AN EMPIRICAL INVESTIGATION OF THE FACTORS INFLUENCING THE ADOPTION OF COMPUTER BASED AUDITING IN PUBLIC LIMITED LIABILITY COMPANIES IN NIGERIA

Olagunju-Adebayo
Department of Financial Studies
Redeemer's University, Mowe, Ogun State
Tel: +2348037076626
E-mail: olagunju66@yahoo.com

&

Olugbemga, Aborode Aderemi
Head, Value Audit and Strategy
Bank PHB, Crescent, Victoria Island, Lagos.

Abstract

The previous method of auditing used, known as the manual system of auditing has gone out of date as a result of the technological development. Overtime, the job of an auditor required more accuracy, efficiency, professionalism and quality which were not possible with the use of the manual system of auditing. As a result of the rapid growth and complexity of business organizations in recent times, the traditional method of Auditing is no longer capable of adequately performing its function. This has given rise to the adoption of computer based auditing which is capable of adequately performing the function of an auditor. The adoption of computer based auditing has brought about saving of time in the carrying out of audit assignment. The study focused on factors influencing the adoption of computer based auditing in public limited liability companies in Nigeria. A sample size of 82 was drawn from three selected audit firms in Lagos. The major instrument used for data collection is the questionnaire and the data analysis technique used is the chi-square. The following findings emerged from the study: the adoption of computer based auditing has increased the level of accuracy of the auditor, there is a relationship between easy retrieval of data and the adoption of computer based Auditing; there is a relationship between efficiency and effectiveness of an auditor as the adoption of computer based Auditing has brought about an increase in the desired result of audit assignment. The paper concluded that recent development in technology has left no aspect of the accounting profession untouched and the auditing field is no exception, the impact of computer based auditing on the auditing profession cannot be over emphasized, it has made the job of the auditor easier, faster and even gone further to reduce the risk in the job of the auditor by guaranteeing a greater level of accuracy, it has brought about increase in the efficiency and effectiveness of an auditor and has helped the auditor in meeting deadlines for audit assignments by saving time. Finally,

the study recommends: that, Audit firms should ensure they have audit software in use for those who have not started using any, in order to enhance the job of the auditor; Adequate training should be given to the auditor regularly on the use of the audit software, audit firms should ensure that they have adequate and current information on current issues such as technological development,

Key-Words: Auditing, Computer based auditing, Information technology.

Introduction

Accounting, as a discipline, is a very broad one with so many areas of specialization, one of which is Auditing. Overtime, accounting has been seen to be a very dynamic discipline. So many changes have occurred in the accounting profession over the years and changes will still occur in the nearest future. However, these changes have not left any area or branch of accounting untouched as they have affected every area of the discipline.

The history of traditional auditing can be traced back many hundreds of years. In contrast, computer audit is a relatively recent development. The use of Information Technology (IT) in business is also a relatively recent development. The father of modern day computing is generally regarded as being Charles Babbage, who produced his Difference Calculator in 1833. It was not until the outbreak of the Second World War and the widespread development of valve technology, that the first generation computers were used. Even then, it was many years later that they became commonplace in business. Usage of technology in auditing has evolved since 1950øs and the density is growing exponentially.

The introduction of computer technology into accounting systems changed the way data was stored, retrieved and controlled. It is believed that the first use of a computerized accounting system was at General Electric in 1954. During the time period of 1954 to the mid-1960s, the auditing profession was still auditing around the computer. At this time only mainframe computers were used and few people had the skills and abilities to program computers. This began to change in the mid-1960s with the introduction of new, smaller and less expensive machines. This increased the use of computers in businesses and with it came the need for auditors to become familiar with EDP concepts in business. Along with the increase in computer use, came the rise of different types of accounting systems. The industry soon realized that they needed to develop their own software and the first of the generalized audit software (GAS) was developed in 1968. Auditing technology refers to any tools that can enhance the auditorøs capacity to perform an audit task. The most prominent type of audit technology being used is generalized audit (GAS) under the category of computer-assisted audit tools and techniques (CAATTs).

The role of the computer has expanded greatly in many types of businesses and throughout many areas of those businesses. The accounting profession has felt the expansion effects as well; particularly the audit function within accounting firms. Audit firms have begun to integrate the computer into many more areas than just the standard use of word processing for generating letters and reports. Computers are increasingly being used to guide the entire audit process from drafting the engagement letter to preparing the audit report. This means that many types of software packages are being used across a wider variety of applications and it is anticipated that this trend will continue.

