

# **AUDITING IN A COMPUTER ENVIRONMENT**

**A CASE STUDY OF**

**BENUE CEMENT COMPANY PLC, GBOKO**

**BY**

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# **CERTIFICATION**

This is to certify that, this project carried out by Mrs. Winnie Nyieyange Dzege meets the requirement for the award of Post-graduate Diploma in computer science of Federal University of Technology, Minna, Niger State.

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# **DEDICATION**

This project work is dedicated to the almighty God for His grace first of all and to the memory of my beloved late husband who initiated my academic carrier before he passed on to the great beyond.

My gratitude goes to my family, my employers and friends whose love, care, affection and contributions made my efforts a success. May God bless you all,  
Amen.

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# **ABSTRACT**

This study covers Auditing in a computer environment. The study therefore covers the basic principle of auditing vis-à-vis the definition of auditing, the role of auditors, their scope of work, planning and practice of auditing.

The approach of an auditor to a computer based accounting system is not fundamentally different from that of manual or electro-mechanical system. The approach is to evaluate and test the system to see that it produces records that form the basis for the preparation of management information reports and safeguard assets.

The study has used Benue Cement Company PLC, Gboko as a case study. Thus, its personnel information system has been reviewed and analysed and a new system has been proposed to replace the existing manual system presently in operation.

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# **CHAPTER ONE**

## **BASIC PRINCIPLES OF AUDITING**

### **1.1 INTRODUCTION**

Computers are increasingly becoming indispensable nowadays. Many tasks at home and in the office that were hitherto executed manually are being automated at a very fast pace world wide. Thus, it is becoming apparent that in whatever discipline of study or nature of employment, the computer is now an important tool for efficiency improvement and precision of job or task execution.

A computer is a machine that follows instruction in order to process data, solve a specific problem or accomplish a particular task. The instruction that controls a computer when it performs a task is referred to as a program. A collection of programs that are made to work together for specific purpose is called software.

The use of computer for auditing has come of age and has become universal. It should be noted however that the presence of a computer in an organisation does not make the organisation a computer environment. Computerising the accounting system in an organisation is what makes the organisation a computer environment. Thus new problems are posed to auditors by the computer-based accounting system. The approach of an auditor to a computerised system is not fundamentally different from his attitude to a manual system. The implication is that, people find computer system more complex to understand. The system is often operated by people who do not have accounting background and are therefore unfamiliar with accounting controls. The approach is to evaluate the system to see that it produces records that form the basis for preparation of accounts and safe

guards assets.

## 1.2 **WHAT IS AUDITING?**

Auditing is a specialised area of an accountants work. Auditing is defined as “A systematic process of objectively obtaining and evaluating evidence regarding assertions about economic actions and events to ascertain the degree of correspondence between those assertions and established criteria and communicating the results to interested users”.

### 1.2.1 **TYPES OF AUDIT**

Audits are classified generally into three (3) categories viz.: Financial statement, compliance and operational Audits.

#### ***Financial Statement Audits***

This involves obtaining and evaluating evidence about an entity’s statements for the purpose of expressing an opinion on whether they are presented fairly in conformity with established criteria. This type of audit is made by external auditors appointed by the company whose statements are being audited.

#### ***Compliance Test***

This involves the obtaining and evaluating evidence to determine whether certain financial or operating activities of an entity conform to specified conditions rules and regulations. This is usually made by the company’s employees who perform an Internal Audit function.

#### ***Operational Audit:***

This involves obtaining and evaluating evidence about an organisation’s operating activities in relation to specified objectives. This is sometimes referred to as performance Audit or management audit. Operational audit results are reported to the party who requested the Audit.

## 1.2.2 TYPES OF AUDITOR

i. ***Independent Auditors:***

These are individual practitioners or members of public Accounting firm who render professional auditing services to their clients.

ii. ***External Auditors:***

It is a legal obligation for an incorporated body to engage the services of an external auditor for the purpose of carrying out an audit assignment of the organisation to the end that an opinion may be expressed. The removal of such statutory Auditor must comply with the provision of the law.

iii. The other person designated as auditor in an organisation is the **INTERNAL AUDITOR**, and this is the main focus of this work. This is an employee of the company or organisation they audit. This type of auditor is involved in an independent appraisal activity called **INTERNAL AUDITING** within an organisation as a service to the organisation. The objective of internal auditing is to assist the management of the organisation in the effective utilisation of its resources.

Internal Auditing therefore can be defined as “an independent appraisal activity within an organisation for the review of operations as a services to the management”. There is no specific legal requirement on the appointment of an Internal Auditor but what the law requires is for the management to install a system of internal controls which will ensure the safety of the company’s assets. Internal Audit therefore is an element of control put in place at the discretion of the management of an organisation.

## **OBJECTIVE OF INTERNAL AUDITING**

The main objectives of internal auditing is to assist members of an organisation ineffective discharge of their responsibilities. In conformity with the objective, internal auditing provides, analysis, appraisals, recommendations, counselling and information concerning the activities that have been audited. The objective also includes promoting effective control throughout the organisation at reasonable cost.

### **1.3 ROLE AND DUTIES OF AN INTERNAL AUDITOR**

This refers to the tasks and actions that must be performed by an internal auditor to ensure an effective and efficient performance of the organisation.

The part to be played depends on the:

- (a) Economic environment
- (b) Type of organisation
- (c) Personality of the Auditor
- (d) Type of Management
- (e) Terms of reference

However, the basic role of an auditor is to assist management to ensure both the survival and the positive development of the organisation. To perform this role efficiently and effectively, the auditor must:

- i. have an understanding of the short and long term objectives of the organisation.
- ii. be conversant with laid down procedures in all the departments (Finance, Admin. Operations etc.).
- iii. be able to ascertain deviations from (ii) above and find reasons for such.
- iv. make recommendation for corrective action or where possible, take corrective actions.

v. be a person of impeccable character

The professional ethics require that the auditor, must be objective, work with integrity and maintain an independent mind.

#### 1.4 **SCOPE OF WORK AND PLANNING**

The scope of internal audit in a computer environment should encompass the examination and evaluation of the adequacy and effectiveness of the organisation's system of internal control and the quality of performance in carrying out the assigned responsibilities. This includes:-

- (1) The reliability and integrity of financial and operating information and the means used to identify, measure, classify and report such information.
- (2) Review the system established to ensure compliance with those policies, plans procedures law and regulations that could make a significant impact on the operations of the organisation.
- (3) Review the means of safeguarding assets and appropriately verifying the existence of such assets.
- (4) Appraising the economical and efficient use of resources.
- (5) Reviewing operations or programs to ascertain whether the results are consistent with established objectives and whether the operations or programs are being carried out as planned.
- (6) Examination and constant scrutiny the methods of authorisation of payments to ensure an adequate control of expenditure.
- (7) Periodic examination of the internal control to ensure the highest standard of efficiency and accuracy.
- (8) Ensuring that all transactions are posted into the Books of Accounts.
- (9) Collaborating generally with the statutory auditor on all matters affecting statutory auditors.

### 1.4.1 **PLANNING OF AN AUDIT**

The auditors is responsible for planning and conducting the audit assignment. The planning should be documented and should include:

- (i) The auditing objectives and scope of work
- (ii) Background information about the activities to be audited.
- (iii) Facts finding to identify areas of audit emphasis.
- (iv) Writing the audit program.
- (v) Determining how, when and whom audit reports will be communicated.
- (vi) Obtaining approval for the audit work.

## 1.5 **THE PRACTICE OF AUDITING**

Auditing is not carried out in a vacuum. Thus, for an independent appraisal to be carried out in an organisation there should exist an effective system of internal control.

An internal control system as defined by the auditing guidelines is the whole system of control, financial or otherwise established by the management in order to carry on business of the enterprise in an orderly and efficient manner to ensure adherence to management policies safeguard assets and secure as far as possible the completeness and accuracy of the records.

All good system of internal control have certain element in common and these are:

#### (1) ***Organisation:***

An organisation should be a clear structure; that is an arrangement of responsibility within the entity. It is necessary that every function within the organisation be put in charge of a person who can be held accountable.

#### (2) ***Proper Segregation of Duties:***

Segregation of duties is important for ensuring a fraud-preventive system. This ensures that too much power is not concentrated in few hands lest they misuse it. It is necessary to ensure that no employee is solely responsible for recording and processing of a complete business transaction.

(3) ***Physical Control:***

This is concerned with physical custody of assets and procedures put in place to restrict access to only authorised staff. Physical controls are very important for valuable, portable, exchangeable or durable assets and are achieved through the use of special locks, safe, watchmen and other security devices. Access to documents also need to be restricted as unauthorised personnel that know the right procedures can take advantage of this knowledge.

(4) ***Authorisation and Approval Procedures:***

All transactions of a company be authorised and approved by an appropriate person with specified limit of authority.

(5) ***Accounting:***

These controls ensure that the accounting system contains control features that readily confirm or question reliability of recorded data. There are controls in recording transaction which have been authorised and that they are all recorded and processed.

(6) ***Personnel:***

We all know that frauds are penetrated by employees of an organisation and this makes personnel the most important elements of internal control. The proper functioning of any system depends on its operating personnel. Incompetent and dishonest employees are causes of corporate failures. Thus there is need for a sound human resources management, encompassing recruitment, selection, development, motivating and dismissal.

(7) ***Mandatory Job Rotation:***

This allow employees to check or verify the operations of other employees for a period of time. This may lead to discovery of irregularities that may have been committed by an employee while he is on vocation and his duties taken over by another employee. Rotation may provide general check on an employee's efficiency and expand the scope of personnel training.

#### 1.5.1 **DIFFERENCES BETWEEN A CONVENTIONAL AND A COMPUTER AUDIT**

There are differences between a conventional and a computer audit and some of the distinguishing features of the later may be as follows:

- (1) In a conventional accounting system it should be a straight forward matter to follow the audit trail i.e. tracing step by step a certain transaction from organisation to completion. With computer based accounting system, it becomes extremely difficult if not impossible to check a transaction step by step in this way, because the records are not maintained in a form readable by human eyes.
- (2) Because a computer is not able to think for itself, the system analyst is oblige to specify ways of doing a job in a great details.
- (3) Adequate controls may not be in built into the routines which may frequently lead to errors or frauds.
- (4) The speed of operation by the computer leads to a lot of jobs being handled at the computer centre, often involving the same set of personnel. This may lead to absence of internal check.
- (5) Tracing of an individual items of data to many recipient areas may become almost an impossible task.



# CHAPTER TWO

## COMPUTER APPLICATION IN AUDITING

### 2.1 INTRODUCTION

In every day life we do process data or encounter data processing . DATA PROCESSING involves all activities which when performed may lead to production of the required information . These include data sourcing, collection, recording, classification, verification, input transformation or output. Electronic Data processing (EDP). The use of computer for auditing has become an important tool for efficiency. To be considered trained and proficient, auditors must have a working knowledge of the function of computerised accounting and control system.

Sufficient training and proficiency in computer auditing are necessary to enable auditors make their own evaluations and decisions about computer operations in an accounting system . Without the knowledge of computers, auditors independence is threatened by inappropriate technical expert explanations and terminology

#### 2.2.1 ELECTRONIC DATA PROCESSING (EDP) SYSTEM

The computer system undertakes four basic data operations. These are input, processing, output and storage. These four processes help us to understand what goes on inside the computer and how it works to our desired objectives. The computer is totally objective. This is because the computer can perform only computations and logic operations. The computational capabilities of the computer include adding, subtracting, multiplying and division. Logic capability permit the computers to make comparisons between numbers and words. The results of the comparisons are used to perform appropriate functions.

It must be acknowledged that errors do occur even when computers are used, but very few if any can be blamed on the computer itself . The majority if not all can be traced to the writer of software (program logic error), a procedural error or mistakes made at the time of raw data entry. The computer will never make mistake once the user gives correct instructions and correct data. Hence, there is still need for human supervision. Once procedures are specifically defined and appropriate data are fed, rapid processing and accurate output is guaranteed. The computer is capable of doing anything including those that cannot be done manually with precision and accuracy. The following questions need to be asked by an auditor in a computer system application procedure:

- (1) Where does information come from that is to be entered into the computer?
- (2) In what form are the raw data?
- (3) Is the data form compatible with the software available?
- (4) What happens when error occurs?
- (5) If electricity goes off, how are programs and data to be protected from being lost?
- (6) Who should have access to the stored information?
- (7) How often should reports be printed?

### **2.2.2 EDP SYSTEM CONTRASTED WITH NON EDP SYSTEM**

The special characteristics of EDP system which an auditor must be aware of are as follows:

- (a) EDP system take longer and are more difficult to install. Inefficient installation can cause problems including cases that have on numerous occasions led to:  
⇒ An auditor being unable to determine the truth and

fairness of the accounts

⇒ Corporate failure.

- (b) ***EDP SYSTEM IS MUCH MORE COMPLICATED.*** This creates problems of understanding for the auditor.
- (c) A large part of the data processing operations becomes centralised with the concentration being in the computer department. This may facilitate error and fraud and militate against its discovery.
- (d) Conversely, the development of the microcomputer has allowed the distributed system whereby accounting records are kept centrally but are disseminated around the firm and kept on micros. This causes problem of control.
- (e) The steps in computer processing and data storage on magnetic files are not visible unless printed out. There is often no regular printing out of output of information so that it can be assessed as required on visual display units. The facility used to trace transaction through a system from source to completion (e.g. final accounts) or vice versa is the **AUDIT TRAIL**. However, losses in the audit trail can occur as follows:

⇒ Use of magnetic files. Files stored on magnetic media cannot be directly inspected.

⇒ Deletion of data. A file can be obliterated to save space in magnetic storage. Recent transactions only are retained.

(1) ***Sorting***

Source document are not often sorted. The tracing of source document can be very difficult. Machine do not make mistakes if correct data are fed into it and faultless computer programs are used, the output will be error free. Hence, there is no point

for the auditor checking for processing errors rather there is point in the auditor investigating the accuracy and completeness of data presented to the computer department for processing and the adequacy of programs. A machine cannot be relied upon to recognise incorrect or useless data.

### 2.2.3 **ELEMENTS OF A COMPUTER BASED SYSTEM**

In computer system, transaction processing and documentation exist only in machine sensible form. The basic records of a computer-based accounting system are machine-sensible data files that cannot be read or changed without a computer. This includes the following elements:

(a) **HARDWARE**

The physical components or devices that constitute a computer. These include the central processing unit, card reader, tape drives, disk devices, printers, terminals and other devices.

