role of the M&E units and provincial MIS committees and a strategy for their implementation.

THE AJ&K MIS

Three aspects of the MIS in the Planning & Development (P&D) Department of the State of Azad Jammu & Kashmir (AJ&K) carried out by UNDP/DESD Project PAK/88/031.

- The Problems and Issues identified by Government and the assessment of the project

- A description of the P&D MIS

- Implementation of the System to date

The Problems Identified

PAK/88/031 started in Feb 1990 for 3 years thus ending in January 1993 but has been extended for one year and will be completed in January 1994 i.e. a total of 4 years.

The problems identified by government

The P&D department had identified a range of planning and project monitoring problems before the start of the project including:

- too much time being spent on repetitive tasks in respect of ADP and PCIIIs

- insufficient information about physical monitoring of projects

- need for more information on financial monitoring to ensure that expenditure was actually being made for items in the PC1 allocations as the need to link monitoring into the planning process

- difficulty of carrying out any analysis of information because all project information was only in the departmental files

- need to link project monitoring to PC1's and APO's

The assessment of problems by the project

The project agreed with these problems and identified additional ones including:

- ADP document needed to be stored and presented better

- ADP information was missing (e.g. start and projected project times; Union Council breakdown of location)

- ADP sector classification was mixed up and either based on beneficiary or sponsoring agency but often not on development activity.

- ADP preparation needed to be run according to fixed deadlines

- APO information was incomplete and more information was needed and the exercise had to have fixed timescales.

- linkages had to be made between PC1's, APO's and Quarterly Monitoring
- insufficient tracking of new unapproved projects
- no analysis of ADP or Monitoring results from PC111's and no linkages to plan-making
- A review of departmental organization and management was needed in line with changes being made in MIS introduction
- Any new computerized MIS had to take into account reporting requirements to ensure that no extra, complicated programming had to be done to be able to pass on information
- specialized staff are needed to run and maintain these systems as well as extensive training in P&D of all levels of staff

Before looking at the Project Monitoring part of the P&D MIS, the main components of the system will be described.

A Description of the P&D MIS (Overhead)(copy attached to this paper)

The PMS is part of a series of linked data bases. Whilst some deal specifically with monitoring, the others can be used for cross-checking of monitoring information. The Overhead shows each of these (explain). Linkages between data bases are achieved by the use of unique project reference numbers.

When we introduced the system we wanted to make sure that the following design parameters were followed:

- proformas for information collection were easy to fill in
- proformas were short in length
- for all databases, the project was seen as the major unit of the system (except sector statistics)
- all data bases created would link using unique reference numbers for each project
- the system of project monitoring should not be seen as a policing system
- every sector should use the same proformas for monitoring i.e. one single style

- the three forms of information to be collected should include project inputs, outputs and activities

(Overhead of APO/Quarterly Proformas - copy attached to this paper)

The 2 main proformas used for information collection are the APO and the Quarterly form. The former is filled in for every project at the beginning of the financial year and the latter is filled in for the first 3 quarters. Here, it is worth noting that the emphasis of content on both forms is both financial as well as physical and is divided into 3 main project monitoring components namely inputs, outputs and activities. Completion of the APO for the first time is the worst because all PC1 information is required; if there are changes in the PC1 throughout the year then a new APO has to be submitted; if an ADP allocation for a project is changed throughout the year then a new APO has to be submitted.

Implementation of the MIS

This had to be thought through in terms of how to ensure timely returns and properly completed returns. For both aspects, training sessions are run in P&D and all 16 line agencies. These sessions have started six months ago with trial form completions and will continue for 18 months unit the project is completed.

Of the 16 line agencies, ten have no computers so returns are manual whilst in the six cases with computers, training to make returns on diskette is being given.

Ensuring timely results which has been a problem in the past; we have devised a weekly timetable for P&D and the line agencies for the whole year indicating by week the activities required (see overhead example). In addition, ACS Development has assigned specific staff for specific responsibilities and has also held a top level meeting with all secretaries and heads of line agencies. As well as these measures, letters are dispatched in advance of a collection and repeat substantive and computer training courses take place.

Of the 682 APO's dispatched on time, nearly all were returned on time (one week later all had been returned). The quality of information is significantly better than anything collected in the past. The major weaknesses so far are the poor returns on activities and the fact that no annual quarterly breakdown of inputs, outputs and activities is available. This will have to be improved in the future. In respect of inputs, these are completed as descriptions whereas we would prefer to use input codes which correspond with the Auditor General's expenditure codes; the latter are not sufficiently detailed at the moment for us to use. The APO is used by us to create an Annual Plan which shows financial and physical inputs and outputs by project. This can be generated quickly and easily from the

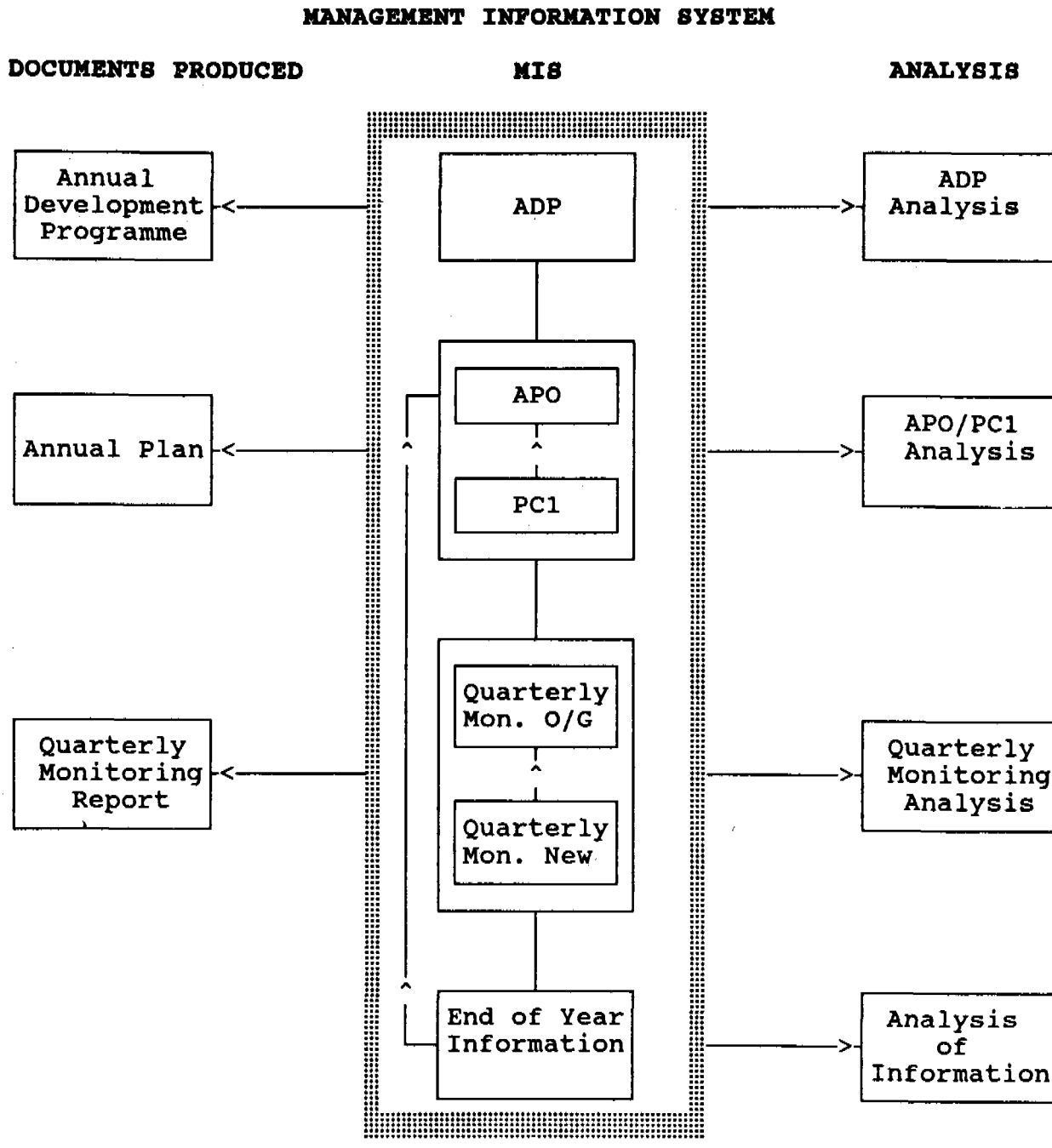
APO database.