One possible reason for this trend is that computers have become more feasible for all size firms, even small accounting firms, as computer prices are lower than they have ever been and since there is more off- the-shelf audit software available at an affordable cost. Additionally, software and hardware are now being designed and engineered for easy use by individuals with little or no computer experience or expertise. Another factor influencing the use of computers among accounting firms is the need for firms to remain competitive in the marketplace for both clients and personnel. As clients become more sophisticated and knowledgeable in the area of computer processing, they tend to seek accounting firms with computer expertise. In addition, new graduates of accounting schools have been trained in a computer environment and, therefore, tend to look for firms with an active commitment to computer technology.

A key feature of many organizations today is change. Although not necessarily the driver of change, Information Technology (IT) is invariably an intrinsic component and much of the change would not be possible without IT. IT has had a major impact on social, economic and political factors throughout the world. Not only has it led to the creation of new professions but it has also revolutionized others, such as office work, or, when combined with robotics, manufacturing industries. Auditing as an area of accounting has also been greatly affected by technological changes. These technological changes in Auditing have brought about improvement in the Audit practice field with the advent of computer systems and computer applications such as software. There is hardly any Audit work to be done now particularly in the 21st century that does not require the use of computer systems and software. If carefully observed, it would be seen that most Auditing firms especially in Nigeria have been thriving to ensure that they are not left out with this great technological advancement and innovation in the profession, Hence, ensuring that they also update themselves with the latest and current technological development.

The adoption of Computer Assisted Audit Techniques and Tools (CAATTs) has not only become a beneficial choice for a few far-sighted businesses, but has become a fundamental part of many audit methodologies. CAATTs are computer tools and techniques that an auditor (external or internal) uses as part of the audit procedures to process data of audit significance contained in an entity¢s information systems. Recent literature has shown that the types of CAATTs embraced by internal auditors are classified to include the following groups: electronic working papers, fraud detection, generalized audit software (GAS) for information retrieval and analysis, network security, continuous monitoring, audit reporting, database of audit history, computer based training, electronic commerce and internet security.

CAATTs, as it is commonly used, is the practice of analyzing large volumes of data looking for anomalies. A well designed CAATTs audit will not be a sample, but rather a complete review of all transactions. Using CAATTs the auditor will extract every transaction the business unit performed during the period reviewed. The auditor will then test that data to determine if there are any problems in the data.

More importantly, these developments changed the roles and approaches of auditing practices to converge with the rapid growth of computerization of most economic transactions. These changes have contributed to new level of expectations towards skill and quality of auditors from employers who now demand that the accounting and auditing professionals are equipped with skills in information systems.

Statement of the Problem

The previous method of auditing used, known as the manual system of auditing has gone out of date as a result of the technological development. Overtime, the job of an auditor required more accuracy, efficiency, professionalism and quality which were not possible with the use of the manual system of auditing. As a result of the rapid growth and complexity of business organizations in recent times, the traditional method of Auditing is no longer capable of adequately performing its function. This has given rise to the adoption of computer based auditing which is capable of adequately performing the function of an auditor. Before the adoption of computer based auditing, a lot of arguments and criticisms have been made against the efficacy of computer based auditing. The problem lies in the following assumptions:

- There is a relationship between easy retrieval of data and the adoption of computer based auditing;
- There is a relationship between efficiency and effectiveness of an auditor and the adoption of computer based auditing; and,
- The adoption of computer based auditing will lead to time saving in carrying out audit jobs.

As a result of the problems stated above, the researcher aims at undertaking a research study with a view to coming out with feasible solutions.

Objective of the Study

It has been discovered that one can hardly find any statutory audit job in public limited liability companies that does not involve the use of computer. As a result, the overall objective of this research is to study and evaluate the factors influencing the adoption of computer based auditing in public limited liability companies. Other objectives of this research work include:

- To investigate the effect of meeting deadline of audit jobs on adoption of computer-based auditing
- To establish the relationship between computer based auditing and easy retrieval of data in audit jobs
- To establish the relationship between computer based auditing and efficiency and effectiveness of an auditor

Research Questions

Answers to the following questions will be sought as a basis for testing the research hypothesis:

- What are the factors influencing the adoption of computer based Auditing?
- To what extent does the adoption of computer based Auditing affect a statutory Audit job?
- To what extent does computer based auditing affect meeting deadline of audit jobs?