(b) **SOFTWARE-**

***System Programs***

Programs that perform the generalised functions for more than one application; these programs including “ Operating System which control, schedule and maximise efficient use of the Hardware; Data management systems” which perform standardised data handling functions for one or more application programs and “utility” programs such as sorting record. System operations are developed by software suppliers or software development companies and are tailored by each user to suit individual requirements.

***Application (User) Programs***

Set of computer instruction that perform data processing tasks. These are usually written within the organisation or purchased from an outside supplier.

(c) **DOCUMENTATION**

Description of the system and its controls in relation to input, data processing, output, report processing, logic and operator instruction.

(d) **PERSONNEL**

Persons who manage, design, program, operate or control data processing system.

(e) **DATA**

Transaction and related information entered, stored and processed by the system.

(f) **CONTROLS**

Procedure designed to ensure the proper recording of transactions and to prevent or detect errors or irregularities. Establishment and maintenance of a system of internal control is an important responsibility of management. The audit responsibility is to make assessment of the control risks. (Study and Evaluate the existing controls). Management can meet its responsibility and assist auditors by:

- ⇒ ensuring that documentation of the system is complete and up-to-date.
- ⇒ maintaining a system of transaction processing that includes an audit trail and
- ⇒ making Computer resources and knowledgeable personnel available to the auditors to help them understand and audit the system.

#### 2.2.4 **EFFECT OF COMPUTER PROCESSING**

When Computer are used to process accounting transactions it affects the company's organisational structure and it influences the procedures and Techniques used to accomplish the broad objectives

of internal controls.

Special control considerations are relevant for evaluating the control environment and control procedures. The following are characteristics that distinguished computer processing from manual processing:

⇒ ***Transaction Trail:***

Transaction trail is a chain of evidence provided through coding, cross-references and documentation connecting account balances and other summary results with the original transaction and calculations

⇒ ***Uniform Processing of Transaction:***

Computer processing uniformly subjects like transactions to the same processing instructions. Hence elimination of the occurrence of random errors, normally associated with manual processing and vice versa.

⇒ ***Segregation of Duties:***

Individuals who have access to computer may be in position to perform incompatible functions. As a result, other control procedures such as Password control technique can be used to prevent unauthorised access to records through on-line terminal.

⇒ ***Potentials Error and Irregularities:***

Less human involvement in handling transactions processed by computers can reduce the potential for observing errors and irregularities. Errors or irregularities made in design or changing application programs can remain undetected for long period of time.

⇒ ***Potential for Increase Management Supervision:***

Computer systems offer management a wide variety of tools that may be used to review and supervise the operations of the company. The availability of these additional controls may

enhance the entire system of internal control on which auditors may place reliance.

### **2.2.5 EDP SYSTEM COMPONENT**

The following are components of an EDP system;

- (1) Hardware
- (2) Software
- (3) Data organisation and processing methods

#### **COMPUTER HARDWARE**

Hardware, consist of the physical components or equipment associated with, the system. The Basic hardware configuration consists of the central processing unit CPU and peripheral and output devices. The principal component is the CPU. It consists of a central unit, an internal storage unit, and an arithmetic logic unit. The control unit directs and co-ordinates the entire system, including the entry and removal of information from storage and the inputting of the data between storage and the arithmetic logic unit. The internal storage unit or computer “memory” stores the program instructions and the data to be processed; The peripheral devices to the CPU, are input, output and auxiliary storage devices.

#### **COMPUTER SOFTWARE**

This component consists of the programs and routines that facilitate the programming and operations of a computer. There are several kinds of computer software. Of particular interest to the auditors are systems programs and application programs.

##### ***(i) Systems programs***

These perform general functions required for the operation of the computer as it executes specific tasks. These include:

⇒ Operating System which directs the operation of the

computer, including input and output devices, main storage, execution of programs and management of files.

- ⇒ Utility Program which perform common data processing tasks, such as copying, re-organising data in a file, sorting, merging and printing, other kinds of utility programs may be used together information about the use of the Hardware and Software, aid in the detection of unauthorised use or changes to programs and data, provide documentation of program logic and facilitate testing of new systems.
- ⇒ Compilers and assemblers translate specific programming languages into instructions in a language that can be understood by the computer. Each computer has a machine language determined by the engineer who designed it.
- ⇒ Data base management systems are utilised by companies employing a computerised database. These program control the data records and files independent of the application programs that allow changes in or use of the data.

System program are generally purchased from Hardware suppliers and software companies. There are then adapted by users to suit their individual needs example, MSDOS, UNIX etc.

- (ii) ***Application Programs:*** Application program contain instructions that enable the computer to perform specific data processing tasks for the user example, MS-EXCEL MS-WORD, LOTUS 123 etc.



## **2.2.6 DATA ORGANISATION AND PROCESSING METHODS**

The accounting function often involves recording, up-dating,, retrieving and reporting on large volumes of transactions data and related information. To understand how all this information is handled in an EDP environment, the Auditor has to be familiar with the methods of data organisation and data processing. The two principal methods of data organisation are the traditional file method and the database method.

### **Traditional File Method:-**

This method of data organisation predominates in accounting applications. There are two types of files maintained.

- (1) Master Files - This contain up-to-date information about a given class of data such as the current balances of customers or the current quantities of inventory items and;
- (2) Transaction files that contain the details of individual transactions of the same class such as daily credit sales or daily cash disbursements. These files may be organised for sequential or direct access processing.

### **Database Method:-**

This method of data organisation is the principal alternative to the traditional file method. This method is based on the creation and maintenance of a single common direct access file for all applications using common data. Thus each element is stored only once but is accessed by all authorised application programs.

## **DATA PROCESSING METHODS**

This refers to the way data are entered into and processed by the computer. The following are the data processing methods widely used:

### **(1) Batch Entry/Batch Processing**

Under this method of data processing, data are accumulated by classes of transactions such as sales or cash disbursements and are both

entered and processed in batches. In EDP systems use of Audit Trail must likely exist

(2) ***On-Line Entry/Batch Processing***

Under this method of processing, individual transactions are entered directly into the computer via a terminal as they occur. A machine - readable validated transaction file is accumulated as the transaction are entered and is subsequently processed to up-date the master file. The advantage of this method is that the data are subject to certain edit or validation checks by the computer program at the time of entry and error messages are communicated immediately on the terminal operator.

(3) ***On-Line Entry/On-Line Processing***

This method differs from on-line entry/batch processing in these aspects:

1. Master files are processed concurrently with data entry and
2. a transaction log is produced that consists of a chronological record of all transactions.

## 2.2.7 **EFFECTS OF EDP ON THE INTERNAL CONTROL STRUCTURE**

Control procedures in a computerised accounting system are classified into two types, General Controls and Application Controls. The possibility of errors and frauds occurring in EDP system is much larger than in manual systems.

(a) **General Controls**

This relates to all or many computerised accounting activities e.g. Controls over access to computer program and data files.

The following types of general control are widely recognised:

⇒ Organisation and operation controls

⇒ System development and documentation controls

⇒ Hardware and systems software controls

⇒ Access controls

⇒ Data and procedural controls

**(i) *Organisational and Physical Access***

This refers to proper segregation of functional responsibility authority to authorise transaction, custody of assets, record-keeping and periodic comparison. Because computer system require accuracy and logic for proper accounting processing, the capability of personnel is of significant importance. Consequently reliance must be based on condition of documentation and the effectiveness or error checking routines. The essential division of duties is among the functions of analyst, programmer and operator.

**(ii) *System Development and Documentation's***

Documentation is the means of communicating the essential elements of the data processing system. Auditors review the documentation to gain an understanding of the system and to determine whether the documentation is adequate.

The system development and documentation standard manual prepared by management of an organisation should contain standard that ensures proper user involvement in the system design and modification process, review of the specification of the system, approval by user management and data processing management and control and auditability. The review of the system accomplishes a compliance check of system development standards (and controls) as well as providing an understanding of how a particular system works. Audit is interested in the following elements of documentation of accounting applications; application description, problem

definition, programs description, testing records, user manual, change and modification log and listing of controls.

**(iii) *Hardware and Systems Software Controls***

An auditor is expected to be familiar with some of the Hardware controls so they will not escape his attention and so that he can converse knowledgeably with computer personnel. The most important control is "***PARITY CHECK***" which ensures that the coding of data internal to the computer does not change when it is moved from one internal storage location to another. Another area of audit interest is the ***PREVENTIVE MAINTENANCE***. This determines whether maintenance is scheduled and whether the schedule is followed and documented. Maintenance is usually under contract with the computer vendor. In such a case auditors should review the contract as well as the record of regular maintenance.

Since magnetic storage media can be erased or written over, controls are necessary to ensure that the proper file is being used and that the files and program are appropriately backed up. Back up involves a retention so that master files can be reconstructed in case of accidental loss and processing can continue at another site if the computer center is lost to fire or flood. Thus backup files must be stored off-site, away from the main computer.

**(iv) *Access Controls***

This should prevent unauthorised use of EDP equipment, data files and computer programs. The specific controls include both physical and procedural safeguards. Access should be limited to authorised individuals such as computer operators. Physical safeguard means housing of the equipment in an area that is separated from user departments and access restricted by

security guards, door locks or special keys. Access to program and data files should be limited to individuals authorised to process, maintain or modify particular systems in form of a library and librarian.

**(v) *Data and Procedural Controls***

This provides a framework for controlling daily computer programs, minimising the likelihood of processing errors and assuring the continuity of operations in the events of a physical disaster or computer failure. The control functions involve:

- ⇒ Receiving and screening all data to be processed
- ⇒ Accounting for all input data.
- ⇒ Following up all input data
- ⇒ Verifying the proper distribution of output

**(b) Application Controls**

Application controls are categorised as:

1. Input Controls
2. Processing Controls
3. Output Controls.

**(i) *Input Controls***

Input controls are of vital importance because most of the errors occur at this point. These are designed to provide reasonable assurance that data received for processing have been properly authorised and converted into machine sensible form and that data have not been lost, suppressed, added, duplicated or otherwise improperly changed. These controls also apply to correction and resubmission of data initially rejected as erroneous. The following are important.

⇒ ***Authorisation***

Each transaction entry must be properly authorised and

approved in accordance with management's general or specific authorisation.

⇒ ***Check Digits***

In computer system check digits test is used as number validation procedure. A check digit test will indicate only whether an identification number is valid.

⇒ ***Data Conversion***

Controls over conversion of data into machine sensible form which is a source of many errors are intended to ensure that the data are correctly entered and converted data are valid. Specific controls include:

1. Verification Controls
2. Computer Editing
3. Control totals or Batch number totals i.e. Document or record count, financial totals and Harsh total which are computed by adding values that would not usually be added together.

**(ii) *Processing Controls***

Processing controls are designed to provide reasonable assurance that the computer processing has been performed as intended for the particular application. This should preclude data from being lost, added, duplicated or altered during processing. Processing controls take many forms as follows:

⇒ ***Control Total***

This is written into the computer program to facilitate the balancing of input totals with processing totals for each run.

⇒ ***File Identification Labels***

External and internal labels are used to permit visual

identification of a file.

⇒ Limit and Reasonable checks

⇒ ***Sequence Test***

This checks for missing documents in a pre-numbered series.

⇒ ***Process Tracing Data***

This involves printout of specific data for visual inspection to determine if the processing is correct.

**(iii) *Output Controls***

Output controls are designed to ensure that the processing results is correct and that only authorised personnel receive the output. The accuracy of the output results includes both up-dated machine sensible files and printed output. The objectives are met by Reconciliation of totals, Comparison to source documents, Visual scanning i.e. Actual results are compared with estimated results.

## 2.3 **AUDITING TECHNIQUES**

Computer accounting application captures and generates voluminous amounts of data that usually are available only on machine readable records. Generalised Audit software (GAS) can be used to access the data and organise it into a format useful to the audit team. Audit software can be used to accomplish six basic types of audit tasks as follows:

1. Examining and reviewing records based on auditors criteria to determine quality, completeness, consistency and correctness e.g. Scan payroll files for terminated employees.
2. Testing calculations and making computations (recalculations) can be done by the computer with accuracy and more speed than by hand.
3. Comparing data on separate files to determine whether compatible information is in agreement. Differences can be printed out for

investigation and reconciliation.

4. Selecting and printing audit samples for auditors work papers or printed in special format such as confirmation request i.e. selecting samples of inventory items for observation.
5. Summarising, re-sequencing and reformatting data can be done in a variety of ways using GAS.
6. Comparing audit evidence from manual audit procedure to company records can be done more efficiently. The audit evidence must be converted to machine readable form and then can be compared to the company records on computer files or auditor files using sample items. The computer cannot observe and count physical things (i.e. inventory) but it can compare auditors made counts to the computer records.

### **COMPLIANCE AUDITING PROCEDURE**

Auditors can take three approaches in using computer as compliance audit tool, select transactions and manually audit the actual transaction processing, Audit the program controls with simulated data and with live data. The computer can be used to select samples of transaction for manual vouching and tracing.

### **TEST DATA**

These are data used by the auditor to test the enterprises computer programs. This is a very rare technique in practice. Test pack will check the computer program with the data that is tested but they cannot guarantee or discover all errors. The auditor will be able to test the computer treatment of the test data with the expected result gained from processing the data manually to ensure that the data is being processed correctly.

### **PARALLEL SIMULATION**

In this, the auditor prepares a computer program using GAS to duplicate the



logic and control of the enterprises program.

## **BASIC TECHNIQUES FOR COLLECTING EVIDENCE**

An auditor may collect audit evidence by means of:

- i. Physical examination and physical count
- ii. Written confirmation, particularly from external office
- iii. Examination of assigned documents
- iv. Re-computation
- v. Retracing the audit trail
- vi. Scanning for unusual items
- vii. Inquiring, asking questions and seeking confirmation
- viii. Observations
- ix. Internal control questionnaire

## **2.4 AUDIT PROGRAMS AND EXCEPTION REPORTS**

An audit program is a plan of work to be done and a record of what has been done in an orderly manner so that work performed can be carried out by a superior officer. It is not a permanent program and is therefore subject to review regularly. The program would be influenced by the volume and complexities of business and the nature of records generated by the various transactions involved.

When designing an audit program it should be totally detailed so that there is no doubt at all as to what the auditor is expected to do or broadly based as to set guidelines and leave the individual to expand particular parts at his own initiative.

