

1



System

Auditing

D. O. MUKORO

Copyright © Mukoro 2012

All rights reserved. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system or translated into any language or computer language, in any form or by any means, electronic, mechanical, magnetic, chemical, thermal, manual or otherwise, without prior consent in writing of the copyright owner.

Applications for the copyright owner's permission to reproduce any part of this publication should be addressed to the publisher.

This book is sold subject to the condition that it shall not by way of trade, or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in writing, in any form of binding or cover other than in which it is published and without a similar condition, including this condition, being imposed on the subsequent purchaser.

Published & Printed by
H-Link Excel
141, Railway Line, Odi-Olowo,
Mushin, Lagos State
Tel: 0802-329-0457

ISBN: 978-978-929-878-5

PREFACE

System Auditing has the potential to be an area of study for Professional Accountants. For it combines the most interesting area of Financial Accounting (Accounts presentation and review) within a framework of inquiry, auditing and investigation and it involves a wide range of knowledge and sophisticated techniques.

Questions on Computer (systems auditing) in one form or the other are systematically creeping into the professional /academic examination. The trend will continue until the expertise required to deal with such questions corresponds with the demands made upon Auditors (Accountants) in their practical dealings with computers, yet it is often regarded as the most boring subject of all (Auditing). I certainly found it so when I was studying, although in practice this was far from the case. The case is different for younger generation because of the ICT age that ushered in a world in which computers are a fact of life, a fact which has fundamentally affected our social, commercial and political environment, both subtly and obviously. When I came to teach the subject - System Auditing, both in the professional environment and subsequently in public and private sector (Universities), I quickly discovered that it was perhaps the most difficult of all subjects in which to maintain students' interest. For there is such a vast body of knowledge that must be learned and understood.

And, Auditors cannot practice their knowledge with written examples in the same way as they do in Accounting. But I found, after much trial and errors in the classroom that interest could be maintained by logical presentation and by the use of simple case studies and analysis, this being so essential, both for maintenance of interest and for understanding. Without it, the subject (System Auditing) degenerates into huge mass of unrelated facts with the result that learning becomes a chore to be performed for the sole purpose of passing an examination.

The old generation text books have been largely responsible for perpetuation of (or perhaps even perpetrating) this instruction approach, and this combined with signed style and tortuous phraseology, has done much harm to students of System Auditing. So I have tried to make this book as readable as possible.

“System Auditing” is previously a book for students, and the structure is such that it is suitable for all levels up to final professional examinations. But it is particularly aimed at the students commencing their study of System Auditing, to take them through, comfortably I hope, to their finals. Those in the universities are not left out.

The body of knowledge incorporated here is not original. No book on System Auditing can claim that. For this knowledge is based on years of research and gradual development in the profession in both large and small firms alike. In particular, I am grateful to Emile Woolf and Associates. I am also indebted to the following for permission to reproduce Copyright materials: (1) Institute of Data Processing Management,

(2) Accountancy and, (3) the author of article "The Best Of Emile Woolf, second edition (for an extract) (4) materials from Auditing Standards and Institute Statement on Auditing and Accounting.

My gratitude also goes to my current H . O. D Dr. (Mrs) A. Umoren who went through the book and did all the corrections and also recommended that the book will also be useful in Accounting lab: to her I said thanks ma.

Dick O. Mukoro
Covenant University

TABLE OF CONTENTS

Dedication	iii
Preface	iv
Introduction	14
<i>Chapter One</i>	
Auditing Information Processing Systems	23
Learning Objective	
Introduction	
Auditing around the Computer	
Auditing through the Computer	
Systems Control	
<i>Chapter Two</i>	
Internal Controls Within The Computerized Environment	36
Learning Objective	
Introduction	
Features of System Auditing and Related Internal Controls	
Audit objectives over Internal Systems.	
Types of Internal Control Systems	
General or Organizational Controls	
Application of Procedural Controls	
General and Organizational Controls	
Administrative Controls	
System Development Controls	
Application or Procedural Controls	
Input Controls	

Processing Controls
Output Controls
Master file Controls
Disaster Control and Prevention

Chapter Three

Audit Role During Systems Development

83

Learning Objective

Introduction

System Development Study Team

System Development Life Cycle

The Standard Systems Development Life Cycle

The Role of an Auditor During Audit Systems

Development Cycle

Systems Planning

Standard System Development Cycle (SSDC)

The Feasibility Phase

The Activities within the Feasibility Phase

Feasibility Study Report

Systems Design Phase

Chapter Four

Computer Assisted Auditing Techniques: for Data Verification, Monitoring and Selection