The Quarterly monitoring system completed by the line agencies is generated from the APO; in other words, once an APO is in the system, we can repeat the information on the quarterly proformas and all the line agencies need to do is fill in the missing information. These take about 20 minutes per project to complete. Thus, if incorrect information is given in the APO, the line agencies will have to line with it for the rest of the year. Thus, there is an incentive to do things right at APO time - that being the difficulty of having to explain differences in data thereafter. Note all APO's whether computerized or not must submit verified and approved copies to P&D at the start of the year.

A major problem facing AJ&K and indeed all of the provinces is lateness of expenditure throughout the financial year; it is hoped that a stronger mid term can be introduced as well as a minimum of reappropriation throughout the 3rd and 4th quarters. Without these changes, the analysis of the first 2 quarters will tell a tale - non activity.

A final few points of advice as a summary:

- monitoring systems often are or can be seen as policing so every effort to have 2 way flow of information/analysis is vital
- monitoring has to be perceived by the people filing in the forms as helpful and important otherwise the quality of returns will be poor
- monitoring information has to be used as a basis for improved PC1's and better future policies and plans
- monitoring information has to be collected by simple proformas and computerized
- the people filling in monitoring forms often know very little about the actual implementation of the project
- the AJ&K P&D system can be used by ministries and line agencies as a basis to extend their monitoring efforts e.g. it can be added to and/or it can be out more frequently than quarterly
- if bad data goes in bad results will come out; if people do not give accurate information then this will be found out
- filling in forms has to be supplemented by site visiting on the part of the agency carrying out the monitoring system


MANAGEMENT INFORMATION SYSTEM
DOCUMENTS PRODUCED
MIS
ANALYSIS
Annual Development Programme
Annual Plan
Quarterly Monitoring Report
ADP
APO
PC1
Quarterly Mon. O/G
Quarterly Mon. New
End of Year Information
ADP Analysis
APO/PC1 Analysis
Quarterly Monitoring Analysis
Analysis of Information

ITEM-1:

ANNUAL DEVELOPMENT PROGRAMME PROFORMA
P&D DEPT, AJ&K.

PLEASE COMPLETE THE FOLLOWING PROFORMA FOR EACH PROJECT USING THE USER GUIDE.

DATE ISSUED:

Where optional answers are available, please circle these:

1.1 Unique Reference No.	_____
1.2 Sub-Sector	_____
1.3 Ongoing/New	
1.4 PC-I/PC-II	
1.5 ADP Year	_____
1.6 Women in Dev. Projects	**S**=Specific I=Integrated **C**=Component

2. Name of the Project:	_____
	_____
	_____
	_____

3. Location of the Project:
3.1 Fill in Annexure-A

4.1 STATUS OF THE PROJECT:
A=Approved B=Unapproved
C=Under Revision

4.2 APPROVING AUTHORITY: A=AKDWP B=AKCDC C=ECNEC

4.3 DATES:

a.	Start Date as in PC-I/PC-II(dd/mm/yyyy)	_____
b.	Completion Date as in PC-I/PC-II	_____
c.	Anticipatory Approval by relevant Forum	Y=Yes N=No
d.	Date of Administrative Approval of First PC-I/PC-II	_____
e.	Last Date of Administrative Approval of Last PC-I/PC-II(if Revised)	_____
f.	Expected Completion date	_____
g.	ADP in which scheme originally appeared	_____

5. AGENCY DETAILS:

5.1 Sponsoring Agency _____

5.2 Executing Agency(ies) _____

5.3 Donor Agency(ies) _____

5.4 Loan Agency(ies) _____

6. TOTAL ESTIMATED COST(Rupees in Million):

6.1 Original Approved/Estimated Cost _____

6.2 Last Revised Cost _____

a. Remarks-1 _____
b. Remarks-2 _____

6.3 Foreign Exchange Component _____

6.4 Foreign Credit _____

6.5 Foreign Aid _____

7. EXPENDITURES:

7.1 Expenditure up to end of Previous Year _____

7.2 Revised Estimates for Last Year _____

7.3 Expenditure Planned up to the end of Last Year as per PC-I/PC-II _____

8. ALLOCATIONS REQUIRED FOR THE NEXT ADP:

8.1 Provision for Project in Five Year Plan _____

a. Remarks _____

8.2 Next Year's Allocation as planned in PC-I/PC-II _____

8.3 Next Year's Allocation _____

a. *Self Financing* _____

8.4 Foreign Exchange Component _____

8.5 Foreign Aid _____

8.6 Foreign Credit _____

9. Beyond this Budget:

9.1 Allocation in PCI/PCII beyond the ADP by Year

Year	Allocation

9.2 Annual Recurring Expenditure after Completion of the Project(PCI Item-7) _____

ANNEXURE-A

S.NO.	DISTRICT	TEHSIL	PLACE(+ ADMINISTRATIVE CODE)

ITEM-2:

ANNUAL PLAN OF OPERATION(APO)
PROJECT MANAGEMENT DATABASE2
LINE AGENCIES

Please complete the items below using the attached users guide:- **Year:** **Date Issued:**

A. Characteristics of the Project:
1. Project Name:

2. ADP Project Number: 3. Sector : 4. Sub-Sector: 5. Approved Cost 6. ADP Allocation for C.Year

B. PC1 or revised PC1 Project Inputs(Approved Quantity & Amounts):				**Exp up to Last Year**		**APO Planned Inputs**	
B1. DESCRIPTION	B2.Unit of Meas-urement	B3. Quan-tity	B4. Total Exp. Planned as in PC-I/PC-II (Rs. In Mill.)	B5. Quan-tity	B6. Exp.(Rupees in Millions)	B7. Quan-tity	B8. Exp. Plan-ned (Rupees in Millions)
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							
21.							
22.							
23.							
B9. Total B10. Total Contract Cost/Exp							

C. PC1 Targets(Outputs):			Targets(Outputs) Achieved upto End of Last Year	APO Targets (Outputs)
C1. DESCRIPTION	C2. Unit of Measurement	C3. Number/Quantity	C4. Number/Quantity	C5. Number/Quantity
C1.1. Physical Targets(Outputs):				
a.				
b.				
c.				
d.				
e.				
f.				
g.				
h.				
i.				
j.				
k.				
C1.2. Non-Physical Targets(Outputs):				
a.				
b.				
c.				
d.				
e.				
f.				
g.				
h.				
i.				
j.				
k.				
C1.3.Printed/Other Communication Materials(Targets)				
a.				
b.				
c.				
d.				
e.				
f.				
g.				
h.				
i.				
j.				
k.				