Research Hypotheses
Hypothesis 1:

H$_0$: There is no significant effect of easy retrieval of data and the adoption of computer based Auditing

Hypothesis 2:

H$_0$: There is no relationship between efficiency and effectiveness of an auditor and the adoption of computer based Auditing

Impact of Information Technology (IT) on Auditing

According to Gallegos, Seft, Maxson and Gonzales (2004), technology has impacted the auditing profession in terms of how audits are performed and the knowledge required to draw up conclusion regarding operational or system effectiveness, efficiency and integrity. Initially, the impact was focused on dealing with a changed processing environment. As the need for Auditors with specialized technology skills grew, so did the information technology auditing profession. As the computer is changing the world, business operations are also changing sometimes very rapidly because of the fast continuing improvement of technology.

Reasons for Start up of IT Audit

Gallegos et al (2004) view the following as the reasons for the start up of information technology in auditing.

- **Advancement of information technology** Auditing is one of the fields that have been touched by information technology and this has brought about advancement in the sense that many companies are beginning to see the need and advantages in the use of information technology, and saw the need to invest in both hardware and software for audit purposes.

- **Personal computers became accessible for both office as well as home use** In recent times, the cost of computer systems have so much reduced and the advantages have outweighed the disadvantages and individuals, small and large organizations can afford both desktops and laptops and this has helped to reduce the volume of paper in both homes and offices.

- **Highly questionable reliance on control** Controls are used to prevent, detect or correct unlawful events which can arise if unauthorized, inaccurate, redundant, ineffective or inefficient, incomplete inputs enter the system.

- **Large amount of data require advanced software programs known as CAAT (Computer Assisted Audit Technique) to Audit them** As a result of the large volume of data, the complexity in the information technology environment, CAAT, plays a very vital role in performance of audit work to evaluate applications and test compliance with procedures. CAAT can be used to overcome loss of audit trail, reduce costs or increase the efficiency of the audit.

Computer Assisted Audit Techniques

Computer assisted audit techniques are the methods of using computer software or test packs either along with the processing computer or using a completely different computer. As organizations depend on information technology to assist their business process, information technology changes the way the organization operate and increase operational efficiency. These changes are increasing demand for assurance for computer systems, information security, and control over the privacy of data and quality assurance practices. In order to meet these demands, auditors may use computer assisted audit

techniques to increase the efficiency and effectiveness of audit. It is also used mainly in an electronic data processing system. The program may be used to search the contents of a computer file or to use the contents of the file to perform some arithmetical or logical calculations. These calculations are then used to compare the results obtained from the computer program. It was originally designed for use in system based approach that tested controls using complicated embedded techniques. Computer assisted audit techniques include a wide variety of personal computer software tools which can be used to access and analyze digital data. Auditors can use computer assisted audit techniques to obtain sufficient, relevant and useful evidence as per audit objective (Rateq 2004). It can also support audit findings and conclusion by facilitating analysis and interpretation of audit evidence. Computer assisted audit techniques support a flexible interactive database approach to verify data accuracy, completeness, integrity, reasonableness and or timeliness.

Computer assisted audit techniques can be used in performing the various audit procedures such as test of transaction and balances, analytical procedure, sites of general controls, sampling program to extract data for audit testing, testing of application control, re-performing calculation performed by the entityøs accounting system (Rateq 2004). Computer assisted audit techniques are most useful for sorting or stratifying year ended balances in order to select a required sample which may be by size or any other unique characteristics. Computer assisted audit techniques when used through out audit process will help reduce a more complete and accurate reports. It also allows auditors to perform 100% testing (Ramamoorti and Weidenmeir 2006). The use of computer assisted audit techniques includes the following; electronic work paper, information retrieval and analysis, fraud detection, database of audit history and time tracking to mention a few. (Le Grand 2001). It may be designed in ó house or purchased. In which ever case, it is important that the program is held secure against client interference.

Types of Computer Assisted Audit Techniques
i. **Generalized Audit Software** These are programs designed to perform data processing functions such as reading data, selecting and analyzing information, performing calculation, creating data files and reports. It could also be used to perform tests on computer files and databases. It could also help examine the effectiveness of control and help perform 100% test on audit population. It is used for identifying financial statement errors.

ii. **Custom Audit Software: these are referred to as purpose written programs** The auditor, the client or an outsider programmer specially develops them. They are used for specific audit task and necessary when the auditorøs generalized audit software is not compatible with the clientøs computer system or when the auditor wants to conduct some test not possible with generalized audit software. They have a high developmental cost.

iii. **Test Data** It uses a set of hypothetical transaction to audit the programmed checks and programs. It is used to test application control. It is also to test data validation controls and error detection processing logic control

iv.   **Parallel Simulation** It attempts to simulate or duplicate the firmøs actual processing results. The auditor must consult a computer program for him to use it.

v.   **Embedded Audit Modules** It is a programmed module that is inserted into an application program. Its purpose is to monitor and collect data based on transaction.

vi.   **Integrated Test Facility** It enables test data to be continually evaluated when information is processed by online systems.