112

Learning Objective

Introduction

Data Verification, Monitoring and Selection

Sources of Computer Audit Programs

Information Retrieval Software

Use of Computer Audit Programs

Preparation of Computer Audit Software
Examination of the Actual Computer Program

Chapter Five

Case Study 128

Learning Objective

Introduction

The Case

Mode of Batch Processing Audit Controls

Chapter Six

The Audit Of A Computer Bureau 136

Learning Objective

Introduction

Definition of a Computer Bureau

Services Rendered

Internal Control Problems

Chapter Seven

The Audit Of On-line/real-time Systems 142

Learning Objective

Introduction

Recommended Controls for On-Line Systems Controls

Real-Time Systems

The Internal Auditor as Diagnostician in a Systems

Auditing Environment

Chapter Eight	
System Auditing	155
Learning Objective	
Introduction	
This Section Envisage the following Situations	
The Suggested Plan.	
Data Processing Standard	
The Future	
Relationship with External Auditors	
Chapter Nine	
IT Based Budgeting System	161
Learning Objective	
Introduction	
Basic Definitions	
Classification of Business Systems	
Approaching the First-Time Computer Audit	
Computer cannot think	
Chapter Ten	
Data Processing Standards	171
Learning Objective	
Chapter Eleven	
System and Control Environment	191
Learning Objective	
Introduction	
Control Environment - Definition	
Reasons for Assessing the Control Environment	
Risk of Management Fraud	
Chapter Twelve	
Accounting System	207
Learning Objective	

Introduction
Accounting Systems
Introduction
Definition
Manual versus Programmed Accounting Systems
Overview of Systems diagrams

Chapter Thirteen

Computer Controls 231

Learning Objective
Computer Controls Introduction
Control Risk Assessment

Chapter Fourteen

Data Base Concepts 259

Learning Objective
Introduction
What is Data?
What is Database?
Database Management System (DBMS)
 Features of a Database Management System
 People who work with Database
Historical Development of database
 Evolution of Database
Organization and Storage of Data in Computer
Traditional Data Files Management and Processing
Benefits of Data base Approach over flat files
Advantages of Database Management System (DBMS)

Chapter Fifteen

Data Base Models 276

Learning Objective

Data Models
Database Architecture
DBMS Languages
Examples of Database Models
 Hierarchical Database Model
 Network Database Model
 Relational Mode
 Other Database Models

Chapter Sixteen

Relation Database Design 293

Learning Objective
Introduction to Database Modeling concept
Database Planning
Entity - Relationship Model (E.R. Model)
Normalizing Data
 Functional Dependencies
 Primary Keys
 Un-Normalized data
 First Normal Form
 Second Normal Form
 Third Normal Form
 Normal Forms

Chapter Seventeen

Data Base Implementation Using Microsoft Access (RDBMS) 306

Learning Objective
The E - R Model
Entity Relationship Diagram
 Consulting E - R Diagram

Database Implementation	
Introduction to MS-Access 2000	
Creating and working with tables	
Managing data in a table	
Creating and using forms	
<i>Chapter Eighteen</i>	
Database Queries	336
Learning Objective	
MS-Access Queries	
Structured Query Language	
Creating and using reports	
<i>Chapter Nineteen</i>	
Other Areas Of Database Application	361
Learning Objective	
Data Warehousing	
Data Mining	
On-Line Analytical Processing	
Knowledge Management System	
<i>Further Reading</i>	
System Approach	364
Bibliography	373
Appendix A	
Glossary of Terms	
Index	

INTRODUCTION

System Analysis puts Internal Auditing into the System

Many books have been written on system analysis and auditing. This book deals with some basics which cause auditors to be viewed as part of the system when they develop conclusions and make recommendations based on system analysis technique. Most people agree on four basic points.

1. Auditing in the U.S. General Accounting Office (GAO) and other U.S. agencies usually includes traditional fiscal and compliance audits, economy and efficiency audits, and program results audits. Audits of results focus on program objectives and how well they are being achieved.
2. A system is an interacting, coordinated set of parts created to achieve an objective. Several specific systems are arranged to show the links between distinct parts. Defining boundaries between one government system and another is often difficult. Practical programs, subsystems which intertwine and interact, must be separated for evaluation.
3. Analyzing a system requires separating and describing data. There are techniques for doing this. Analysis relates descriptions to data and describes causal relationships among parts. In a causal relationship, a change in one part causes a change in another. There are many ways to detect the apparent strength or closeness of quantitative relationships. Informed judgment, which comes from experience in working with the system, is required to convince program managers and other decision makers that cause and effect is involved in an apparent relationship.