D1. APO Activities to be done by the Department:	D2.Start Date	D3. End Date
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		

E. **Completion/Verification/Approval:**

	NAME	DESIGNATION	TELEPHONE	DATE	SIGNATURES
Form Completed by: Form Verified by: Form Approved by:					

ITEM-3:

QUARTERLY MONITORING ON-GOING PROJECTS
PROJECT MANAGEMENT DATABASE2
LINE AGENCIES

Project Number	YEAR:
Project Name	QUARTER:
Sponsoring Agency	

PLEASE COMPLETE THE FOLLOWING FORM USING THE ATTACHED USER'S GUIDE:

A1. FINANCIAL INFORMATION(In Million Rupees):

1. Total approved cost of project _____.__
2. ADP allocation for the current year _____.__
3. Funds released for the 2nd Quarter _____.__
4. Expenditure for the 2nd Quarter _____.__

A2. IF APPLICABLE TICK THE REASON(S) FOR LOW FUNDS UTILIZATION

1. Delay in release of funds
2. Delay in project inputs
3. Weather
4. Lack of accessibility to project area
5. Difficulties with contract
6. Difficulties with contractor
7. Internal project problems
8. Difficulties of Acquiring Land

X1.Others(Please Specify)
X2.Others(Please Specify)

B. Project Inputs(APO):

B1. DESCRIPTION	B2. Unit of Measurement	B3. Quantity	B4. Planned APO Exp. (Rs. in Millions)	Inputs in 2nd Qtr: B5. Quantity	Inputs in 2nd Qtr: B6. Exp. of each Item (Rs. in Millions)	Status of Inputs in 2nd Quarter: B7. On Schedule	Status of Inputs in 2nd Quarter: B8. Delayed
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							

B9. REASONS FOR DELAYS IN INPUTS(TICK REASON(s)):

1. Tendering Procedure for equipment
2. Delays in Staff Recruitment
3. Unavailability of appropriate material
4. Unavailability of Appropriate Machinery/Equipment
5. Power Cuts
6. Delay in Land Acquisition
7. Strikes of Staff
8. Tendering or Contract/Sub-Contract not Completed
9. Current costs of equipment/materials/exceeds/ planned costs
10. Admin difficulties due to shortage/transfer of personnel
11. Changes in Senior Management
12. Foreign experts not assigned
13. Problems with contractors
14. Weather or Accessibility
15. Problems of installation of water, gas, electricity
16. Lack of public participation at community level
17. Lack of locally mobilized funds
18. Finalisation of Bills not completed

X2. Others(Please Specify)

. PROJECT TARGET (OUTPUTS, FROM APO)			APO Achievements in QT2	C3. STATUS IN 2ND QUARTER:		
1. DESCRIPTION	Unit of Measurement	No./Qty	C2.No./Qty	C3.1 Continuing	C3.2 Completed	C3.3 Cancelled
1.1 Physical Targets(Outputs):						
a.						
b.						
c.						
d.						
e.						
f.						
g.						
h.						
1.2 Non-Physical Targets(Outputs):						
a.						
b.						
c.						
d.						
e.						
f.						
g.						
h.						
1.3. Printed/Other Communication Matter						
a.						
b.						
c.						
d.						
e.						
f.						
g.						
h.						

4. SUGGESTIONS FOR BETTER OUTPUT RESULTS(TICK Suggestions):

1. Introduction of Penalty Clauses in Contracts
2. Enforcement of Existing Penalty Clauses
3. Improved Pre-qualification of contractors/consultants
4. More efficient tendering procedure for equipment purchase
5. Access to a bigger range of suppliers
6. Better Monitoring & Updating of Scheduled rates of construc:
7. Need of better bills of quantities
8. Neec of more account to be taken of inflation
9. Less restrictive recruitment rules for specialised staff
10. Improvement in Land Acquisition Procedure
11. More encouragement of public participation
X1.

1. PROJECT ACTIVITIES OF THE DEPARTMENT:	D2. STATUS OF ACTIVITIES IN C1 DURING 2ND QUARTER		
	D2.1 COMPLETED	D2.2 CONTINUING TO NEXT QTR	D2.3 CANCELLED
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
X. List alterations during the 2nd quarter			
11.			
12.			

3. Reasons for cancelling activities(Tick Reasons):

1. No longer relevant
2. Problems with inputs
X1.
X2.

E. PROJECTS COMPLETED/UNDER REVISION:

1. Has this project been completed in the 2nd Quarter — Yes/No(Tick appropriate answer)
   If yes request a PCIV form from P & D
2. Is this PC1 of this project under revision — Yes/No

F. Name of officer who filled in this form _____
Designation _____
Telephone number _____
Date completed _____

G. VERIFICATION/SITE VISIT:

1. Name of Officer who verified this information: _____ 2. Telephone Number _____
3. Date Verified _____

4. Method of Verification: a. Officer Report ___ b. Site Visit ___
5. Site Visits to the Project by the Headquarters Staff:

a. Name of Officer	b. Designation Officer	c.Date of Site Visit	d. Place(s) Visited	e.Inspection Report Issued Yes/No	f. Date of Inspection Report
1.					
2.					
3.					
4.					

H. Verification/Approval:

	NAME	DESIGNATION	TELEPHONE	DATE	SIGNATURE
Head of Department					

Annex III

MIS of Rural Development Department, Sindh

Presentationby
Mr. Abdul Hamid Rajput,
Director (Technical), RDD Sindh

First of all I will give a brief introduction of the organization and functions of the Rural Development Department of Sindh.

In the province of Sindh the Rural Development and Local Government are separate departments. The Local Government Department takes care of the administrative & financial aspect of rural and urban councils whereas the Rural Development Department is responsible for looking after and monitoring the development activities of rural local councils i.e. Union Councils, Town Committees and Municipal Committees outside the District Head Quarters.

The RDD is headed by the Director General at provincial level having Director (Technical-I) and Deputy Director Administration and Accounts in his office supported by other officers and staff. Director (Technical-I) in the Head Office in mainly responsible for monitoring of various development activities being carried out by the Department directly or in-directly, while the Deputy Director is responsible for administration and accounts.

At the field level the Department has two wings: the Technical Wing and the Development Wing. The technical Wing is headed by Director (Technical-II) stationed at Hyderabad having executive engineers at Divisional level i.e at Hyderabad Sukkur and Larkana and Assistant Engineers at Sub-divisional level i.e. 3-4 Assistant Engineers per District. On the Development side there are Directors (Development) at Divisional level and Assistant Directors at District Level.

The main function of the Rural Development Department is to facilitate in execution of development schemes of rural local councils, provide them technical guidance, preparation of design etc, and supervision of the schemes carried out by the councils out of their own sources and through grants provided by provincial and Federal Govt. Monitoring of these schemes is also done by RDD. The number of such small schemes in the province runs into thousands.

Since 1987 with the induction of Senior Technical Officers in the Department i.e. Director (Technical)/Superintending Engineer and executive Engineers, the Department has also been involved in execution of rural water supply and sanitation schemes for

small villages with the assistance of UNICEF. Phase-I of the schemes was completed in the year 1991 under which about 2,300 community Hand Pumps were installed. Phase-II of the scheme was started in 1992 with a target of installing 2,250 handpumps and about 8,000 community and house hold latrines. Similarly with the World bank assistance the Department has initiated a rural water supply and sanitation project for the implementation of the Strategic Investment Plans (SIPs). Under this project about 1,800 small water supply schemes and 10,000 household and community latrines will be completed in 8 years period commencing from 1992-93 in Sukkur and Larkana District of the province of Sindh.