### **2.4.1 AUDIT PROGRAM**

An example of an audit program for salary records and payrolls:

There are different systems for preparation of payrolls i.e. manual with Kalamazoo, Mechanical and Computerisation which ever system, the

general principles of separation of duties or internal checks is vital for avoidance of fraud. There are four categories of staff; Permanent, Temporary, Contract and Casual staff. The terms and duration of employment of the last three groups are limited and therefore care must be taken not to prolong their length of service proper authorization. Ensure that, individual files and records cards are kept for staff showing date of engagement, promotion, discharge by termination or retirement or lapse of time, etc.

The advantages of audit program includes:

- i. The auditing is carried out in a consistent way and a continuous record of the work done is maintained.
- ii. The help for orientation of new members of staff and work can be more conveniently allocated by the senior auditor/team leader.
- iii. The team leader can determine which work has been carried out in order to plan the next auditing.

#### 2.4.2 **AUDIT REPORT**

An auditor should report the result of his audit work:

- i. A signed written report should be issued after the audit examination is completed.
- ii. The report should be objective, clear, concise, constructive and timely.
- iii. Reports should present the purpose, scope and results of the audit and where appropriate, report should contain an expression of the auditors opinion.
- iv. The auditor should discuss conclusions and recommendation at appropriate levels of management before issuing final written reports.

- v. Reports should include recommendations for potential improvements and acknowledge satisfactory performance and corrective action.

## 2.5 COMPUTER FRAUDS DETECTION, PREVENTION AND CONTROL

There is no aspect of our daily lives that the issue of fraud is currently not being addressed. In the financial institutions, civil service, parastatas, industries and even the social service sectors fraud or irregularities becomes even more complex in a computer environment. Since most of our job functions are being performed by computers and since irregularities are concealed in the functions then it follows that computers are being used to carryout a sizeable percentage of the frauds.

The use of computers in fraud perpetration is also made more difficult to detect because many people are scared of computers and tend to believe whatever comes out of a computer.

### 2.5.1 WHY FRAUDS ARE EASIER IN A COMPUTER ENVIRONMENT

It is relatively easier for an intentional distortion of records to succeed in a computer system than in manual system. This is due to certain factors which are considered below:

#### 1 ***Complexity:-***

Computerised systems are however at the introductory stages in most organisations in this country. This implies that most people find a computer system complex to understand. The system is often operated by people who have no accounting background and are not therefore familiar with accounting controls. They could therefore perpetrate substantial frauds and

still conceal them from the other unsuspecting and “uninitiated” members of staff of an organisation.

2 ***Concentration of records in the Computer Department:***

In a manual accounting environment the system can be segregated into account application areas like Sales, Purchases, Cash, Payroll etc. and responsibilities for these various segments will be equally separated for effective internal control. However, in a computer system, a major portion if not all of the volume of processing will be computerised. This means that the various account application areas will be handled by the same personnel. Unless there is adequate organisational control within the computer department itself the basic internal control requirement of segregation of duties will break down and fraud can then be perpetrated and concealed.

3 ***Visibility of Records***

In a computer environment data are produced and stored on magnetic media. This means that inconsistencies can be concealed easily if the internal control system is very weak.

4 ***Effective of Real Time***

The use of on-line and Real-time processing makes possible the input of transaction data at the time the transaction takes place. This comes with it attendant risk of fraudulent manipulation of the data entry.

5 ***Effect of Micro Computers***

The microcomputer is small, cheap and does not require strict environmental control. It is designed to be flexible in use and easy to operate with simple programs. The machine is accessible to everyone in the office using it as required. The potentials for fraud in these circumstances is vast.

## 2.5.2 SOME COMMON TYPES OF COMPUTER FRAUD

In order to fully understand the nature of computer frauds, it is pertinent for us to be aware of some of the types of computer fraud perpetrated by the tricksters. These include:

1 ***Scanning:***

This is the process of using sequentially sorted information to compare source stored data resident in a computer (i.e. Telephone numbers, Password) with intent to identifying those that respond and those that do not.

2 ***Eavesdropping:***

This involves wiretapping and monitoring radio frequency waves with a view to intercepting transmitted data on live communication so as to divert the destination or alter the value of such data.

3 ***Masquerading (Impersonation):***

A type of computer fraud whereby one person assumes the identity of an authorised computer user by acquiring the password, codes or knowledge of that person.

4 ***Data Diddling:***

This involves changing data before or during their input to computer. e.g. Forging, misrepresentation or counterfeiting documents exchanging valid computer lapse or disk with prepared replacement, keyboard entry and avoiding or neutralising internal controls.

5 ***Super-zapping:***

The unauthorised use of a specialised computer program (a macro utility) that can bypass all controls, thus enabling the user to modify or obtain information from the computer.

6 ***Scavenging and Reuse:***

This a method of obtaining or reusing information that may be left in or around a computer system after processing.

7 ***Trojan Horses:***

These involve the placement of illegal instructions which still allow the program to perform most or all of its intended purposes. This is the most commonly used fraud in computer program.

8 ***Computer Virus and Worms:***

A virus is a set of computer instructions that replicates and propagates copies or versions of itself into computer program or data when it is executed within contaminated program. The virus may be introduced through a program written for that purpose (called a pest) or a Trojan Horse hidden instructions inserted into a computer program, the data or the computer hardware itself. A worm attack is a variation in which an entire program replicates itself throughout a computer or computer network.

9 ***Salami Techniques:***

This a technique whereby the Trojan horse methods is used to secretly execute an unauthorised program that moves slices of amount of assets from a large number of sources or accounts without noticeably reducing the whole.

10 ***Trapdoors:***

This assist programmers in debugging large application programs and operating systems, codes are usually inserted in the program to provide breaks in the program for inserted or additional codes.

11 ***Logic and Time Bombs:***

These are virus codes with counter and logical parameters set on a computer, awaiting certain time and events to occur before they are triggered off to unleash their terror on the system on which the infected disk is used.

12 ***Data Leakage:***

Illegal removal of data or copies of data from a computer system.

13 ***Program Piracy:***

Piracy is defined as the copying and use of computer programs in violation of copyright and trade secret laws.

14 ***Computer and Computer Components Larceny:***

This has to do with the unlawful taking away of another person's computer or the components with a view to selling it as a second hand system or spare part, these are on the increase dramatically.

### 2.5.3 **REASONS FOR COMPUTER CRIME**

In addition to curiosity which has been found to be the major reason of young hackers, the reasons for committing serious computer crimes may be varied and these may include:

- (a) Vengeance/vendetta/Animosity
- (b) Personal or Financial gain
- (c) Technical challenge to beat the system.
- (d) Accident
- (e) Vandalism
- (f) Entertainment
- (g) Need/Desire or intent

Most organisations, because of their size and sophistication of operations, employ computer based information systems. These

organisations can be prone to computer crime because:

- i. They lack formalised procedures to handle rapid growth for security related matters.
- ii. They are characterised by an informal management style, many of the managers do not have time for data security.
- iii. The manager may not be sufficiently computer literate, hence they lay much emphasis on the protection and security of physical cash and not on information stored in the computer.
- iv. Some organisation do not consider adequate internal control and security mechanisms during the analysis and design stages of the information system.
- v. Where such internal control and securities are in place, they have probably never been tested.

These organisation are also vulnerable due to the fact that all the information assets of a particular organisation are concentrated in the computer system, hence the computer presents all the information in a compact but highly vulnerable form.

#### 2.5.4 **CONTROL OR PREVENTION OF COMPUTER FRAUDS**

The effective means of preventing computer frauds is by the following methods:

- i. Restricting access to the computer facilities to authorised persons
- ii. Verification of the validity of the computer programs.
- iii. Controlling the computer entry forms and
- iv. Production of certain daily reports which can help to facilitate immediate discovery of errors or intentional manipulation i.e. large item reports and reports of log-in.



## 2.6 **SECURITY OF DATA**

Computer systems security encompasses the security of all the information assets that constitute the system. Others see security measures beyond just the physical access and password. It should be noted that if hardware fails then the information system has failed. Therefore adequate measures should be taken regarding both the software and the hardware sub-systems.

Security involves physical safeguards, procedural control, recovery plan and insurance. It also involves the need to protect the corporate information database, its integrity and accessibility. The problem of data insecurity may arise from one or a combination of the following points:

1. Lack of formal logging-in mechanism.
2. Inadequate protection of the system software.
3. Inadequate mechanism for password violation.
4. General laxity on the part of users.
5. Non-compiler based programming languages
6. un-encrypted form of information transfer which might lead to eavesdropping or write-tapping.

### 2.6.1 **CONTROLS OVER DATA INTERGRITY, PROGRAM FILES AND COMPUTER OPERATIONS.**

#### (1) ***PHYSICAL CONTROL***

These may be classified as fire protection access security infrastructural protection and off-premises storage. The computer centre houses very expensive set of equipment and vital records thus access to the centre should be restricted to authorised personnel only. Generally;

- (a) Solid construction of the computer structure centre with secured windows using burglary proof and fire assisted materials i.e. extinguishers, should be considered.

- (b) Strict access to the computer centre should be enforced using either a key, a badge and guards. Also registers for movement in and out of the centre.
- (c) Provision must be made for lock-word or password (access codes) which users must provide to gain access to the system and also the provision of security software that will only grant access to a designed directory only and a non-copy protection which makes it impossible for unauthorised users to copy programs or files from protected directories on the hard disk.
- (d) An alternative power supply standby generators and/or un-interruptible power supply (UPC) to avoid absurd disruption of jobs must be provided.

(2) ***PROCEDURAL CONTROLS***

This involves clearly laid down personnel policies and procedures by computer center management. These are aimed at preventing operational errors that may lead to data/program files destruction such as external file labels, magnetic tape file protection ring and library procedures. That is;

- i. Files should be labelled for operators to know the file contents.
- ii. Magnetic tapes are protected with protection ring to prevent writing and destruction of the content of the tape.
- iii. Magnetic tapes reels and disk packs are labelled with a paper label.
- iv. Library procedure do maintain the log of the use to which the tape has been put to and providing efficient storage for tapes.

### (3) ***RECOVERY OF DATA***

Recovery plan provides against accidental loss of files. This is done by retaining the master file until the master file has been updated with the transaction file. The most commonly used system is the Grand Father- Father and son system. For example: A transaction file is produced at the end of the day's activities and is used to update the master file to reflect the current status of an organisation. This creates a new master file called son while the former, father. Another transaction file when produced updates the "Son" and makes the father to become the Grand father. Once the cycle is complete the grand father should be removed and kept from the computer center to be recalled in case of an eventuality.

### (4) ***COMPUTER VIRUS***

A computer virus is a program file that has the capability to propagating itself by attaching codes to the other programs or data files. Computer virus are man-made and are capable of causing irritating or malicious effects by disrupting the efficiency of the computer, causing irregular activities by displaying unfamiliar letter or objects on the screen as well as corrupting secondary storage media and the software contained therein.

There are many types of virus around depending on the name type and size in bytes. Generally as name are given to files so does virus have signatures which help to detect their presence in a file. These enables experts to produce an antidote to prevent persistent infection.

### **ANTI-VIRUS KITS**

Prevalent anti virus kits which are used to detect, clear and protect program files against all sort of infections are:

1. Central point Anti Virus (now Microsoft Anti Virus (MSAV Kit).
2. Norton Anti Virus (NAV) kit.
3. Dr. Solomon's Anti virus kit
4. Untouchable Anti virus kit

### 2.6.2 **PREVENTION AND CURE**

Backup copies of software should be made and be relied upon in times of hazards.

1. Obtain anti virus kits for regular check-up of the system every day. The system can be configured to check for virus at each start-up each day.
2. Make sure the diskettes are write protected to avoid contacting disease.
3. Avoid giving out software and taking software from others.
4. The system should not be booted with other system disk besides your own master disk. Where hardware exists, always boot from the hard disk.

## **CHAPTER THREE**

### **A CASE STUDY: BCC PLC, GBOKO**

#### **3.1 BRIEF HISTORY OF BENUE CEMENT COMPANY PLC GBOKO**

The history of Benue cement company Plc., the sole manufacture of the popular lion brand Portland cement, dates back to early sixties when traces of Limestone deposits were discovered in the Mbayion district of Gboko Local Government area of Benue State. A top quality product of the Benue Cement Company, the Lion Brand Cement has, strength, durability and economy, and has gained national recognition as the Nations leading building raw materials.

The Plant which is conspicuously sited on a rich belt of high grade Limestone deposits at Tse-kucha, 72 Kilometres along the Federal Trunk A Makurdi-Gboko high way, was officially commissioned on February, 16<sup>th</sup> 1981.

The Company recorded a major land mark on August 15<sup>th</sup> 1980, when the first ever 50kg bag of this finest brand rolled out of one of the Plants Packing bays (Four Automatic, Four Manual).

The modern dry process, two-line Plant has a rated capacity of 900,000 tonnes of ordinary Portland Cement (OPC) annually. Technically, Lion Brand Portland Cement fully satisfies the Nigerian Industrial Standard (NIS) 11 which conforms with universally accepted British Standard (BS) 12 specifications.

It is interesting to note that the popular Lion Brand Portland Cement has 100% of its content produced locally. The main raw material used for the production of Lion Brand Portland Cement are;

- ⇒ Limestone
- ⇒ Sharp Sand
- ⇒ Gypsum.

Benue Cement Company Plc. Is the first industrial concern in the sub-sector in this Country to have successfully and speedily executed the Nigerianization Policy. Since 1985, when the company achieved a record production of 818,900 tonnes (91% rated capacity), its Management has been fully Nigerianized.

The Company has adapted a production enhancement programme christened the BCC VISION. The working document is targeted at “attaining production targets through committed team work, its main thrust being to produce and market 650,000 tonnes of high quality Lion Brand Portland Cement in 1997.

Lion Brand Portland Cement is distributed all over the Country with concentration in the middle Belt, Northern and Eastern States which must of necessity be catered for by the only viable cement complex nearest to them. The company is the second largest employer of labour in Benue State coming only after the State Civil Service, with a workforce of 1813 employees.

Within a relatively short time of coming to the scene, the Benue Cement Company Plc. Has greatly enhanced the economic status of its locality as evidenced by the springing up of numerous small and medium scale businesses. Its impressive contribution towards the general improvement of social standard in the community indicates that the company is absolutely committed to participating in the development programmes initiated by Government.