4. Developing a model of the system is fundamental to systems analysis. A useful model defines the system's parts in terms of causal relationships interconnecting the parts. When these relationships can be expressed quantitatively, they can be put through a computer. The result is a computerized simulation model. Such a model can be adjusted to simulate what might happen in the real system if the recommended adjustments were made.

If the model is a good representation of the real system, it can help decision makers anticipate the effects of their decisions. Obviously, if the model is poor, a decision based on the model may be worse than one made on some other basis. Experienced decision makers know this danger, and many do not spend much time listening to analysts. One way to improve the credibility of analysts is to make model verification and validation a priority so that confidence in analysts will improve.

For a number of reasons, particularly because of the need for independence, auditors have seen themselves as being outside the systems that they audit. For example, the Budget and Accounting Act of 1921, which established the U.S. General Accounting Office, placed the GAO under the direction of the comptroller general who was independent of the executive branch. It directed the comptroller general to investigate all matters relating to the receipt, disbursement, and application of public funds and to report regularly on such matters. In a majority of states, either a statute or the constitution established the office of state auditor or auditor general as an independent organization.

Many auditors coming from this tradition have sensed, correctly that they might lose some of their independence by getting involved in recommendations about how to better

Introduction

achieve the objectives of programs. Why? One reason is that in order to review program effectiveness, auditors had to follow their standards and practices to assure that the audit staff had the skills necessary for the work. This required that audit staffs have personal skilled in systems analysis and program evaluation. But many auditors came from disciplines with an opposite tradition.

Experienced systems analysts have not felt successful unless they were involved in the decision making process and their analysis directly impacted on the choice of alternatives being considered by the decision makers.

Faced with this dilemma, auditors have learned to make good use of the applied techniques used in systems analysis. However, they generally have stopped short of the complete analysis and ranking of alternatives which most characterizes systems analysis and related fields.

In the GAO, this has led to the effective use of highly skilled technical assistance staffs of experts in such fields as systems analysis, statistical analysis, actuarial science, automatic data processing, and sample survey design and analysis. The officer has learned to make effective use of these staff members from the planning of reviews to the final processing of the report. The importance of getting these people involved at the planning stage should be emphasized.

Because these staff members' time is scheduled on a monthly basis, applying only those days needed for each job, individual staff members can assist with a number of jobs simultaneously. It is not possible to describe the applications of these skills in detail here. Case histories of people involved in all phases of review can be found in:

- a. Better overall planning needed to improve the standard of living of white mountain apaches of Arizona, FGMSD-75-47, August 12, 1975. Various techniques found in systems analysis and evaluation were used to study and explain relationships among health, housing, education, employment, income, new business and industry, and the cultural environment.
- b. Student attrition at the five Federal service academies, FPCD76-12, March 5, 1976. The evaluation of attrition made extensive use of survey research methods and an analysis of the data using mathematical statistics. All of the work was built on a student attrition model. This allowed studies of the interaction of student characteristics at entry with both academy and external environment in decisions to remain or resign before graduation.
- c. Effectiveness, benefits, and costs of federal safety standards for protection of passenger car occupants, CED 76-121, July 7, 1976. This report analyzes costs and estimated benefits of these standards. Information on more than 2,000,000 cars involved in accidents in North Carolina and New York was used to compare driver death and injury rates for various model cars of years. This report required extensive statistical analysis of large amounts of data.

The above reports illustrate the position of the auditor in developing conclusions and making recommendations after an analysis. Specific recommendations for change are generally based on one or more parts of the analysis which reveal particular problems and for which data was available to support a firm recommendation for improvement. However, even though these analyses might be more comprehensive and better supported than any available as yet in the affected agencies, the reports often stop short of recommending major new programs or major program changes.

Introduction

Instead, the analysis plus additional improved analysis, gives the auditor concrete evidence to improve agency decision making. Thus, the typical recommendation places the responsibility for using improved methods on the heads of agencies. Specific improvements which might be made with better methods are suggested.

Auditors also need to see feedback to decision makers as part of the system. Effectiveness of the feedback should be measured in terms of improved system effectiveness.

Perhaps an oversimplified analogy would help view agency decision making as an engine and the analysis and evaluation as a fuel source. Pollutants in the exhaust are the unwanted effects of decisions which should be fed back to the engine (decision makers) for correction. View auditing as a mobile diagnostic center which compares power output with design. It also shows what is out of tune, causing decision making to be less effective than it should be and causing excessive, unwanted effects. The diagnostic results should be available when there is time for corrective adjustments in the system.