In addition to the above mentioned projects & schemes the RDD- Sindh is also coordinating in execution of USAID Road Resource Management project through District Councils. The total cost of this project is about US$ 14.1 million.

Information Needs of the Department:

A fairly large number of monthly, quarterly, half yearly and annual reports are prepared for reporting, monitoring and evaluation of the projects and activities mentioned above. Most of the information for the reports come from the field. At present these reports are complied & consolidated manually in the field and also in the head-offices. This manual process is cumbersome and time consuming and needs to the improved and modernized by introduction of computers for which there is a felt need, however due to financial constraints and lack of trained staff in this field, the department has not been able to introduce computers effectively for reporting and monitoring purposes.

Similarly a series of reports on administrative and budgetary matters are also prepared regularly e.g. returns for budgetary expenditure statements, schedule of new expenditure, statement of excess and surrenders and many other which are required to be submitted periodically to Finance Department and P&D Department. The quantum of work load in this regard is of the magnitude that requires to be computerized as soon possible. One of the reasons for not switching over to computerized system is also the lack of realization of the importance and benefits of computerized management information system.

Plans for Introduction of Management Information System in the RDD, Sindh

The Rural Development Department is one of the executing agency of the IDA assisted project in Sindh. Technical assistance under this project includes institutional development of the department particularly strengthening of management information system and monitoring and evaluation. The Department through the IDA project has engaged expatriate and local consultants for technical assistance in the area of MIS. The consultants will assist the department in introducing and developing MIS. Initially, MIS

is proposed to be developed for the office of the Director General, RDD which is also the provincial head-office of the department. The unit in the D.G. Office will be headed by Director (technical-I) (B-18) having a system analyst (B-17) and one computer operator (B-11). Other lower level staff will also be associated with this unit as per requirements. Director (Technical-I) is already available in D.G. Office where as the system analyst and computer operator will be engaged soon. Provision for these positions exist in the IDA project. The D.G. office has two computers at present and more can be procured as per requirement through the IDA project.

Similar MIS unit is proposed to be established at Sukkur in the Office of Director (Development), a Divisional level Office under the IDA project. In this unit one MIS Officer (BPS-16) and one computer operator (B-11) will be engaged with computers. Provision for these also exist under the IDA-assisted project.

MIS consultants will be attached with the Department for about three years and with their assistance and technical guidance the Department will expand the management information system to other Divisional and District level Offices if the resources for the same could be arranged.

Annex III

Management Information System of PHED, Sindh

Presentation by
Hasan Ali Talpur, Superintending Engineer, PHED Sindh

The Public Health Engineering Department is basically an engineering oriented department responsible for planning, designing and construction of government sponsored drinking water supply, sewerage and sanitation schemes in the entire province of Sindh except the cities of Karachi and Hyderabad.

Although the Department has been in existence since 1961 but its activities were quite limited because of lesser importance given to water supply and sanitation sector. The workload started increasing at the beginning of 1980's and has reached to about 1,500 schemes presently. This is expected to rise to about 3,500 in the next Five Year because of increased investments in the sector by the government and the World Bank.

In order to design, develop and monitor the ambitious programme on scientific lines, the need for an efficient Management Information System has become almost inevitable. Some preliminary work in this regard has already been done with a view to develop it further under the recently started Rural Water Supply and Sanitation Project assisted by the World Bank, which has a major component on developing modern management information system for the department.

The details of actions already taken can be summarized as under:

The Department has so far arranged 3 micro-computer with printers and installed in chief Engineer's office at Hyderabad and trained the departmental Executive and Assistant Engineers (about 30 personnel). The training has been imparted in the basics of computers and designing of water distribution system and sewerage net work both on Loop and Branch Programmes developed under TAG programme by World Bank.

The documentation presently being done with the help of these computers which are being operated by three lady steno typists and one Assistant Design Officer are mostly limited to the following:

i. Preparation of ADP for New and On-going Schemes i.e. review of physical and financial targets and achievements.

ii. Monitoring Water Supply and Drainage Schemes based on laboratory analysis.

iii. Preparation of Monthly and Quarterly Progress reports.

iv. Listing of operation and maintenance completed schemes.

The basic data for above is regularly received from field officers through the Superintending Engineers.

As stated above since the activities are increasing day by day as such basing the system of data collection, computing and monitoring etc. on scientific lines has really become the need of time and this is our basic aim under the IDA assisted project "Sindh Rural Water Supply and Sanitation Project" where in specific emphasis has been given on the development and establishment of a complete MIS Cell.

Under this Project the Strategy proposed shall be activated through splitting of five modules which are as under:-

- The Project Monitoring Database.
- The Sector Monitoring Database.
- The financial Management Database.
- The Administration Management Database.
- The Inventory Control Database.

The design of these database and their programming will be undertaken in modular phases and it is envisaged that there will be two modules and these will be as follows:

Module I	-	Programming, installation and testing of customized database.
	-	the Project Monitoring Database.
	-	the Sector Monitoring Database.
Module II	-	Installation and tailoring of commercial packages:

Priority will be given to the provision of the project monitoring database where base line data on the status of all Rural and Urban Water Supply and Sanitation Projects will be collected and regularly updated.

Presentation on Management Information System by PHED Punjab

Chaudhry Naseer Ahmed Khan,
Superintending Engineer, PHED North Punjab.

Water Supply and Sanitation projects in Punjab used to be executed by Building and Roads Departments before 1957. Special Circles were earmarked to handle these projects and therefore used to be named as Public health Circles. After 1957 a separate Department was formed under the name Social Welfare Works Department, West Pakistan. This Department used to deal with the Water Supply Sanitation and other Civil Works pertaining to Local Bodies.

In 1961, Social Welfare Works Department was renamed and it emerged as Public Health Engineering Department.

Presently in Punjab, Public Health Engineering Department has been divided into two Zones namely North Zone and South Zone. Each Zone is headed by one Chief Engineer.

North Zone consists of six circles while South Zone comprises of five circles. The chief engineer's offices have two Directorates each. One of the Directorates is called Works and Administration Directorate headed by a Director while the other is known as Planning and Designing Directorate. It too is headed by a Director. The main functions of the first Director are to help the chief engineer in monitoring the cases concerned with.

a) Administrative approval of projects from Departmental Development Sub-committees and from PDWP pertaining to ADP, PM and CM Directives and other programmes.

b) Allocation from P&D and to get the funds released from Finance Department for the projects under execution.

c) Monitoring of the physical and financial progress of the projects.

d) Examining monthly, quarterly, half yearly/yearly returns/statements required to evaluate the efficiency of performance of Circle and Divisional Offices.

The Directorate for Planning and Designing helps the Chief Engineers in scrutinizing the technical designs of the projects.

As far as the physical execution of projects is concerned, it is accomplished through Executive Engineers under the control of Superintending Engineers. The Executive Engineer's jurisdiction generally comprises of a full District. Similarly a circle office covers the boundary of a Civil Division. However, where number of schemes or projects is exceptionally large or small then the jurisdiction of Division and Circles can be increased or decreased depending upon the situation. According to the existing system, the planning Design and cost estimation of schemes is done in the Executive Engineer's Office and is then scrutinised in the Superintending Engineer's Office or Chief Engineer's office depending upon the amount of the estimate.

Similarly as far as Administrative Approval of Projects is concerned, it is done at three levels.

a) Divisional Development Sub Committee headed by Commissioner for cases up to Rs 35.00 lacs.

b) Departmental Development Sub Committee headed by Administrative Secretary for cases between Rs 35.00 lacs to Rs 60.00 lacs.

c) Provincial Development Working Party headed by Chairman P&D for cases between Rs 60.00 lacs to Rs 10.00 crores.