The company with a total of over 35,000 shareholders, has made phenomenal land mark in the Federal Government Policy on privatisation of Companies hither to virtually controlled by the government. Following the privatisation exercise, the federal government holding dropped from

39% to 29.53%, Nigerian Public now have about 25.28% holding in the Company. The company therefore stands as one of the five members of Cement Manufacturers Association of Nigeria (CMAN) to be publicly quoted on the stock exchange market.

The company has a Gold Award from the standard organisation of Nigeria for product quality. It has won the Grand Prix Award for Applied Technology from Spain and it is the first Cement company to have won National productivity merit Award in addition to winning the National Merit Award for Local Raw Material Utilisation, among many others. Benue Cement company is therefore a responsible and responsive corporate body in Nigeria.

### **3.2 COMPUTERIZATION IN BCC PLC**

The need for improved data processing methods become apparent when the size of our stores made it difficult to maintain an accurate inventory control system by conventional method. Thus in 1983, the purchasing and supply department was permitted to utilise bureau services rendered by a Lagos based computer company-commercial and scientific computing (CSC) to process its stores records.

The first formal move for computerisation of the company's operation was made in April 1984 when the then managing director had a discussion with a consultant who presented a proposal to management for consideration. Thereafter management decided that it was better to invite computer companies to send in proposals rather than work through consultants. Consequently, Kittle System International Nigeria Limited was invited to carry out a preliminary study regarding computerisation of the company's operations. Members of Staff of the company were incorporated by the consultants.

The consultants took one year to conduct the study and identify the areas for computerisation. Recommendation were made to the company's

management in form of computerisation study report. The report was considered and submitted to the board for final consideration and approval.

### **OBJECTIVES/TARGETS IN RESPECT OF COMPUTERISATION**

1. Provision of monitoring/decisions support information system; This is to be accomplished by the integration and some level of centralised corporate data base, that will assist the company by increasing the value of information and making it more accurate and timely.
2. There should be flexibility in the computer system so that other identified applications can be added as the need arises. All identified applications are first to be prioritised and scheduled.
3. Implement computer facilities which will increase productivity work force i.e.;
  - i. Maintenance planing/scheduling to be fully computerised
  - ii. Complex routine and tedious mathematical/engineering computations done hitherto manually would be eliminated.
4. Reduce manpower cost by cutting down on number of casual workers and re-deploying staff involved in present manual data processing operations to other productive areas.
5. Reduce errors by reducing human involvement e.g. eliminate cases of over invoiced orders as well as errors in respect of staff sales and special sales
6. Reduce per unit processing/operating cost e.g. reduction of man-hours spent on computations or information searches.
7. Trim cost of other office/business processing equipment e.g. Typewriters, calculators and minegraphic machines invoicing unit, Reduce number of photocopying machines by 40-50% and their associate maintenance cost.
8. Reduce physical storage space while increasing information retrieval capability in elect/mechanical/production, sales accounts treasury,



bookkeeping, invoicing and legal units e.g.

- i. Equipment history information.
- ii. customer account information
- iii. Personnel records
- iv. Medical records in staff clinic etc.

9. Improve control/security e.g.

- i. Give maximum free-hand to in-house auditors to interrogate Financial/Admin. data base on-line.
- ii. Add/improve maximum security to information on data base-access only given to authorised users.
- iii. Provide off-site backup storage arrangement in case of fire, sabotage or other computer disasters.
- iv. Ensure that only management staff get some category of reports/information (Controlled dissemination).

Thus computer applications will be forced to zero-in on the implementation of these objectives especially those short terms ones while entire running system would meet long term goals during their life circle.

## **BOARD INPUTS**

In addition to the management effort, the board setup a computerisation committee in May, 1985 with representation from each division. The committee was to study and implement the project in phases.

The committee's terms of reference were as follows:-

- ⇒ To establish the data/information needs of all functions of the company.
- ⇒ To prioritise these articulated needs for computerisation.
- ⇒ To liaise with consultants for the co-ordinated feasibility studies to be conducted by computer companies and recommend to management based on findings most suitable system for effective data information processing.

## **PROPOSALS FOR CONSULTANCY SERVICES**

In order to stop the acquisition of more micro-computers, management decided to pursue more vigorously a comprehensive and long-term computerisation policy. The computerisation committee was mandated by the Board technical committee to award the contract to a consultant based on merit. Thereafter the consultant commenced work on the project. The consultants recommended training of systems support staff and preparation of computer environment. The training was done abroad and the computer environment was approved. Based on approval, Altos computer system was supplied and installed. The work was commissioned on 1<sup>st</sup> March 1991.

### **3.3 COMPUTER APPLICATION**

Computer system is currently applied in the following areas of the company:

i. ***Finance division***

There are three micro-computers in this division, they are used primarily for data processing activities which include; payroll processing, budgeting and costs control, financial modelling and Capital expenditure monitoring.

The report generated on these system are; wages analysis, Financial projections, cash flow statement, and Management Information Report (MIR).

ii. ***Commercial division***

At present there are three Micro-computers in this division. The program are designed to provide management with complete analysis and understanding of sales activity. The system allows for enquiry into all sales information at any time. This provides the division with continuous flow of information to help guide its sales efforts and constantly monitor sales performance.

iii. ***Technical division***

At present this division has not been computerised. However, there is

a proposed Computer aided maintenance system (CAMS) program. The proposed maintenance control software will be made up of modules of programs covering the following areas;

- ⇒ Electrical department
- ⇒ Mechanical department
- ⇒ Production department
- ⇒ Quarry department
- ⇒ Quality Control department.

The main module of maintenance planning software will be centred around

- ⇒ Preventive maintenance schedule
- ⇒ Work orders
- ⇒ Maintenance schedule
- ⇒ Maintenance forecasting and
- ⇒ Past inventory.

This will enable the history on equipment to be readily and easily obtainable.

#### iv ***General Management Division***

In this Division, computer is applied in the following areas;

##### ⇒ **Procurement Department**

There is one Micro-computer here and it is primarily used for word processing and local purchase orders (LPO) monitoring.

##### ⇒ **MD/CE's Office**

The system in this office is mainly used for word processing.

##### ⇒ **Coy Sec./Legal Adviser's Office**

The system is mainly used for word processing for quality, security and speed in the production and distribution of information for company and board.

### ⇒ **Corporate Planning/DP Department**

This department co-ordinates the application of computer systems company wide. The company's network server is located there along with three workstations.

The introduction of LAN is intended to centralise control and operations and as such a corporate database file structure is used to optimise data and information sharing between users and application. The "Window" capability aids users to view any authorised information on the Network thus reducing costs associated with printing and disseminating reports frequently. In addition, Word processing and electronic Mails capability is available for any user on the Network..

## **3.4 ANALYSIS OF COMPUTER BENEFITS AND PROBLEMS**

The data processing facility should be considered as the nerve centre which requires careful protection of its data, files and equipment. It is a vital organ for the continuation of the life of the organisation. If the standard documentation and procedures are accurate and comprehensive, a system analyst or programmer with no previous knowledge of an application can monitor and trace through the system to identify and correct irregularities or problems, should they occur. Insufficient documentation and non-standard procedure make it virtually impossible for any one other than the veteran on the job to overcome system difficulties.

### **3.4.1 BENEFITS OF COMPUTERISATION IN BCC**

These include:

- i Computerisation of some of the company's operations has reduced human involvement in report generation which is now faster
- ii Maintenance of up-to-date information on all cement sales and

despatches to all customers.

- iii Easy access to vital corporate data for management decisions.
- iv Better accuracy in transaction, especially those that are financial in nature.
- v Higher volume of information is processed at a cheaper rate.
- vi Elimination of tedious and routine calculations.

### 3.4.2 **INTANGIBLE BENEFITS**

- ⇒ Increase in morale of workforce
- ⇒ User, supplier and customer satisfaction
- ⇒ New challenges due to new information technology etc.
- ⇒ Faster job turn-around
- ⇒ Compliance with good business ethics/objectives minimize cost of operation

### 3.4.3 **PROBLEMS WITH COMPUTERISATION**

A number of factors contributed greatly to the company's computerisation efforts from its inception in 1983 till date. The four typical stages in the evolution of EDP were followed knowingly/un-knowingly as it were to a great extent.

#### **Stage 1 - EDP INITIATION**

Where a single user Department (in this case purchasing and supply) start up some form of computerization. Typically accounts Department are the primary users or initiators of basic function like payroll, inventory control etc.

#### **Stage 2 - EXPANSION**

When several other user department will go out to procure their own equipment having seen some advantages, prestige or power the EDP could provide. Expenditure could be quite high in this case without adequate productivity tools to measure payoffs at this stage.

### **Stage 3 - FORMALISATION**

When management set-up a formal EDP centre with a manager and a host of staff to work with. At this stage all resources are centralised as well as budgeting for EDP to give management good control. However, huge expenditure is incurred within a short time to get the EDP going.

### **Stage 4 - MATURE**

Lot of things have stabilised at this stage.

- i. The users of the computer were not well prepared and did not have any experience at the time of initiation hence the system did not accomplish much of what was expected of them e.g. the Micro Stock System which started ahead of the other failed and has packed up.
- ii. Lack of short/long term objectives in measurement/identifiable terms for EDP. Thus, benefits were not well known or understood.
- iii. Like any other new development, staff resisted the acceptance of computerisation for fear of losing their employment.
- iv. Lack of co-operation among the users with respect to EDP efforts and resources.
- v. Computer vendors, consultants, Software and hardware maintenance support were virtually non-existent for most of the systems.
- vi. Spare parts, logistics location and environmental hazards (i.e. dust) posed a lot of problems for the computerization.
- vii. lack of managers acceptance/co-operation due to lack of computer literacy.
- viii. Lack of proper standard software specification and procedures with respect to documentation, hardware expansion/software up-gradedability. Typical documentation on system design

overview, flowchart, source codes, how, where and when to were not made available to existing software application which made it difficult for new people to be engaged.

### **3.5 INTERNAL CONTROL SYSTEM**

Internal control is very important in ensuring a fraud free working environment. It is concerned with physical custody of assets and procedures put in place to restrict access to only authorised staff. Access to documentation needs also to be restricted because unauthorised personnel that knows the right procedures can take undue advantage of any laxity.

#### **3.5.1 SECURITY FEATURES/PROTECTION**

Data and information is secured on the system by use of security features built in the systems. Each application module in the company is assigned to a user to whom such an application is relevant to. The systems administrator has the ability to use password to protect all user directories, database files and programs. Access/usage rights are granted to various categories of users as needed.

# CHAPTER FOUR

## AUDITING ANALYSIS AND SYSTEM DESIGN

### 4.1 INTRODUCTION

The auditability of the system is enhanced by the use of:

- (1) Standard practice and procedures in system development , which not only make it easier for the auditor to review the system development process but simplify the subsequent review of the EDP applications.
- (2) Adequate documentation, which provide an audit trail of the process of development and maintenance, as well as complete documentation of such application system.

The purpose of system development and documentation's control is to create an environment that assures the auditor that effective application controls are included in the system and that the integrity of these application controls will be preserved after the system has been implemented.

System development controls start with written standard procedures for the planning, development and implementation of system. The written standard procedures represent a generalised process of system design, that increases the ability to review and evaluate controls both on an on-going basis through out the system development process and subsequent to the completion of the system design. This is true where there exists sound management practices requires standard programming conventions and procedures, encourages participation in the development process by interested parties (auditors), requires review and approval of the system, tests the system, provides final approval, maintains control over conversion and institutes a post implementation review. After the completion of the system, management continues to emphasis its concern over the system program changes.

Limitations in the effectiveness of the system of internal control exist because of people. People get tired, make mistakes and misunderstand what



they have been asked to do. In addition,, intentional attempts to circumvent the control system especially when collusion is involved are difficult to detect.

Sound personnel practices are essential to both the quality of data processing and the quality of data processing and the functioning of other organisational controls. Thus, for the purpose of the review of internal control system in BCC PLC, a proposed personnel information control system would be used as an example.

#### 4.1.1 **THE PURPOSE OF AUDIT INVOLVEMENT.**

Auditing becomes an on-going activity during phases of the development of the computer system software. To ensure the maintenance of availability and privacy, one needs a complete system of controls encompassing all system activities as follows:

(a) ***Availability***

Is the fact that the defined service performed by the system is available for the prescribed time, period and at the predefined rate throughout.

(b) ***Integrity:***

Means the correct operation of computer systems including the preservation of data and program for their intended purpose.

(c) Privacy goes beyond integrity and has three components:

(i) Propriety refers to the legal and ethical aspects of collecting, storing and using various types of personnel data.

(ii) Access refers to the maintenance of confidentiality. No one should be able to access data without the knowledge of the person responsible for the file.

(iii) Quality refers to the protection of information against distortion or misinterpretation of its intended meaning.

## 4.2 **SYSTEM DESIGN**

When designing a system, measures must be taken which will identify both human error and malfunctions in the system and the misuse of their effects.

The first step in program development is the analysts phase which produces a requirement specification. The function is to create a clear understanding of the problem, its components (such as input and output to be produced) and the processing tasks needed to solve the problem.

The program controls may be required to check the acceptability of input data and files, the correct functioning of program instructions, hardware operation and data handling, together with security measures to detect any accidental or deliberate misuse of data or any malpractice within the system. The controls and security measures must be specified in details at this stage, together with the procedures necessary to ensure their effective use.

The security of the system must be given careful consideration throughout the design process, from the system analysis stage to the question of future need.

## 4.3 **DATABASE MANAGEMENT SYSTEM(DBMS)**

A database management system is a software that constructs, expands and maintains the data contained in a database. It also provides the interface between the user and the data in such a way that it enables the user to record, organise, select, summarise, extract, report on, and otherwise manage data contained in a database.

The overall objective in the development of database technology has been to treat data as an organisational resource and as an integrated whole. Database systems allow the data to be protected and organised separately from other resources (e.g. Hardware, Software and program).

The following are some of the important functions of a DBMS: DEMS

- (i) Create or populate a database

- (ii) Retrieve data from the database.
- (iii) Generate reports from the database.
- (iv) Up-date information in the database.
- (v) Organise the data of the database.
- (vi) Maintain integrity and consistency of data.
- (vii) Allow time-sharing of data by users.