This analogy goes further. Increasingly, diagnostic tests are being built into engines so that there is real-time feedback. This makes real-time adjustment possible and better-than-average effectiveness of the engine (system).

These generalities must be interpreted by auditors in each major type of government system. For example, auditing must be viewed as part of the system in reviewing effectiveness of the variety of experimental programs which exist in the Nigerian government. The essence of an experimental program should be the testing of a new idea. This requires collecting data to measure the effect of the experimental treatment, comparing it with what exists in similar situations without repeating the experiment. Program efficiency is not unimportant, but it is not as important as validity because less

public funds will be wasted on an experiment than on mistakes in new programs or modifications of programs that have been based on invalid experimental results.

Useful auditing of these experiments requires skill in understanding the experimental design. Lack of compliance with the rules of the experiment may cause invalid results. Other factors such as inadvertent bias in sample selection, however, may be at least as damaging and more difficult to compensate for in the analysis of results.

There is a general need in useful experiments to gather limited confidential and private data which would be considered excessive in a full-scale program. Auditors of these experiments are learning to balance accountability against the right to privacy. In this case, there are system constraints against normal audit practice to some degree.

There is a need for the appropriate weighting of fiscal integrity, management efficiency, and validity of results. These criteria are not easy to apply, particularly because the audit itself will have impacts the experiment which effect experimental responses. If these effects are uncontrolled and unmeasured, validity will be damaged. As stated before, the usefulness of the audit must be related directly to the effectiveness of the system. That requires auditing to be viewed as an independent component of the system being reviewed.

Summary

Auditors need to see their function as an independent component of systems. They should measure their own effectiveness in terms of improved effectiveness of the systems.

Introduction

Not many would question that work by auditors has an impact on the agency involved. However, to illustrate their value, examples of good systems analyses performed by auditors must be transferred to the agency's systems analysis and evaluation activities. If that is done, the improvements will be more directly involved in the decision making process and will help decisions makers make the most effective choice.

The internal audit function of an agency can also help set the needed example. If the internal audit staff does not contain the necessary skills, it can use reviews by the GAO as guides to judge the effectiveness of the agency's systems analysis and evaluation activities.

The point is that we need to view correctly the impact of an essentially independent audit activity, an integral systems analysis, and an evaluation activity.

A Review of an Employee Information System

The county of San Diego processes its employee information for more than 10,000 employees through a large complex computer system. This system provides for payroll and leave accounting data, a broad range of personnel data, the printing of payroll warrants, and the passing of payroll cost data to the county's overall accounting and resources management system. We are in the process of developing a new position-control system as part of this larger system

Audit Significance of the System

This system is important from an audit perspective for a number of reasons.

1. The financial magnitude is quite substantial. About one-half of the county's expenditures are related to payroll.

2. The mechanics of such a large system make it very complex because of the number of people inputting the system, the variety of input data, the number of alternatives, and the complexity of system logic due to numerous control considerations.
3. The sensitivity of errors is an important factor. Few things in life upset employees more than an error in their paycheck.

Primary Audit Objectives

Broadly stated, our audit objectives are to determine that this system's controls are sufficient and to assist in upgrading the system through recommendations.

On the broadest level, the first decision that must be made is how to approach the system review. Do you analyze the total system or only a portion?

We survey the total system and identify those areas we feel are significant from an audit perspective. We then concentrate our efforts in those areas only. We do this annually as a functional examination on a county-wide basis.

As the survey progresses, we decide how and to what extent to integrate the work of our system audit team with that of the field audit team. The latter has overall responsibility for the audit.

This approach is employed because of the way we are organized. We have separate units of computer auditors and field auditors. This is due, in part, to the fact that we perceive a need for some of our staff to have specialized, above-average knowledge of computer auditing and because there is a

Introduction

continuous, current, and on-going nature to the review of computer systems as opposed to the more traditional post audit. There are some major considerations or approaches we use in this system. Since it is a large computer system, the bulk of the systems review falls to the computer audit unit.

To the extent that we are able, we try to build audit checks and testing mechanisms into the system during development. We work with system analysts and users to identify what controls are necessary during design and implementation.

To assist in reviewing and controlling the system after development, we have, with the help of our Data Processing Department, developed a system to identify all program changes made to this and other systems' production programs. Changes to predetermined, sensitive, and critical programs are reviewed daily.

Our approach to some tests depends on the nature of what is under analysis. Some procedures and programs, due to their complexity, lend themselves to simulation techniques.