Similarly tendering for the jobs to be executed is done by the Executive Engineers. All the contracts costing upto Rs 10.00 lacs are awarded by them at their level, upto Rs 50.00 lacs fall within the competency of superintending engineers and beyond Rs 50.00 lacs are awarded by Chief Engineers.

The execution of works is generally done through contractors. However, some minor jobs can be handled departmentally also.

Our present MIS is based on the traditional and stereotyped statements and returns. During the times these forms were designed, the work load used to be very small and the number of water supply, drainage and sewerage schemes used to be less. Presently the number of water supply and sanitary schemes has risen many fold. The volume of work has also expanded tremendously. Formerly Rural Water Supply and Sanitation schemes used to be operated for two years after their completion and then handed over to local bodies for further maintenance but w.e.f. 1.7.1992, all the completed schemes since the creation of PHED have been taken back from local bodies. Although various types of information is imparted from Executive Engineer level to Government through Superintending Engineer and Chief Engineer's offices yet because of the heavy load the information invariably does not reach the desired quarters in time and its accuracy is also not credible because possibility of mistakes cannot be ruled out on account of haste and rush of work. Keeping the record of the following information has become imperative for various reasons.

a) Population served with potable water in the province.

b) Population yet to be served in the province.

c) Consumption per capita of water.

d) How much population is being served in Arid (water scarce) Zone.

e) How much population being served in brackish Zone.

f) Number of villages having water supply with house connections throughout the village.

g) Number of villages without comprehensive water supply system but with modest skeleton system.

h) Number of villages with a mixed system of house connection as well as through Public stand posts.

i) Detail of house connection on every water supply scheme.

j) Detail of water rate levied per house connection.

k) Recovery of revenue, its percentage default etc.

l) Details of expenditure on various water supply schemes.

m) Details of allotment of funds to maintain the water supplies v i s - a - v i s actual expenditure being incurred on the operation and maintenance of schemes.

n) Capital cost of production of water being shared per persons of the village.

o) Capital cost of production of water per 1,000 gallons.

p) Operation and maintenance cost per 1,000 gallons supplied to consumers.

q) Operation and maintenance cost being shared by each person of thevillage.

Apart from the above information the physical progress and detail of financial progress on monthly basis of on-going projects needs to be stored and compiled for successful monitoring and removing of any impediment or bottleneck in the way of completing certain projects in time, to render the desired facilities to communities on time.

In addition to the above, for efficient management, and for concrete decision by the

competent forums, availability of quick and accurate information is a must. This is only possible through computerized system of storing various information.

Even for designing projects with very big and complicated networks of water supply distribution systems or Drainage and Sewerage schemes having different slopes and various velocities is a big task if undertaken with conventional methods, whereas, with the help of computers, it becomes far more easy and quick, and time saving exercise. In this way, in a short span of time many alternate solutions of networks of water supply or drainage systems can be formulated and competitive studies can be made for arriving at the most economical, and cost effective schemes.

Seeing the needs, it is strongly felt that present MIS of PHED should be strengthened by introducing modern gadgets available and by employing modern techniques for improving performance and for better decision making.

As far as the PHED Punjab is concerned it highly appreciates to improve MIS for obtaining reliable and timely data for monitoring and evaluation of water supply and sanitation projects, in order to render improved services during operation and maintenance stage of the systems and to design and plan efficient and economical system before execution state and therefore welcomes all the recommendations which will be arrived at, on the conclusion of this Seminar.

Regarding constitution of MIS units it is suggested that they should be formed at Divisional, Circle and Chief Engineer's levels. The details of such MIS Units will be sorted out during discussions among the participants of this seminar.

Annex III

Presentation by PHED-NWFP

Mr. Nazir Hussain Afridi, Chief Engineer

FUNCTIONS AND OBJECTIVES OF PHED

TO IMPROVE HEALTH AND WELL-BEING OF THE POPULATION

TO SAVE THE ENVIRONMENT FROM DEGRADATION

STRATEGIES FOR THE ACHIEVEMENT OF THE STATED OBJECTIVES

1. ADEQUATE SUPPLY OF POTABLE WATER.

2. REMOVAL OF WASTE WATER

3. SOLID WASTE MANAGEMENT

4. TREATMENT OF DOMESTIC AND INDUSTRIAL WASTE WATER

5. MONITORING AND PROTECTION OF WATER QUALITY

6. COMMUNITY INVOLVEMENT

PHED'S DEVELOPMENT HISTORY

- PHED, ON DISMEMBERMENT OF ONE UNIT WAS ABOLISHED IN N.W.F.P (1071) BY MERGING IT WITH B&R DEPARTMENT.
- IN EARLY 1970s THERE USED TO BE ONE P.W.D SECRETARIAT FOR ALL THE LEADING NATIONAL BUILDING DEPARTMENT.
- IN 1974 PHED EMERGED AS AN ATTACHED DEPARTMENT TO P.W.D SECRETARIAT.
- PHED, ON SUBSEQUENT DISINTEGRATION OF P.W.D SECRETARIAT (C&W, IRRIGATION AND PP&H) BECAME ATTACHED TO IRRI: & PHE SECRETARIAT.
- PHED TODAY IS AN ATTACHED ORGANIZATION TO IRRIGATION SECRETARIAT HAVING THE FIELD CHARGES AS UNDER:-

*	Circle Officers	=	06
*	Divisional Officer	=	14
*	Sub-Divisional Officer	=	42
*	Engineers working in Headquarter Office	=	19

EXISTING SERVICE LEVEL

Area	No. of Schemes in Operation	Population Benefitted	%age Service
Settled Area	1,902	7,805.180	60
FATA	445	1,405,452	45
Afghan Refugees	154	1,429,390	64

CLASSIFICATION OF EXISTING (COMPLETED) SCHEMES BY MODE OF SERVICE

Mode	No. of Schemes in Operation	Population Benefitted	Population Connected
House connection & community service	659	4,761,598	722,000
Community service	1,243	3,044,000	

CLASSIFICATION OF EXISTING (COMPLETED SCHEMES BY MODE OF FLOW

Mode	Number
No. of schemes based on gravity flow	771
No. of schemes based on pumping	1,131

WATER SUPPLIES
(RURAL)
ADP INVESTMENTS

Sixth Plan	ADP Allocation (Settled Area)	% Prov. ADP (Settled Area)	ADP Allocation (FATA)	% FATA ADP
1983/84	87.6	5.7	17.00	4.2
1984/85	78.6	5.6	20.8	4.3
1985/86	106.0	5.3	30.6	5.9
1986/87	156.6	6.2	50.6	7.2
1987/88	183.2	6.0	54.6	7.5
Seventh Plan				
1988/89	155.5	4.5	42.6	6.0
1989/90	164.2	5.5	64.1	8.2
1990/91	239.2	7.0	81.0	10.4
1991/92	256.9	6.3	81.7	10.3
1992/93	636.0	14.0	139.5	18.2

FINANCIAL ALLOCATION UNDER THE SOCIAL ACTION PLAN

		Rs. in Million
Water Supply	=	2550.00
Sanitation	=	597.00
Total		3147.00
Current year 1992-93 allocation	=	636.00
Turn Over per year for the remaining two years.	=	1255.00

SANITATION (RURAL)

Sixth Five Year Plan	Allocations (Rs in mil)
1983-88	1.097
Seventh Five Year Plan	
88-90	0.4
90-91	5.8
91-92	20.1
92-93	111.45