DBMS programs keep information in files and within each file is a collection of related information. The data in a file are organised into rows and columns with each row making up a record. A column of data is known as a field and the column heading is a field Name. The content of a field determines the field type. The usual field types are numeric, character, memo date, etc.

#### 4.3.1 **COMPONENTS OF DATABASE STRCUTURE**

There are three main types of DBMS available; hierarchical, Network and relational database management systems. The type of DBMS used depends on the organisational method used to create database files.

For the proposed application program for BCC Plc's personnel information system control relational DBMS is used to create its databases.

In a relational DBMS a database file is organised as a two-dimensional table of data consisting of rows representing a record and columns representing a field in the record of database file. They store data containing values relating to a particular item like employee record. An employee's record contains categories called employee number, employee Name and so on.

#### 4.3.2 **DBASE IV**

Dbase IV is the programming languages used for the proposed personnel information system control program. Dbase IV is said to be one of the most popular and powerful DBMS available for personal

computers. It organises data into database file is a collection of related records. Dbase IV when applied to personnel record like used in the proposed application program a database file can be set up to keep the records of employee's information such as employee's number, name, age, sex, department, rank, date employed, type of employment, educational qualification etc. are provided for. Each is regarded as a field in the database file while the collective information on all employees is referred to as a record.

#### 4.3.3 **METHODS OF PROCESSING DATA IN DBASE IV**

Dbase IV provides two different methods of data processing stored in its database files. These are interactive processing mode and batch processing method. In the interactive mode processing method, two options are available namely, control centre mode and dot prompt mode. In control centre mode, commands are supplied to Dbase IV by the selection of options available in the control centre menu. In the dot prompt mode, commands are supplied by user by typing from the keyboard. Dbase IV interprets and executes to produce results. For the batch processing, the commands are stored in the form of programs and are executed in group mode. This process increases users efficiency and confidence.

#### 4.3.4 **COMPONENTS OF DATABASE FILE**

Dbase IV as a relational DBMS organises its files into a form of tables. A table consists of two components -database file structure and database file data.

(i) ***Database file structure:***

This describe each field in the database record indicating its position in the record (Field number), field name, field type, field width in characters and the number of decimals in the field.

(ii) ***Database file data:***

The database file data are represented in the form of a table. Each row presents record. Each row (record) is made up of four columns and each column represents a field.

#### **4.4 PROGRAM FLOWCHART AND SYSTEM FLOWCHART**

Flowchart is an important part of the documentation for the audit process despite the some disadvantages. Flowcharts are used to document both the accounting system in general and specific computer program system and program flowchart that are understandable and accurate can be useful to the auditor. Accuracy is ensured by the use of flowchart testing. There are two main types of flowchart;

##### **4.4.1 SYSTEM FLOWCHART**

In depicting flow of documentation and data through the entire accounting system, application, computer audit utilises systems flowcharts to emphasise what processing is done in the system, rather than how it is done.

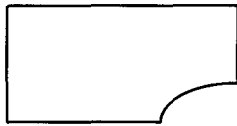
In emphasising what processing is done in the system, the auditor will highlight input into it, output from it, functional resources for what is done, and internal control procedures performed to ensure the accuracy of processing results.

## **SYMBOLS**

There are specialised symbols used as

Thus: Basic Input / Output symbols

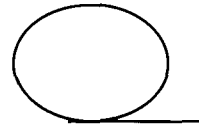
Specialised input / output symbols .



**Document**

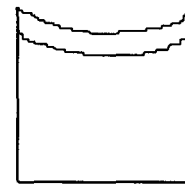


**Punched card**



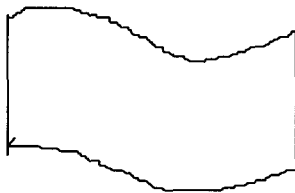
**Magnetic**

**Tape**

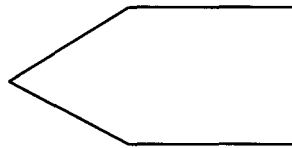


**Magnetic**

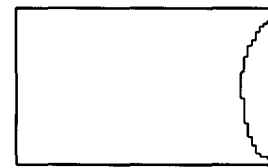
**Disk**



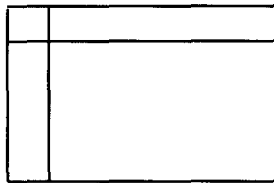
**Punched Tape**



**Display**



**On-Line Storage**



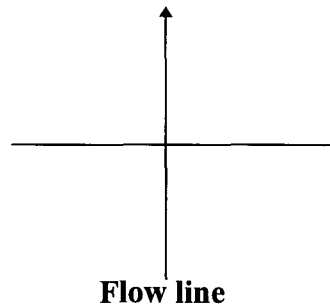
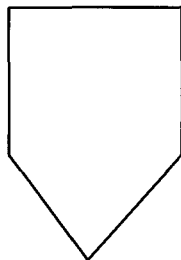
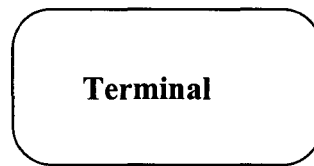
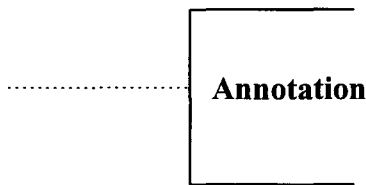
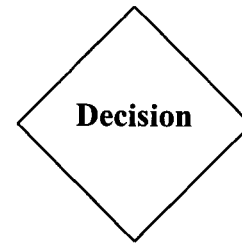
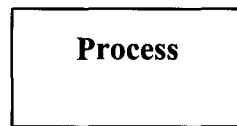
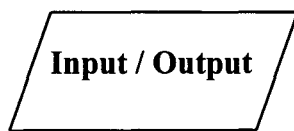
**Magnetic Core**

A system flowchart is not complete until it has been tested for accuracy. Accuracy in a system's flowchart means that all significant documents and process are shown and that flow of information is actually as depicted.

### **4.4.2 PROGRAM FLOWCHART**

In auditing, auditors utilise program flowchart to portray the processing of accounting data graphically with the computer. Program flowcharts are tested by following the program logic, a task much more difficult than testing a system flowchart because of the incredible no of logic paths.

Basic symbols for program flowchart are;



In the audit trail component, the concern is that data can be traced backward and forward through the program and that control exist to detect the loss, addition or change in data.

#### 4.5 **GENERAL PROGRAM DESCRIPTION AND MAIN PROCESS.**

The details of program description for the proposed personnel information system control system will be attached as appendix. The program is a menu driven one in which different processing options are presented to users who select one at a time as the need arises. Depending on the user's selection the menu program perform the associated processing. No data from any database or memory file(s) in the menu program are used.

##### 4.5.1 **PROGRAM CODING**

This is the process in which Pseudocode instruction are translated into a programming language (Dbase iv in this case) when coding is complete, the and result is a coded program consisting of a set of command that directs the computer to carry out processing function

needed to solve the problem.

The coded program is entered into the computer system, creating a program file using Dbase IV -PERS., DBF. This program file is called the source program.

#### 4.5.2 **THE TEST AND DEBUGGING**

The source program is tested to see if any errors exist in it. An error in the program is called a BUG, and the process of locating and correcting these errors is called DEBUGGING.

There are two possible types of errors (1) Syntax and (2) Logic. Syntax error occur when the rules of grammar for the program language are violated. Computers cannot process commands with grammatical errors. Logic errors are located by program testing which involves executing the program using test data. The end product is a computer program free of syntax and logic errors.

#### **TESTING**

Compilation of the process and execution of the object program do not mean that the program is operating correctly and the results produced are correct. The program may still contain logic errors, the compiler cannot detect them. These are found by program listing, which involves executing the program using test data. Some of the output can be verified to ensure its accuracy. If any discrepancies exist, the needed correction are made until the program produces correct and practicable results.

#### 4.6 **CHANGE OVER PROCEDURE**

The change over may be achieved in a number of ways. The most common method are; direct, parallel running, pilot running and staged changeover.

The method proposed for the new system is the staged changeover. This involves a series of limited size direct changeovers, the new system being



introduced piece-by-piece. A complete part or logical section is committed to the new system while the remaining parts or sections are processed by the old manual system. The selected part is transferred when operating satisfactorily. This enables the users to learn from mistakes made as the changeover progresses.

#### 4.6.1 **FILE CONVERSION**

This involves the conversion of data from the old file into the form required by the new system. This is part of changeover which involves fact-finding analysis, data capture, the design of form and clerical methods and computer processes.

#### 4.7 **OPERATING MANUAL**

The program PER. PRG. Is written in Dbase IV programming language is tailored towards the results from analysis of the current manual system including its procedures, information flows, method of work, organisation and control measures used.

The program will replace the manual operations based on requirement specification. The Staff Nominal roll will be prepared and the maintenance of the database file.

#### 4.8 **HOW TO RUN THE PROGRAM**

At the DOS (disk operating system) prompt change directory to Dbase IV sub-directory To Start the program <sup>MENU</sup> PERS. PRG, enter DO PERS. PRG at the Dot prompt. If we want the program to start automatically when we load dBase IV, add the command =DO PERS.PRG command to the CONFIG. EXE file. The presence of this command will automatically at the start of dBase IV execute the DO PERS.PRG every time dBase IV is loaded, Type Do <sup>PERS</sup> ~~Do~~ <sup>MENU</sup> and press ENTER KEY dBase IV will execute the program file called <sup>PERS</sup> ~~MENU~~.PRG.

During the listing, the program will clear the screen and present the user with the Main Menu consisting of listed options.

#### 4.8.1 **BENEFITS OF THE PROPOSED SYSTEM**

The likely benefits of the new computer-Based personnel information system control application program would be as follows:

- (i) Reduction in number of staff within the personnel department.
- (ii) Fast and quick means of data processing and information presentation.
- (iii) High degree of accuracy and efficiency and timeliness.
- (iv) Reduction in storage space for files and file cabinets.
- (v) Better management information system
- (vi) A more effective and result oriented personnel department with enhanced data integrity.
- (vii) Better access, privacy, confidentiality, continuity and audibility.

## **CHAPTER FIVE**

### **IMPLEMENTATION AND CONCLUSION**

#### **5.1 ANALYSIS OF RESULTS**

Sound personal practices go beyond the establishment and normalisation of appropriate control procedures. The EDP should follow these procedures consistently and enthusiastically. It is noted generally that, control procedures tend to generate negative attitudes among staff.

The acquisition, storage and retrieval of information present a significant challenge. One key part is gaining co-operation from others in the organization. To accomplish this, personnel department needs to rely on computer based information system, that can store detailed information about employees, jobs, laws, economic trends and other internal and external factors.

No matter what the organizational set-up is, it is always necessary for someone to have responsibility for movement of people into, through and out of the organization, if human resources are to be effectively managed.

##### **5.1.1 ANALYSIS OF PRESENT SYSTEM**

The existing manual system of personnel information system's control in BCC PLC has been appraised as against the propose new system by using the following methods:

- 1 Information generation
- 2 Data processing
- 3 File organisation and storage
- 4 File movement and information
- 5 Performance evaluation system
- 6 Training to improve current job performance, communication and consultation mechanism

## 7 Security and safety of personnel records in the company.

A comparative analysis of the old and the new system shows a lot of similarities as well as differences. Each has its own characteristics that distinguish it from the other by way of accuracy, efficiency, speed, security and hence, the advantage of the new system over the manual system presently in use.

Below is the proposed program on personnel information control system and the output result attached as appendixes

## 5.2 CONCLUSION

In order to carry out any management function effectively, the top management of an organisation will need information on continuous basis about the performance of the various sections of the organisation. Management of an organisation may generally not have the time or expertise to collect and analyse the pieces of financial information it needs for its management function; the internal auditor in this case does not only provide the management with the information but also gives the necessary assurance that the operations are being carried on in accordance with laid down procedures.

Auditing becomes an on-going activity in a computer system during all phases of the development of the computer system software. It requires the consideration of complimentary measures and the use of various tools. Constructive measures should prevent or reduce the occurrence of errors as early as possible.

While analytical or testing measures should detect and locate errors during the development, operation and maintenance of the computer system. Management control should assure implementation of such measures and ensure discipline in handling configuration changes.

The degree to which computer processing is used in significant accounting

application as well as the complexity of the processing may influence the nature, timing and extent of audit procedures. Accordingly when evaluating the effect of computer processing on an audit of financial statement auditors will consider such matters as:

- 1 A description of the company's computer resources, including details of computer equipment used, the use of outside service center if any, and location of computer processing activities.
- 2 The organisational structure of computer operations as it relates to personnel with the computer department and the interaction of personnel in other department.

### 5.3 **RECOMMEDATIONS**

There are vast differences in the ways in which people deal with information and the methods by which computers can input it, manipulate and output it. These differences will have important or significant impact on the ease and success with which any given application can be achieved.

- 1 As manual systems are replaced by computer systems, it is important to identify control problems and look for solutions. Auditors most have a greater understanding both of the concepts of control in a data processing environment and the basic technology of computers.
- 2 To be considered trained and proficient in a computer based accounting system, auditors most have working knowledge of computers. Sufficient training and proficiency in computer are necessary to enable the auditors make their decisions about computer operations in an accounting system that is computer based.
- 3 Data processing of information system is now a critical part of the organisation's basic structure. Auditors should ensure that:
  - i effective controls are designed into the system
  - ii there is adequate audit involvement in the design process to help ensure that appropriate controls are implemented.

iii controls are aimed to achieve proper operation of the computer system as well adequate accounting control.

4 It is said that, the greatest hazards to computer security is people and the most dangerous people are the organisations own employees. Hence, there is need for separation of responsibility, written procedures, training, communication, transaction control, continuous audit, improve responsibility reporting, program controls and files controls.

5 Computers can be used negatively. Crime is a neutral accomplishment to the use of computers in view of the increasing application of computer technology to sensitive functions in a society where crime flourishes. A tight system<sup>of</sup> internal control is often an excellent means of combating fraud in a computer environment.

There is need to implement the proposed personnel information system control in BCC PLC for better access to records, privacy, confidentiality of documents, continuity, auditability and timeliness.

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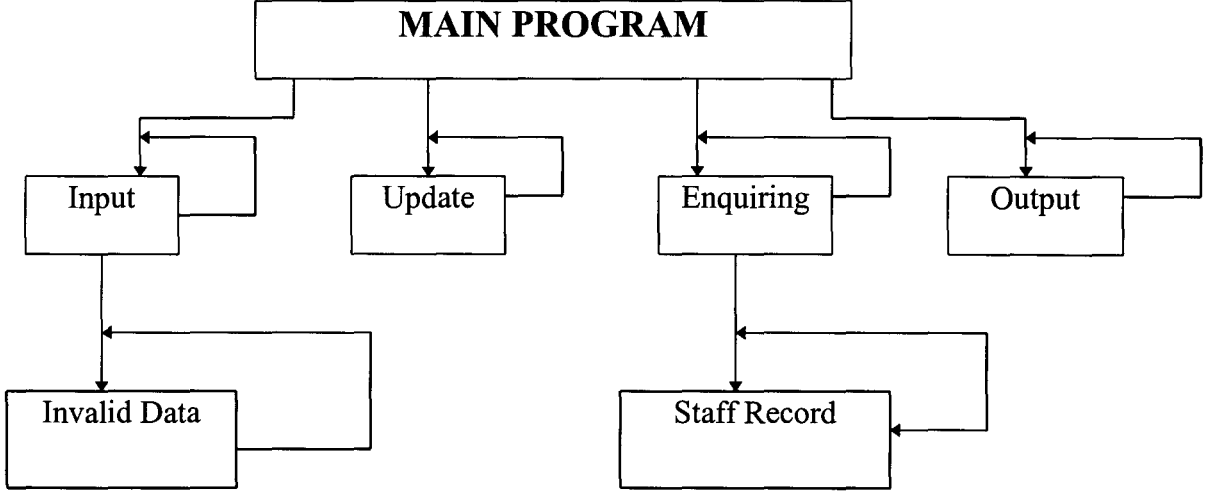
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- 13 Walter G. Kell, William C. B. Modern auditing. Published by John Wiley and sons Inc. 1992, New York.



# PROGRAMING APPROACH

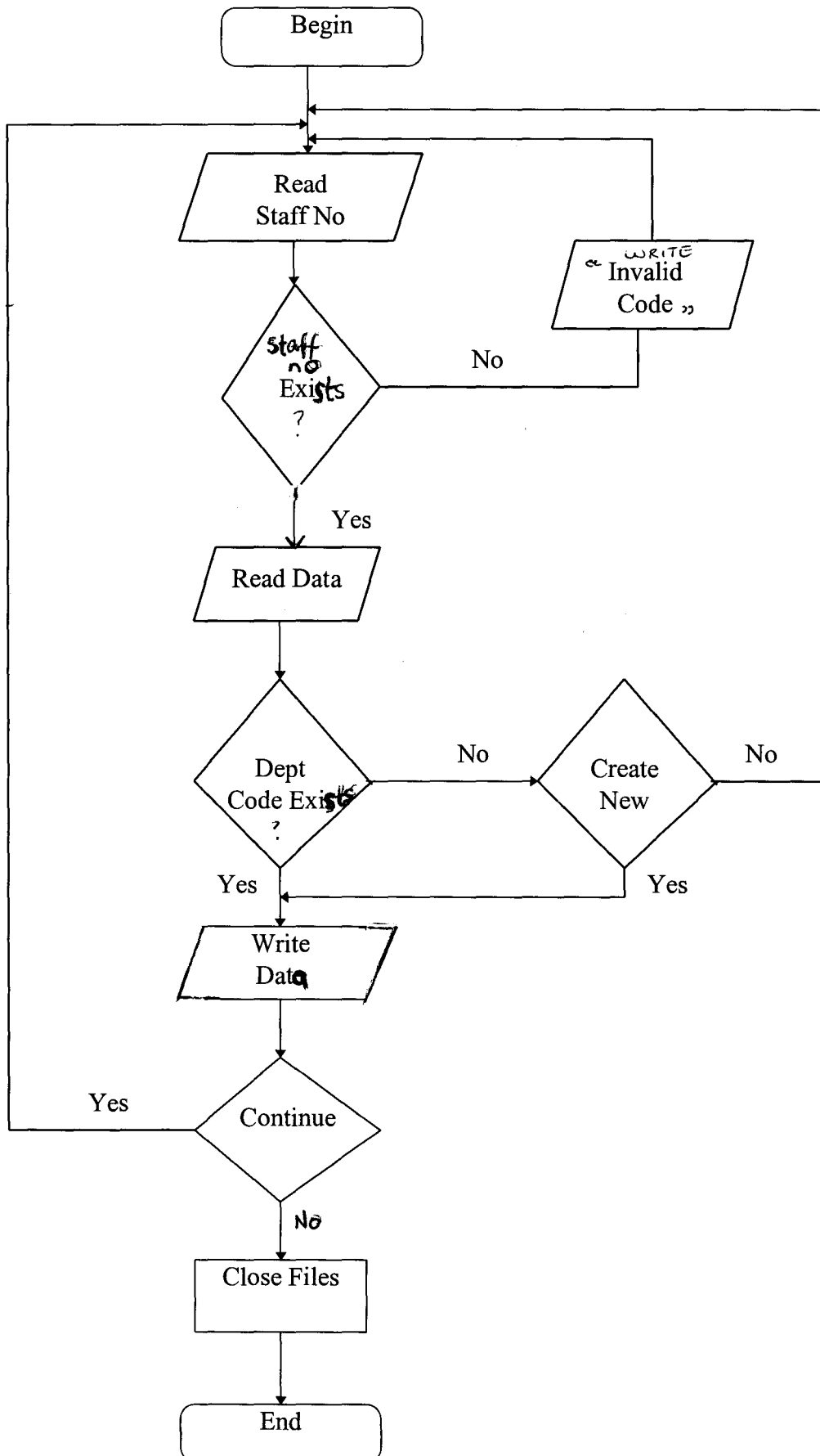
Modular programming approach is use where the program is defined in the form of a hierarchy of small section known as Module, which is intended to be a basic piece of work which can be coded and tested in isolation from any other module.

Each module is a subroutine and the hierarchical nature of the structures means that a module may call another at a lower level or be called by one at a higher level. In this way, the independence of each module is maintained so that a complete program can be assembled from fully tested modules.