PROGRAMMES ASSISTED BY FOREIGN DONORS (SINCE 1988)

Project	**No. of Schemes**	**Donor Agencies**	**Cost (Rs. in mil.)**
Water Supply and Sanitation Phase-I	11	Germany (KFW)	114.0
Water Supply and Sanitation Phase-II	35	Germany (KFW)	240.0
Water Supply and Sanitation Phase-III (in pipe line)	23	Germany (KFW)	677.0
Afghan Refugees	130	UNICEF	
Narcotics control programme (FATA)	84	USAID/EEC	100.0
Narcotics control programme (settled area)	24	USAID/EEC	24.0
Promotion of PHED Phase-I		Germany (GTZ)	60.0
Installation of Handpumps and sanitation programme		UNICEF	7.207

TABLE INDICATING WORK LOAD IN TERMS OF NUMBER OF SCHEMES

Items	Location	No. of Schs. in 1974-75	No. of Schs. in 1992-93
Original work	Settled area	53	634
ADP	FATA	11	206
Sub-total		64	840
Recurring Budget (O & M)	Sattled area	30	1,902
	FATA	Nil	445
Sub-total		30	2,347
Total		94	3,187

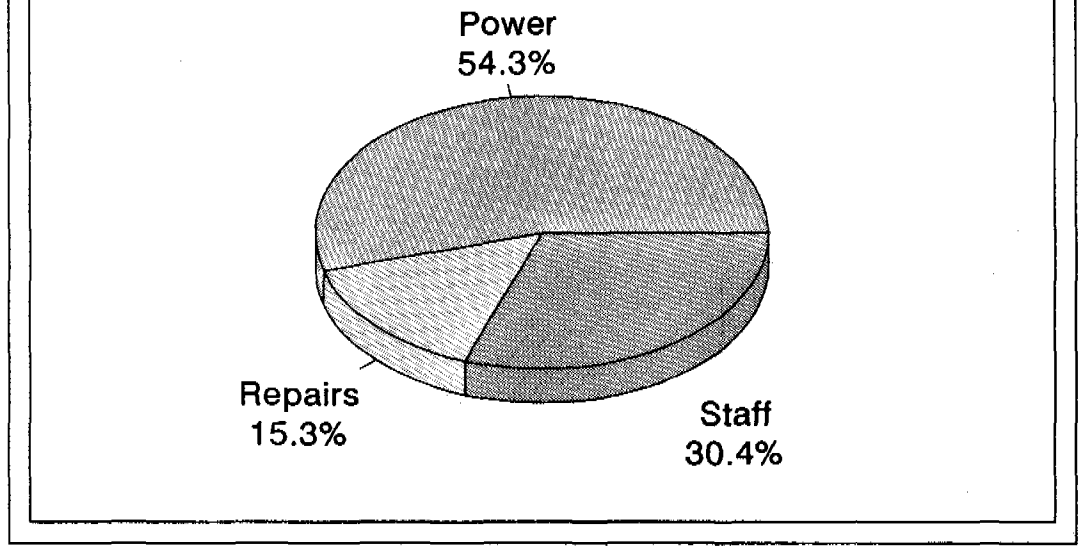
TABLE INDICATING WORK LOAD IN (FINANCIAL INPUT)

(Rs. in Million)

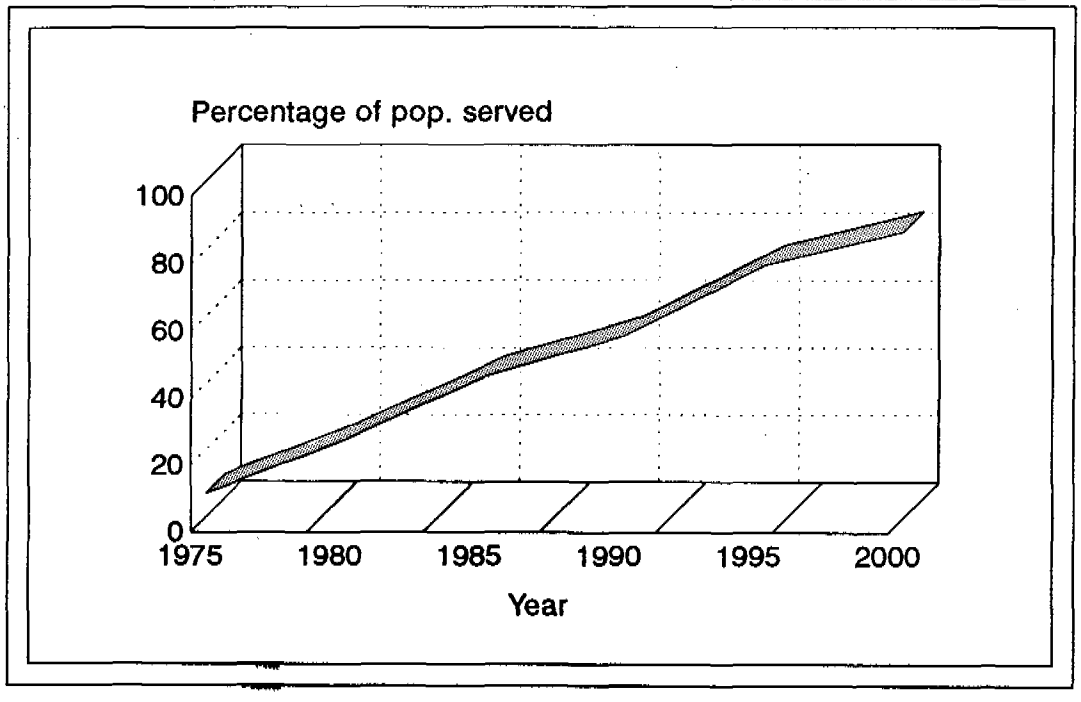
Item	Locatio	Financial Allocation in 1974-75	Financial Allocation in 1992-93
Original Work	Settled Area	14.216	636.000
A.D.P.	FATA	7.450	139.508
Sub-total		21.466	775.508
Recurring	Settled area	0.700	182.690
Budget (O&M)	FATA	-------	28.990
Sub-total		0.700	211.680
DEALING WITH DONORS LIKE: (KFW, GTZ, UNICEF, UNDP, UNHCR, ADB, WHO, World Bank, IDBP, BCCI, & USAID)			
K.F.W.			80.00
Other Donors			20.00
Sub-total			100.00
TOTAL			1,087.188

Break-up of O&M Costs

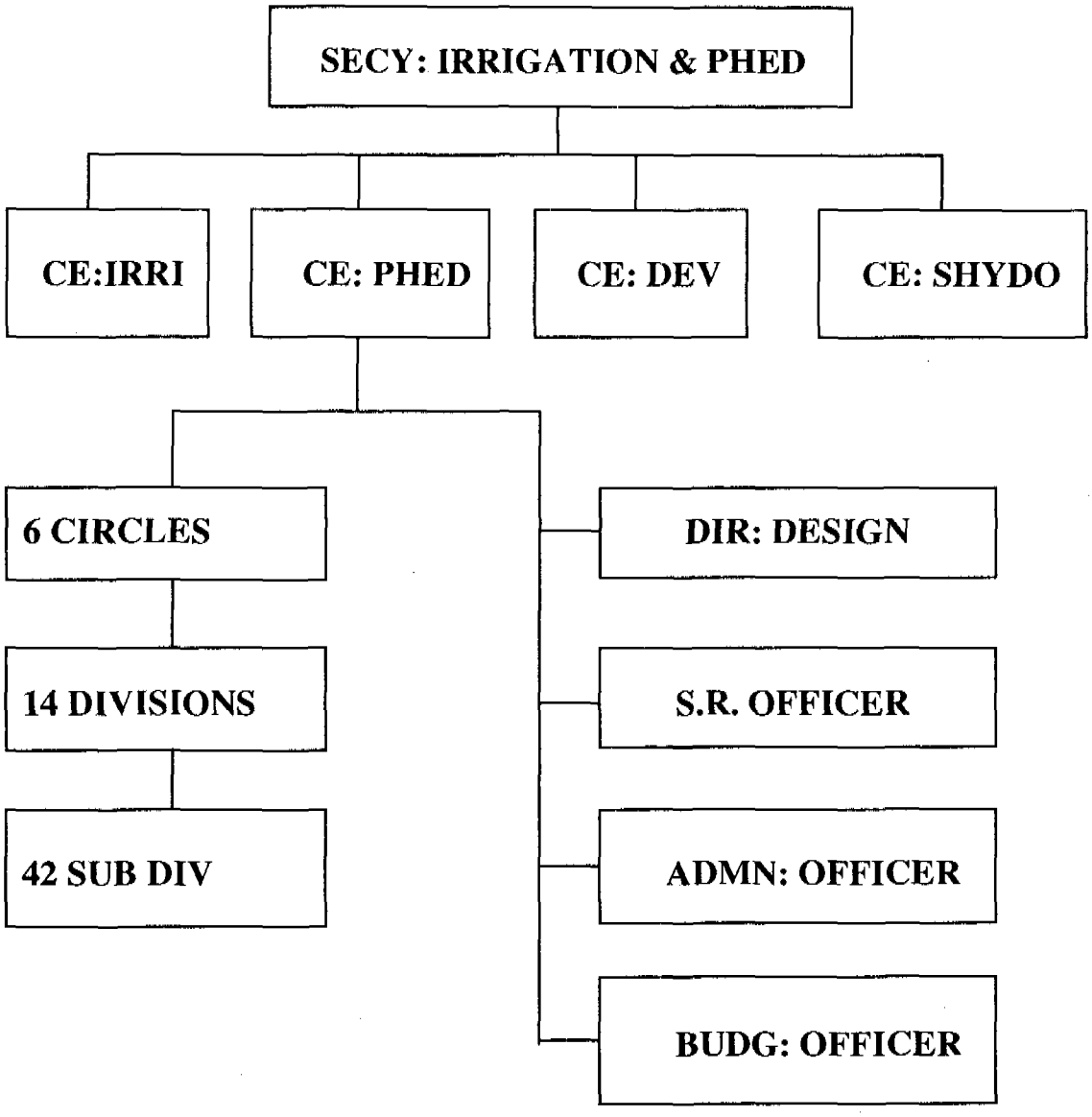
Rural Water Supply Schemes: PHED-NWFP



Rural Water Supply Coverage in NWFP



EXISTING ORGANIZATION OF PHED



OBJECTIVES OF RESTRUCTURING

- To enhance capacity of the Department to effectively manage the increasing workload under the Integrated Concept.

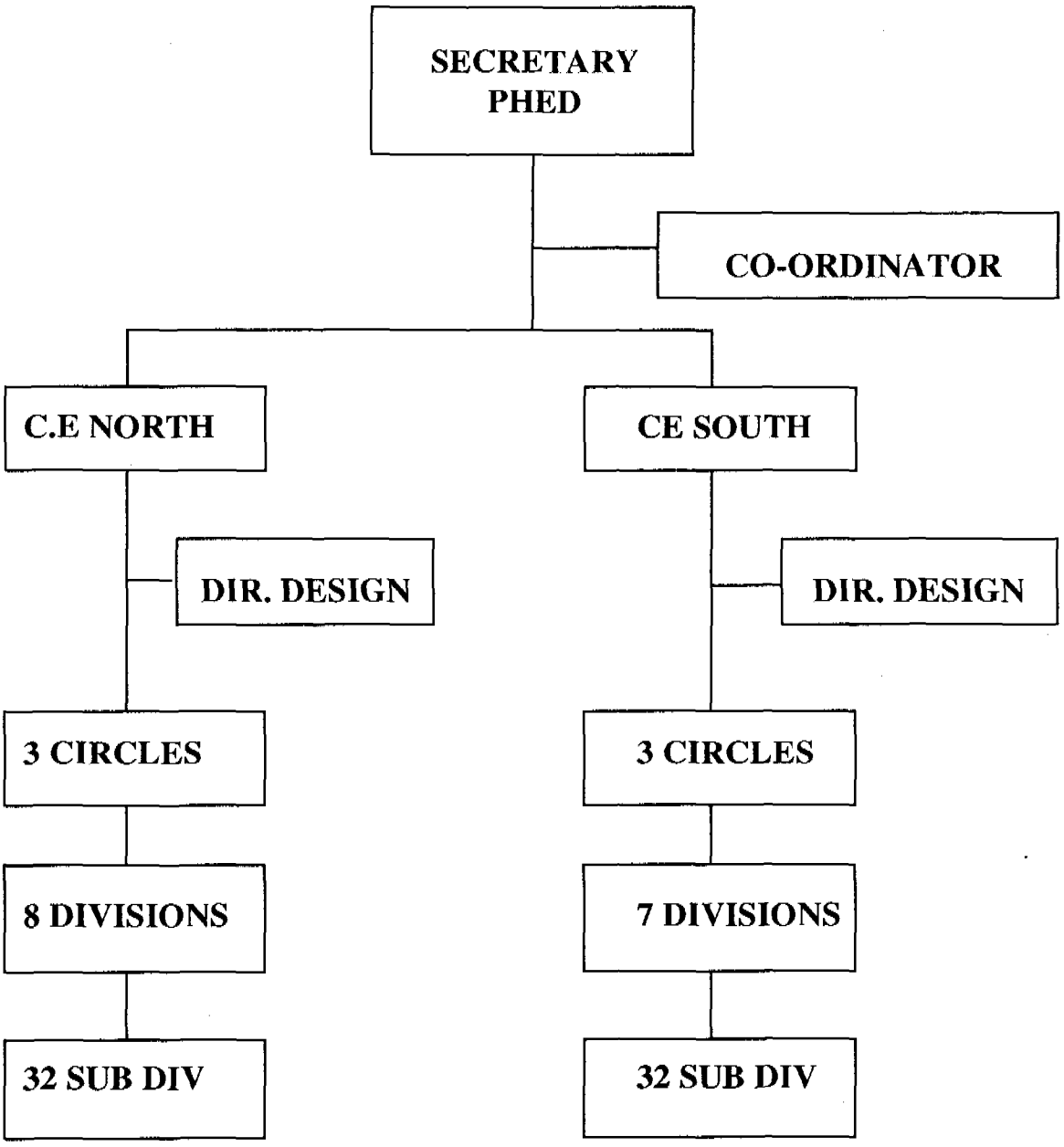
- To improve administrative capability by introducing modern management information systems.

- To reduce operation and maintenance burden with improved management and methodology.