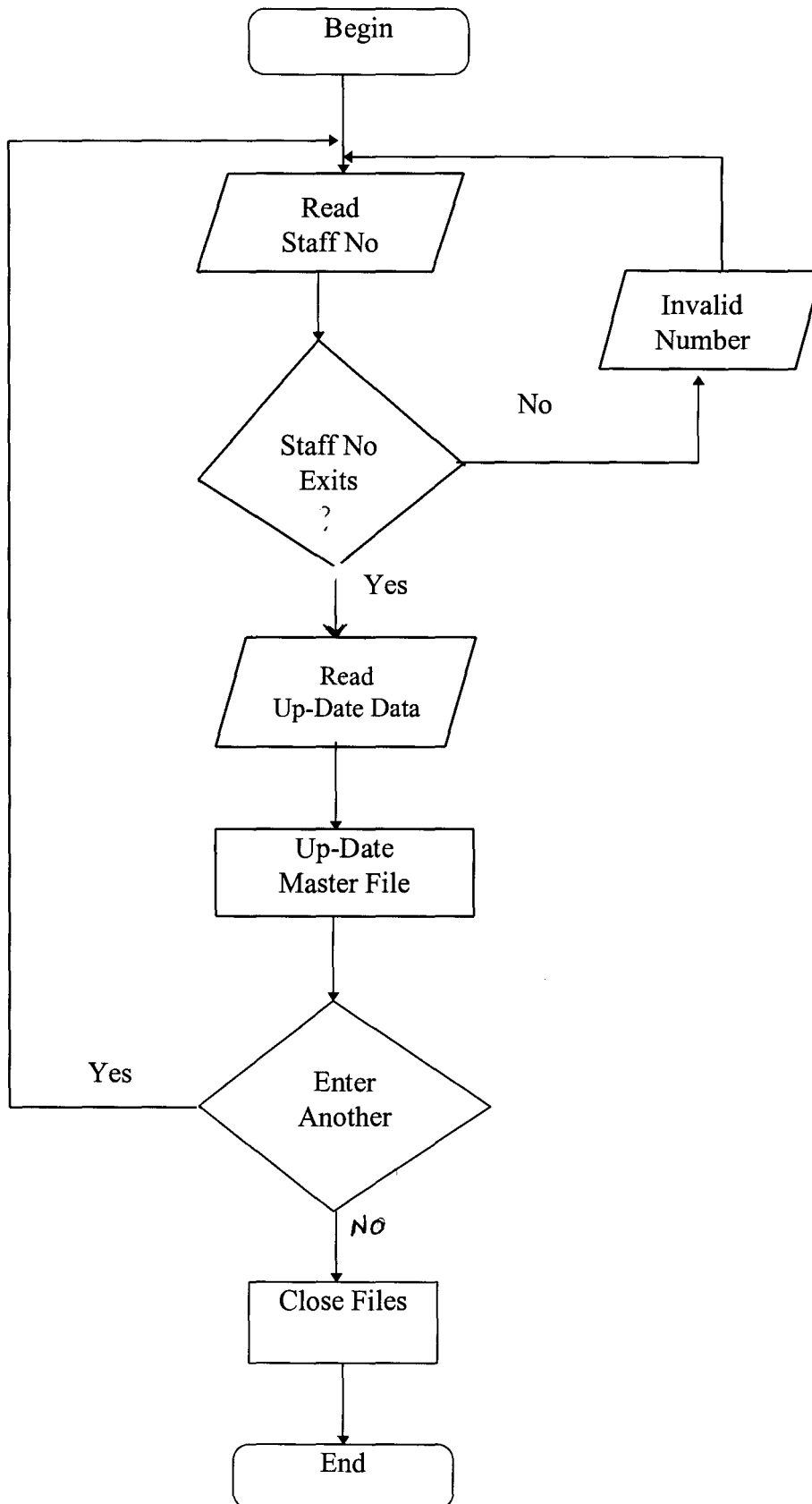


# APPENDIX

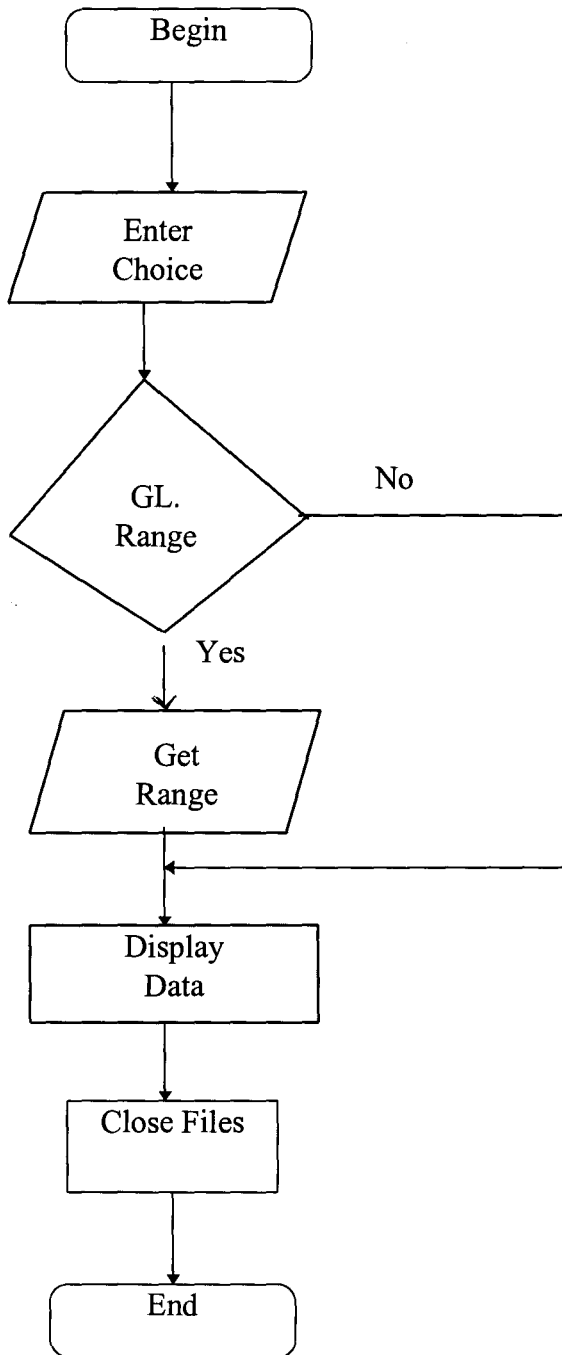
## PERSONNEL MASTER RECORD ENTRY PROGRAM FLOWCHART



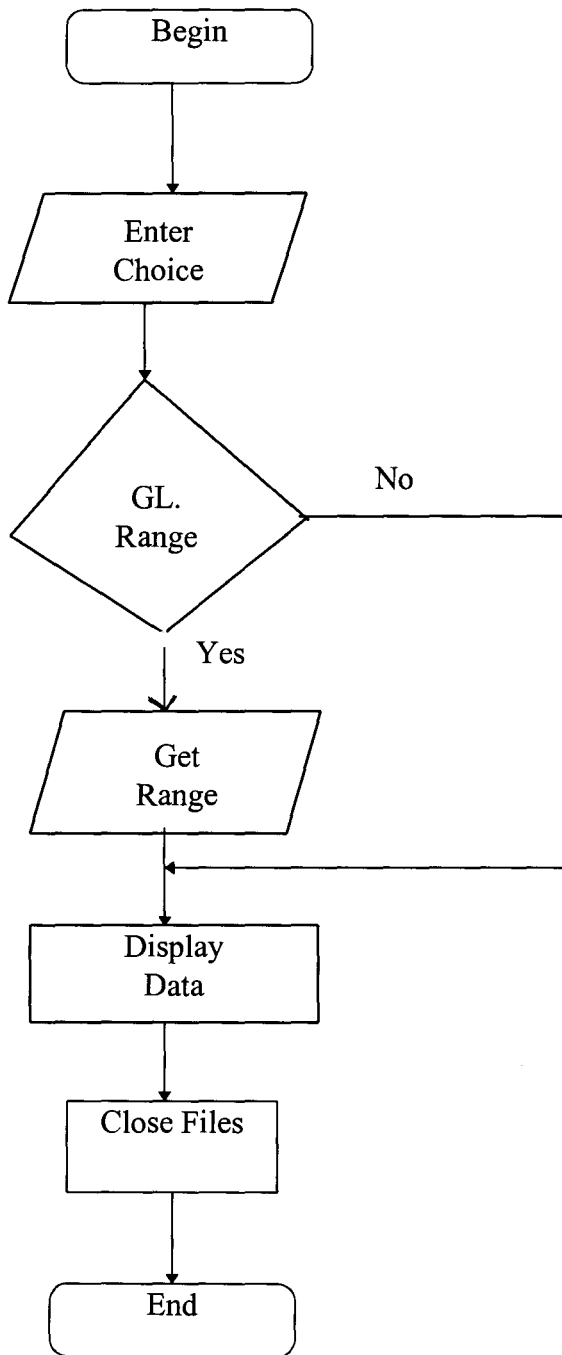
# UPDATE DATA ENTRY PROGRAM FLOWCHART



# ENQUIRY PROGRAM FLOWCHART



# REPORT PROGRAM FLOWCHART



```
*****
* PROGRAM TITLE : PERSONNEL INFORMATION SYSTEM CONTROL *
* AUTHOR       : MRS W. N. DZEGE                       *
* DATE        : AUGUST 1997                             *
* PURPOSE     : IN PARTIAL FULFILMENT OF THE REQUIRE-  *
*              MENTS GOVERNING THE AWARD OF POST-      *
*              GRADUATE DIPLOMA IN COMPUTER SCIENCE    *
*              OF THE FEDERAL UNIVERSITY OF TECHNO-    *
*              LOGY, MINNA. NIGERIA.                   *
*****
```

```
SET TALK OFF
SET ECHO OFF
SET STAT OFF
DO WHILE .T.
CLEAR
@2,10 TO 20,70 DOUBLE
@3,20 SAY "    BENUE CEMENT COMPANY PLC"
@4,20 SAY " PERSONNEL INFORMATION SYSTEM CONTROL"
@5,20 SAY "    MAIN MENU"
@7,11 TO 7,69
@09,25 SAY "[ ] FILE MAINTENANCE"
@11,25 SAY "[ ] ENQUIRY"
@13,25 SAY "[ ] REPORT"
@15,25 SAY "[ ] EXIT"
SET COLO TO GR+/B
@09,26 SAY "1"
@11,26 SAY "2"
@13,26 SAY "3"
@15,26 SAY "4"
SET COLO TO W+/B
@17,11 TO 17,69
K=0
@19,20 SAY "SELECT CHOICE [1,2,3 or 4] " GET K RANGE 1,4 PICT "9"
READ
DO CASE
  CASE K = 1
    DO FILEMN
  CASE K = 2
    DO QUERYMN
  CASE K = 3
    DO REPORTMN
  CASE K = 4
    EXIT
ENDCASE
ENDDO
```

```
CLEAR ALL
CLEAR
RETURN
SET TALK OFF
SET ECHO OFF
SET STAT OFF
DO WHILE .T.
CLEAR
@2,10 TO 19,70 DOUBLE
@3,20 SAY "    BENUE CEMENT COMPANY PLC"
@4,20 SAY " PERSONNEL INFORMATION SYSTEM CONTROL"
@5,20 SAY "    FILE MAINTENANCE MENU"
@7,11 TO 7,69
@10,25 SAY "[ ] ADD NEW STAFF RECORD"
@11,25 SAY "[ ] UPDATE STAFF RECORD"
@12,25 SAY "[ ] DELETE STAFF RECORD"
@13,25 SAY "[ ] EXIT"
SET COLO TO GR+/B
@10,26 SAY "1"
@11,26 SAY "2"
@12,26 SAY "3"
@13,26 SAY "4"
SET COLO TO W+/B
@15,11 TO 15,69
K=0
@17,20 SAY "SELECT CHOICE [1,2,3 or 4] " GET K RANGE 1,4 PICT "9"
READ
DO CASE
CASE K = 1
DO ADDREC
CASE K = 2
DO UPDREC
CASE K = 3
DO DELREC
CASE K = 4
EXIT
ENDCASE
ENDDO
RETURN
SET TALK OFF
SET ECHO OFF
SET STAT OFF
DO WHILE .T.
CLEAR
@2,10 TO 19,70 DOUBLE
```

```

@3,20 SAY "      BENUE CEMENT COMPANY PLC"
@4,20 SAY " PERSONNEL INFORMATION SYSTEM CONTROL"
@5,20 SAY "      ENQUIRY OPERATION"
@7,11 TO 7,69
@08,25 SAY "[ ] GENERAL STAFF RECORDS"
@10,25 SAY "[ ] BY DEPARTMENT"
@12,25 SAY "[ ] BY STATE"
@14,25 SAY "[ ] BY SALARY GRADE LEVEL"
@16,25 SAY "[ ] EXIT"
SET COLO TO GR+/B
@08,26 SAY "1"
@10,26 SAY "2"
@12,26 SAY "3"
@14,26 SAY "4"
@16,26 SAY "5"
SET COLO TO W+/B
@17,11 TO 17,69
K=0
@18,20 SAY "SELECT CHOICE [1,2,3 or 4] " GET K RANGE 1,5 PICT "9"
READ
DO CASE
CASE K = 1
    USE PERSMAS
    DO STAFFENQ
CASE K = 2
    CD=0
    @21,20 SAY "ENTER DEPT. CODE " GET CD PICT "99"
    READ
    USE DEPT
    LOCATE FOR DEPT_CODE = CD
    IF EOF()
        WAIT+"          DEPT. CODE NOT FOUND ! PRESS ANY KEY."
    LOOP
ENDIF
    USE PERSMAS
    SET FILT TO DEPT_CODE = CD
    DO STAFFENQ
CASE K = 3
    ST=SPACE(15)
    @21,20 SAY "ENTER STATE " GET ST PICT "@!"
    READ
    USE PERSMAS
    LOCATE FOR STATE = ST
    IF EOF()
        WAIT+"          STATE NOT FOUND ! PRESS ANY KEY."

```



```

LOOP
ENDIF
SET FILT TO STATE = ST
DO STAFFENQ
CASE K = 4
STORE SPACE(4) TO GL1,GL2
@21,20 SAY "ENTER GRADE LEVEL (lower limit) " GET GL1 PICT "99"
READ
@21,20 SAY "ENTER GRADE LEVEL (upper limit) " GET GL2 PICT "99"
READ
USE PERSMAST
LOCATE FOR SAL_G_L >= GL1 .OR. SAL_G_L <= GL2
IF EOF()
WAIT+"          SAL. G/LEVEL NOT FOUND ! PRESS ANY KEY."
LOOP
ENDIF
SET FILT TO SAL_G_L >= GL1 .AND. SAL_G_L <= GL2
DO STAFFENQ
CASE K = 5
EXIT
ENDCASE
ENDDO
RETURN
SET TALK OFF
SET ECHO OFF
SET STAT OFF
DO WHILE .T.
CLEAR
@2,10 TO 19,70 DOUBLE
@3,20 SAY "      BENUE CEMENT COMPANY PLC"
@4,20 SAY "  PERSONNEL INFORMATION SYSTEM CONTROL"
@5,20 SAY "      REPORT MENU"
@7,11 TO 7,69
@10,25 SAY "[ ] DEPARTMENTAL STAFF LIST"
@11,25 SAY "[ ] STATEWISE STAFF LIST"
@12,25 SAY "[ ] UPDATE REPORT"
@13,25 SAY "[ ] EXIT"
SET COLO TO GR+/B
@10,26 SAY "1"
@11,26 SAY "2"
@12,26 SAY "3"
@13,26 SAY "4"
SET COLO TO W+/B
@15,11 TO 15,69
K=0

```

```
@17,20 SAY "SELECT CHOICE [1,2,3 or 4] " GET K RANGE 1,5 PICT "9"
READ
DO CASE
  CASE K = 1
    DO DEPTRPT
  CASE K = 2
    DO STATERPT
  CASE K = 3
    DO UPDATRPT
  CASE K = 4
    EXIT
ENDCASE
ENDDO
RETURN
DEPCD=0
DEPNM=SPACE(15)
USE DEPT
@22,20 SAY "ENTER DEPT. CODE " GET DEPCD PICT "99"
READ
LOCATE FOR DEPT_CODE = DEPCD
IF EOF()
  WAIT+"          DEPT. CODE NOT FOUND ! PRESS ANY KEY..."
  RETURN
ENDIF
DEPNM=DEPT_NAME
USE PERSMAS
LOCATE FOR DEPT_CODE = DEPCD
IF EOF()
  WAIT+"          NO RECORDS FOUND ! PRESS ANY KEY..."
  RETURN
ENDIF
  SET FILT TO DEPT_CODE = DEPCD
STORE 0 TO P,R,SN,SFNO
H1="  BENUE CEMENT COMPANY PLC"
H2="PERSONNEL INFORMATION CONTROL SYSTEM"
R=60
SN=1
@22,20 SAY "PRINTING REPORT...."
SET DEVICE TO PRINT
SELE A
DO WHILE .NOT. EOF()
IF R>23
  P=P+1
  @1,20 SAY H1
  @2,20 SAY H2
```

@3,1 SAY "DEPARTMENT : "+DEPNM

@4,1 SAY REPL("-",79)

@5,1 SAY "S/NO"

@5,7 SAY "STAFF NO"

@5,20 SAY "N A M E"

@5,40 SAY "JOB TITLE"

@5,57 SAY "SAL."

@5,62 SAY "DATE"

@5,71 SAY "DATE LAST"

@6,57 SAY "G.L."

@6,62 SAY "EMPLOYED"

@6,71 SAY "PROMOTED"

@7,1 SAY REPL("-",79)

R=8

ENDIF

@R,1 SAY LTRIM(STR(SN))

@R,08 SAY STAFF\_NO

@R,15 SAY NAME

@R,40 SAY JOB\_TITLE

@R,57 SAY SAL\_G\_L

@R,62 SAY DATE\_EMP

@R,71 SAY DATE\_L\_P

R=R+1

SN=SN+1

SKIP

ENDDO

@r,1 SAY REPL("-",79)

EJECT

SET DEVICE TO SCREEN

CLOSE DATABASE

CLEAR

RETURN

\*-- Name.....: ADDREC.PRG

\*-- Date.....: 7-08-97

\*-- Version....: dBASE IV, Format 1.1

IF SET("TALK") = "ON"

SET TALK OFF

lc\_talk = "ON"

ELSE

lc\_talk = "OFF"

ENDIF

lc\_cursor = SET("CURSOR")

SET CURSOR ON

lc\_status = SET("STATUS")

```
IF lc_status = "ON"
  SET STATUS OFF
ENDIF
SELE A
USE PERSMAS
SELE B
USE DEPT
*-- Format Page: 1
SELE A
DO WHILE .T.
  CLEAR
  MNO=0
  @ 1,1 TO 21,75 DOUBLE
  @ 2,24 SAY "BENUE CEMENT COMPANY PLC"
  @ 3,18 SAY "PERSONNEL INFORMATION SYSTEM CONTROL"
  @ 5,27 SAY "STAFF DATA ENTRY FORM      [0]=EXIT"
  @ 6,2 TO 6,74
  @ 8,3 SAY "NEW STAFF NO"
  @ 8,18 GET MNO PICT "99999"
  READ
  IF MNO=0
    EXIT
  ENDIF
  LOCATE FOR Staff_no = MNO
  IF .NOT. EOF()
    @21,18 SAY ""
    WAIT + "          INVALID NUMBER !  PRESS ANY KEY..."
    @22,18 SAY SPACE(50)
    LOOP
  ENDIF
  APPEND BLANK
  REPL STAFF_NO WITH MNO
  DO WHILE .T.
    @ 10,3 SAY "FULL NAME"
    @ 10,18 GET Name PICTURE "@!"
    @ 12,3 SAY "JOB TITLE"
    @ 12,18 GET Job_title PICTURE "@!"
    @ 14,3 SAY "DEPT. CODE"
    @ 14,18 GET Dept_code PICTURE "9999"
    READ
    DEPCODE=0
    DEPCODE=DEPT_CODE
    SELE B
    LOCATE FOR DEPT_CODE=DEPCODE
    IF EOF()
```

```

@21,18 SAY ""
WAIT +"          INVALID DEPT. CODE, CREATE NEW ONE (Y/N)" TO C
@22,18 SAY SPACE(50)
IF UPPER(C)="Y"
  APPEND BLANK
  @16,3 SAY "NEW DEPT NAME : " GET DEPT_NAME PICT "@!"
  READ
  REPLACE DEPT_CODE WITH DEPCODE
  SELE A
  @16,3 SAY SPACE(40)
  ELSE
  SELE A
  LOOP
  ENDIF
ENDIF
SELE A
@ 16,3 SAY "SEX"
@ 16,18 GET Sex PICTURE "!"
@ 18,3 SAY "MARITAL STATUS"
@ 18,18 GET Marital_st PICTURE "@!"
@ 20,3 SAY "STATE OF ORIG."
@ 20,18 GET State PICTURE "@!"
@ 8,41 SAY "NATIONALITY"
@ 8,56 GET Nationalty PICTURE "@!"
@ 10,41 SAY "DATE OF BIRTH"
@ 10,56 GET D_o_birth
@ 12,41 SAY "EDUC. QUALIF."
@ 12,56 GET H_e_qual PICTURE "@!"
@ 14,41 SAY "DATE EMPLOYED"
@ 14,56 GET Date_emp
@ 16,41 SAY "DATE LAST PROM"
@ 16,56 GET Date_l_p
@ 18,41 SAY "SAL. GRADE LEV"
@ 18,56 GET Sal_g_l PICTURE "99"
READ
I=SPACE(1)
DO WHILE .NOT. I $ "SRA"
@ 22,18 SAY "[S]ave  [R]epeat  [A]bandon !" GET I PICT "!"
READ
ENDDO
IF I <> "R"
  EXIT
ENDIF
ENDDO
IF I $ "A"