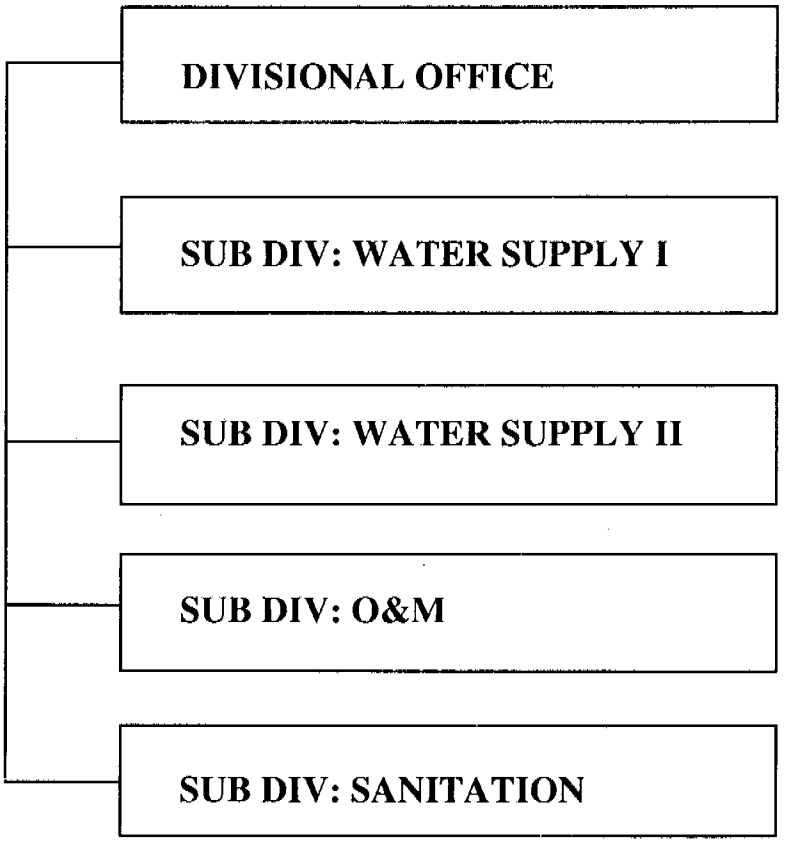
- To establish on a regular basis training and manpower development programmes.

- To involve the communities with planning, execution and operation of the systems.

AFTER RESTRUCTURING



AFTER RESTRUCTURING



CIRCLE OFFICE (After restructuring):

- **General Administration**
- **Supervision of Work**
- **Community Participation**
- **Administration of Revenue Collection**

WATER CHARGES ESTIMATES BASED ON PROPOSED TARIFFS

1.	Population being served	=	7.422 persons
2.	Population served through system based house connection :		
	a. Community users	=	877 persons
	b. Household users	=	0.722 persons
3.	Population getting service from based system	=	2.822 persons
4.	No. of households getting service from community system	=	0.957 Nos.
5.	Water charges estimates :		
	- Household users @ Rs. 40/- P.M/house	=	Rs 49.53
	- Community users @ Rs 10/- P.M/house	=	Rs 114.84
	Total	=	Rs 164.37
6.	Assuming 80% overall efficiency of the collection system, amount expected to be collected	=	Rs 131.496

Note: The above however, shall need community mobilization with the support from politician besides developing a most effective water collection system through VDOs development.

Annex IV

Questionnaire used for the Seminar

The following questionnaire should be completed by PHED, LG&RDD and P&D from each province and AJK and a copy of the completed questionnaire alongwith an organization chart of the department should be sent to the Federal Support Unit by October 20, 1992. The participants are requested to bring along one copy of the completed questionnaire to the seminar.

1. Name of the department and province.
   e.g. PHED, Sindh

2. Please provide information on:

   - Staffing of the dept in 1992 or in any of the last 3 yrs
   - Staffing in the past (e.g either in 1984, 1985 or 1986)
   - Workload in terms of numbers of schemes completed and maintained in 1992 or in any of the last 3 years
   - Workload in the past (e.g either in 1984, 1985 or 1986)

   The purpose of this item is to examine whether the staffing has increased or decreased vis-a-vis the workload during the past 5-10 years.

Hardware and trained manpower facilities

6. List the number and type of computers in your department. Also list the number of computers in the district/tehsil offices.

7. How many staff of your department use micro computers. Indicate the number, job title and grade.

Information needs

3. List the types of report produced by the department. Also mention its frequency of generation, where does the information for the report comes from and for whom is the report produced.

2. List the main components for which information/data is required by the department on a regular basis e.g. inventory, project statistics (cost, O&M etc), coverage, accounts, Annual Plan of Operations, quarterly monitoring forms etc. (List in descending order of priority; the most important should come first).

Status of computerization of data in the department

3. Data for which of the above listed components is computerized?

4. Has any attempt been made in the past to develop a management information system for the department? If yes please provide

details including the salient features of the system, when was it developed, whether it is in use etc.

Training needs for MIS development and operation

9. Has any of the staff received training on the use of micro-computers? If yes please provide details.

Major components of an MIS for the department

10. List the major components of a Management Information System for your department (e.g. Inventory, Personnel Management, Accounts, Statistical database etc.).

Immediate steps for developing an MIS for the department

11. Outline the immediate steps that should be taken by your department to initiate the development of an MIS.

12. Please nominate atleast one person from your department for the Provincial MIS Committee. (Write the name, designation and present job description of the nominated person).

13. What in your opinion should be the role/TORs of the MIS committees?

Participants

Ministry of Local Government and Rural Development	
1.Commander A. A. Neseem,	Secretary
2.Iqbal Ahmed	Director
3.M. Siddique Khan	Chief Technical Adviser
4.Munir Ahmed	Deputy Director
5.Ali Gohar Khan	Deputy Director
6.Abid A. Mallick	M&E Adviser
National Centre for Rural Development	
7.Tehmina Kazmi	Assistant Director
8.Zakia Khanum	System Analyst
Government of Balochistan	
9.Mehmood-ul-Hasan	Deputy Director LG&RDD
10.Shams-uz-Zuha	Project Coordinator, PHED
Government of NWFP	
11.Nazir Hussain Afridi	Chief Engineer, PHED
12.Gulfam Khan	Director Design, PHED
13.A. Karim Khan	Superintending Engineer, PHED
Government of Sindh	
14.Abdul Hamid Rajput	Director (Tech), Rural Development Department
15.Hakim Din Tunio	Chief of PPH, P&D department
16.Hassan Ali Talpur	Superintending Engineer, PHED
Government of Punjab	
17.Chaudry Naseer Ahmed Khan	Superintending Engineer, PHED
18.Iftikhar Ali Toor	Joint Director, LG&RDD
19. A. A. Sajid	Assistant Chief, P&D Department
Government of Azad Jammu & Kashmir	
20.Muhammad Latif Khan	Secretary, P&D deptt.
21.Mirza Mohammad Akram	Director, LG&RD.
22.Ghulam Murtaza Khan	Assistant Director, LG&RDD
23.Mirza Ziwar Baig	Systems Analyst
24.Aamir Ghani Mir	Programme Officer
International Agencies	
25.Dr. Irene Wilson	CTA, UNDP Project
26.Walter Kolkma	Expert, UNDP Project
27.Mr. K.M. Minnatullah	UNDP/World Bank, RWSG-SA
28.Qazi Azmat Isa	Project Adviser, World Bank
29. Allah Javaya	UNDP/World Bank, RWSG-SA
30. Dietrich Wolfrum	CTA, GTZ/PHED, NWFP
31.Mir Naeemullah	Consultant, GTZ/PHED, NWFP
32.Dr. Warren Mellor	CTA, NEMIS Project, UNESCO
Federal Agencies	
33. Ijaz H. Khawaja	Director, Pakistan Computer Bureau
34. Zahid Rashid	Assistant. Chief, P&D Division
Consultants	
35. Rahat Saghir	SRDC, Islamabad
36. Jacques Marchand	Project Manager, Wardrop-Acres