```

```
DELETE
PACK
ENDIF
ENDDO
CLOSE DATABASE
RETURN
SELE A
USE PERSMAST
SELE B
USE DEPT
SELE C
USE OPTIONS
DEFIN WIND PERSWIN FROM 10,40 TO 20,70 doubl
@22,38 say "Select = Highlight and press [Esc] key."
ACTIVATE WIND PERSWIN
BROW NOINIT NOAPPEND NODELETE NOEDIT FIELDS OPTIONS
DEACT WIND PERSWIN
@22,38 SAY SPACE(50)
CD=0
DES=SPACE(15)
CD=CODE
DES=OPTIONS
*-- Format Page: 1
SELE A
DO WHILE .T.
CLEAR
MNO=0
@ 1,1 TO 21,75 DOUBLE
@ 2,24 SAY "BENUE CEMENT COMPANY PLC"
@ 3,18 SAY "PERSONNEL INFORMATION SYSTEM CONTROL"
@ 5,27 SAY "UPDATING STAFF RECORDS      [0]=EXIT"
@ 7,2 TO 7,74
SET COLOR TO GR+/B
@6,24 SAY "CURRENT OPERATION := "+DES
SET COLOR TO W+/B
@ 8,3 SAY "STAFF NO"
@ 8,18 GET MNO PICT "99999"
READ
IF MNO=0
  EXIT
ENDIF
LOCATE FOR Staff_no = MNO
IF EOF()
  @21,18 SAY ""
  WAIT + "          INVALID NUMBER !  PRESS ANY KEY..."
```

```
@22,18 SAY SPACE(50)
LOOP
ENDIF
@ 10,3 SAY "FULL NAME"
@ 10,18 GET Name PICTURE "@!"
@ 12,3 SAY "JOB TITLE"
@ 12,18 GET Job_title PICTURE "@!"
@ 14,3 SAY "DEPT. CODE"
@ 14,18 GET Dept_code PICTURE "99"
READ
DEPCODE=0
DEPCODE=DEPT_CODE
SELE B
LOCATE FOR DEPT_CODE=DEPCODE
IF EOF()
  SELE A
  @21,18 SAY ""
  WAIT +"          INVALID DEPARTMENT CODE... PRESS ANY KEY."
  @22,18 SAY SPACE(50)
  LOOP
ENDIF
SELE A
@ 16,3 SAY "SEX"
@ 16,18 GET Sex PICTURE "!"
@ 18,3 SAY "MARITAL STATUS"
@ 18,18 GET Marital_st PICTURE "@!"
@ 20,3 SAY "STATE OF ORIG."
@ 20,18 GET State PICTURE "@!"
@ 8,41 SAY "NATIONALITY"
@ 8,56 GET Nationalty PICTURE "@!"
@ 10,41 SAY "DATE OF BIRTH"
@ 10,56 GET D_o_birth
@ 12,41 SAY "EDUC. QUALIF."
@ 12,56 GET H_e_qual PICTURE "@!"
@ 14,41 SAY "DATE EMPLOYED"
@ 14,56 GET Date_emp
@ 16,41 SAY "DATE LAST PROM"
@ 16,56 GET Date_l_p
@ 18,41 SAY "SAL. GRADE LEV"
@ 18,56 GET Sal_g_l PICTURE "99"
READ
IF CD=1
  REPL PROMOTN WITH PROMOTN+1
ENDIF
IF CD=2
```

```
    REPL TRANSF WITH TRANSF+1
ENDIF
IF CD=3
    REPL TRAINING WITH TRAINING+1
ENDIF
IF CD=4
    REPL QUERY WITH QUERY+1
ENDIF
IF CD=5
    REPL LEAVE WITH LEAVE+1
ENDIF
IF CD=6
    REPL TERMINATN WITH TERMINATN+1
ENDIF
IF CD=7
    REPL RESIGNATN WITH RESIGNATN+1
ENDIF
IF CD=8
    REPL DEMOTN WITH DEMOTN+1
ENDIF
IF CD=9
    REPL SAL_ADJ WITH SAL_ADJ+1
ENDIF
@ 21,18 SAY ""
WAIT+      Editing completed... Press any key."
@22,18 SAY SPACE(50)
ENDDO
CLOSE DATABASE
RETURN
USE PERSMAST
*-- Format Page: 1
DO WHILE .T.
CLEAR
MNO=0
@ 1,1 TO 21,75 DOUBLE
@ 2,24 SAY "BENUE CEMENT COMPANY PLC"
@ 3,18 SAY "PERSONNEL INFORMATION SYSTEM CONTROL"
@ 5,27 SAY "STAFF DATA DELETING           [0]=EXIT"
@ 6,2 TO 6,74
@ 8,3 SAY "STAFF NO"
@ 8,18 GET MNO PICT "99999"
READ
IF MNO=0
    EXIT
ENDIF
```



```
LOCATE FOR Staff_no = MNO
IF EOF()
  @21,18 SAY ""
  WAIT + "          INVALID NUMBER !  PRESS ANY KEY..."
  @22,18 SAY SPACE(50)
  LOOP
ENDIF
@ 10,3 SAY "FULL NAME"
@ 10,18 GET Name PICTURE "@!"
@ 12,3 SAY "JOB TITLE"
@ 12,18 GET Job_title PICTURE "@!"
@ 14,3 SAY "DEPT. CODE"
@ 14,18 GET Dept_code PICTURE "99"
@ 16,3 SAY "SEX"
@ 16,18 GET Sex PICTURE "!"
@ 18,3 SAY "MARITAL STATUS"
@ 18,18 GET Marital_st PICTURE "@!"
@ 20,3 SAY "STATE OF ORIG."
@ 20,18 GET State PICTURE "@!"
@ 8,41 SAY "NATIONALITY"
@ 8,56 GET Nationalty PICTURE "@!"
@ 10,41 SAY "DATE OF BIRTH"
@ 10,56 GET D_o_birth
@ 12,41 SAY "EDUC. QUALIF."
@ 12,56 GET H_e_qual PICTURE "@!"
@ 14,41 SAY "DATE EMPLOYED"
@ 14,56 GET Date_emp
@ 16,41 SAY "DATE LAST PROM"
@ 16,56 GET Date_l_p
@ 18,41 SAY "SAL. GRADE LEV"
@ 18,56 GET Sal_g_1 PICTURE "99"
CLEAR GETS
I=SPACE(1)
DO WHILE I <> "DA"
  @ 22,18 SAY "[D]elete  [A]bandon ! " GET I PICT "!"
  READ
ENDDO
IF I $ "D"
  DELETE
  PACK
ENDIF
ENDDO
CLOSE DATABASE
RETURN
```

```
DEFIN WIND PERSWIN FROM 7,5 TO 21,75
@22,15 say "Use Up & Down OR Right & Left arrow keys, [Esc]=exit."
ACTIVATE WIND PERSWIN
BROW NOINIT NOAPPEND NODELETE NOEDIT
DEACT WIND PERSWIN
@22,5 SAY SPACE(60)
CLOSE ALL
RETURN
USE OPTIONS
DEFIN WIND PERSWIN FROM 10,40 TO 20,70 doubl
@22,38 say "Select = Highlight and press [Esc] key."
ACTIVATE WIND PERSWIN
BROW NOINIT NOAPPEND NODELETE NOEDIT FIELDS OPTIONS
DEACT WIND PERSWIN
@22,38 SAY SPACE(50)
@22,20 SAY "PREPARING... PLEASE WAIT !"
CD=0
DES=SPACE(15)
CD=CODE
DES=OPTIONS
USE PERSMAST
IF CD=1
    SET FILT TO PROMOTN > 0
ENDIF
IF CD=2
    SET FILT TO TRANSF > 0
ENDIF
IF CD=3
    SET FILT TO TRAINING > 0
ENDIF
IF CD=4
    SET FILT TO QUERY > 0
ENDIF
IF CD=5
    SET FILT TO LEAVE > 0
ENDIF
IF CD=6
    SET FILT TO TERMINATN > 0
ENDIF
IF CD=7
    SET FILT TO RESIGNATN > 0
ENDIF
IF CD=8
    SET FILT TO DEMOTN > 0
ENDIF
```

```
IF CD=9
  SET FILT TO SAL_ADJ > 0
ENDIF
SORT ON DEPT_CODE TO TEMP
SELE A
USE TEMP
SELE B
USE DEPT
STORE 0 TO P,R,SN,SFNO
H1="  BENUE CEMENT COMPANY PLC"
H2="PERSONNEL INFORMATION CONTROL SYSTEM"
R=60
SN=1
DEPNM=SPACE(15)
DEPCD=0
@22,20 SAY "PRINTING REPORT....."

SELE A
IF EOF()
  @21,20 SAY ""
  WAIT+      NO RECORDS FOUND ! PRESS ANY KEY..."
  CLOSE ALL
  ERASE TEMP.DBF
  RETURN
ENDIF
SET DEVICE TO PRINT
DO WHILE .NOT. EOF()
IF R>23
  P=P+1
  @1,20 SAY H1
  @2,20 SAY H2
  @3,27 SAY RTRIM(DES)+" REPORT"
  @4,1 SAY REPL("-",79)
  @5,1 SAY "S/NO"
  @5,10 SAY "STAFF NO"
  @5,25 SAY "N A M E"
  @5,45 SAY "JOB TITLE"
  @5,62 SAY "DEPARTMENT"
  @5,75 SAY "G/LEV"
  @6,1 SAY REPL("-",79)
  R=7
ENDIF
  @R,1 SAY LTRIM(STR(SN))
  @R,10 SAY STAFF_NO
  @R,20 SAY NAME
```

```
@R,45 SAY JOB_TITLE
DEPCD=DEPT_CODE
SELE B
LOCATE FOR DEPT_CODE = DEPCD
@R,62 SAY DEPT_NAME
SELE A
@R,77 SAY RTRIM(SAL_G_L)
R=R+1
SN=SN+1
SKIP
ENDDO
@R,1 SAY REPL("-",79)
EJECT
SET DEVICE TO SCREEN
CLOSE DATABASE
ERASE TEMP.DBF
CLEAR
RETURN
```

```
STATENM=SPACE(15)
USE PERMAST
@22,20 SAY "ENTER STATE " GET STATENM PICT "@!"
READ
LOCATE FOR STATE = STATENM
IF EOF()
    WAIT+"          STATE NOT FOUND ! PRESS ANY KEY..."
    RETURN
ENDIF
GO TOP
    SET FILT TO STATE = STATENM
STORE 0 TO P,R,SN,SFNO
H1="    BENUCE CEMENT COMPANY PLC"
H2="PERSONNEL INFORMATION CONTROL SYSTEM"
R=60
SN=1
@22,20 SAY "PRINTING REPORT....."
SET DEVICE TO PRINT
SELE A
DO WHILE .NOT. EOF()
IF R>23
    P=P+1
    @1,20 SAY H1
    @2,20 SAY H2
    @3,1 SAY "STATE : "+STATENM
```

```
@4,1 SAY REPL("-",79)
@5,1 SAY "S/NO"
@5,7 SAY "STAFF NO"
@5,20 SAY "N A M E"
@5,40 SAY "JOB TITLE"
@5,57 SAY "SAL."
@5,62 SAY "DATE"
@5,71 SAY "DATE LAST"
@6,57 SAY "G.L."
@6,62 SAY "EMPLOYED"
@6,71 SAY "PROMOTED"
@7,1 SAY REPL("-",79)
R=8
ENDIF
  @R,1 SAY LTRIM(STR(SN))
  @R,08 SAY STAFF_NO
  @R,15 SAY NAME
  @R,40 SAY JOB_TITLE
  @R,57 SAY SAL_G_L
  @R,62 SAY DATE_EMP
  @R,71 SAY DATE_L_P
  R=R+1
  SN=SN+1
  SKIP
ENDDO
@R,1 SAY REPL("-",79)
EJECT
SET DEVICE TO SCREEN
CLOSE DATABASE
CLEAR
RETURN
```

**A MAIN MENU**

<p><b>Benue Cement Company Plc.</b> <b>Personnel Information System Control</b></p> <p>Main Menu</p>
<p>Master File Maintenance Up-Date File Maintenance Enquiries Report Exit</p>

**B MASTER FILE MAINTENANCE MENU**

<p><b>Benue Cement Company Plc.</b> <b>Personnel Information System Control</b></p> <p>File Maintenance Menu</p>
<p>Add New Staff Record Edit Staff Record Delete Staff Record Exit</p>

## C ENQUIRY MENU

<p style="text-align: center;"><b>Benue Cement Company Plc.</b> <b>Personnel Information System Control</b></p> <p style="text-align: center;">Enquiries Menu</p>
<p>[1] By <b>D</b>epartment</p> <p>[2] By State</p> <p>[3] By Salary <b>G</b>rade Level</p> <p>[4] <b>E</b>xit</p>

<p style="text-align: center;"><b>Benue Cement Company Plc.</b> <b>Personnel Information System Control</b></p> <p style="text-align: center;">Report Menu</p>
<p>Department Staff List</p> <p>State wise Staff List</p> <p>Up-date Report</p> <p>Exit</p>

## **FILE MAINTENANCE**

Press 1 to select this option, this takes it to the following menu

<b>Benue Cement Company Plc.</b>	
<b>Personnel Information System Control</b>	
File Maintenance Menu	
[1]	Add New Staff Record
[2]	Up-Date Staff Record
[3]	Delete Staff Record
[4]	Exit
Select Choice [ 1, 2, 3, 4 ]	

### **ADDING NEW STAFF RECORD**

From file maintenance menu, press 1 then enter New Staff number. If the number entered already exists, it will reject - cannot be used for another person.

When department code is applied and it is not already on the list, a message is displayed thus;

“Dept code not found, create a new one? (Y/N)”

At this point, press Y to create a new Dept or press N. to enter another code.

Once entries are completed, press S to save, R to repeat that entry or A to cancel or abandon that entry.

### **UP-DATING STAFF RECORD**

Press 2 from the file maintenance menu. A window will be displayed containing the various options from which one can select the desired option by pressing [ESC] key once the option is highlighted.

Enter the staff number and effect the appropriate changes once the staff data is displayed.



## **DELETING STAFF RECORD**

Select 3 from the file maintenance menu and enter the staff number. If the number is found it is displayed, press D to delete or abandon.

## **MAKING ENQUIRY**

To make enquiry into personnel records, press 2 from main menu. Then select 1, for general staff records, 2 for departmental enquiry, 3 for enquiry about state, 4 for salary grade levels and 5 to return to main menu.

For option 2 - By department, department code must be supplied. For option 3 - State, the state must be supplied too. In the case of salary grade levels, the lower and upper limits must be supplied for successful operation.

## **PRINTING REPORTS**

From the main menu press 3 and the following report menu appears.

### **Benue Cement Company Plc.**

### **Personnel Information System Control**

#### Report Menu

- [1] Department Staff List
- [2] State wise Staff List
- [3] Up-date Report
- [4] Exit

Select Choice [ 1, 2, 3, 4 ]

For each of these reports, press the corresponding number and Y to start printing or [ to abandon printing. Ensure that printer is ready.