Computer Assisted Audit Techniques in Auditing Process

The core of audit process is analyzing controls to determine if they are adequate or need improvement. According to Osita (2008), computer assisted audit techniques are the methods of using computer software either along with the processing computer or using a completely different computer. Auditing must change to keep pace with organization environment. Auditing is a cyclical process that uses historical and current information for risk assessment, analysis of controls, reporting to management and then incorporating audit results into risks assessment. The continuing evolution of information technology has placed advanced features of both hardware and software in the hands of auditors to apply in support of conducting, documenting, executing the practice of audit. The auditing profession is particularly dependent on computer to perform most of the functions of the job and furthermore, Software tools can be used as advantage to improve effectiveness and efficiency.

Uses of Computer Assisted Audit Techniques

The following are the uses of computer assisted audit techniques
- To carryout compliance or substantive test on internal control system
- To select transactions and balances on a random basis from the computer file, for the purpose of audit testing
- To sort the content of the clients file in an appropriate order for audit purpose
- To print or display on screen transactions and balances on computer file
- To ascertain the existence and effectiveness of program control
- To examine transactions and balances on computer files and select exceptional items for further Audit testing
- To copy the content of the computer files for audit testing

Methodology

The research methodology adopted in this paper is descriptive. The descriptive design focuses on the evaluation of the factors influencing the adoption of computer based auditing in public limited liability companies. The primary method of data collection used was the questionnaire. The questionnaire was administered on 90 respondents consisting of audit firms. It should be noted, however ,that out of the total   ninety (90) copies of questionnaires administered on the respondents, only 82 were filled and returned. The study adopted summary tables and simple percentages. This is because they allow for a great deal of quantitative data to be presented in a very clear and precise manner. These tables are constructed from the questionnaire responses from our respondents. The technique used for

analysis in the study is the chi-square. That is to say, the two null hypotheses formulated are tested using the chi-square. The value is calculated using the following formula:

$$x^2 = \frac{\sum(o-e)^2}{e}$$

Results and Discussions

The data collected was interpreted through the use of the computer statistical software called Statistical Package for Social Sciences (SPSS). The hypotheses were tested using chi- square. The scores obtained from the retrieved and edited questionnaires were presented visually on analysis tables and chart.

Hypothesis 1, H_0: There is no significant effect of easy retrieval of data and the adoption of computer based Auditing

Table 1   Chi - Square

Variable	Observed (o)	Expected (e)	$(o-e)$	$(o-e)^2$	$\frac{(o-e)^2}{e}$
Strongly Agree	47	20.5	26.5	702.25	34.26
Agree	29	20.5	8.5	72.25	3.52
Uncertain	4	20.5	-16.5	272.25	13.28
Disagree	2	20.5	-18.5	342.25	16.70
Strongly Disagree	0	0	0	0	0
Total	**82**				**67.76**

Source: Field survey, April 2011

Degree of Freedom (DF) = (row-1) (column-1)
Therefore, DF = (4 ó 1) (2 - 1) = 3
Checking DF = 3 under the chi square table at 5% level of significance is 7.82

Decision Rule

Where calculated value is greater than the tabulated value at 5% level of significance, reject Ho and accept H1, and where calculated value is less than tabulated value, accept Ho and reject H1.

Result of Test

Under the computation above, the computed or calculated value of 67.76 is greater than the tabulated value of 7.82 at 5% level of significance.
Therefore, we reject the null hypothesis (i.e. Ho) and accept the alternative hypothesis (i.e. H1) which implies that there is a relationship between easy retrieval of data and the adoption of computer based auditing.

Hypothesis 2

H_0:   There is no relationship between efficiency and effectiveness of an auditor and the adoption of computer based Auditing

Table 2   Chi - Square

Variable	Observed (o)	Expected (e)	$(o-e)$	$(o-e)^2$	$\frac{(o-e)^2}{e}$
Strongly Agree	40	16.2	23.8	566.44	34.97
Agree	34	16.2	17.8	316.84	19.56
Uncertain	5	16.2	-11.2	125.44	7.74
Disagree	1	16.2	-15.2	231.04	14.26
Strongly Disagree	1	16.2	-15.2	231.04	14.26
Total	81				90.79

Source: Field survey, April 2011

Degree of Freedom (DF) = (row-1) (column-1)
Therefore, DF = (5 ó 1) (2 - 1) = 4
Checking DF = 4 under the chi square table at 5% level of significance is 9.49

Decision Rule

Where calculated value is greater than the tabulated value at 5% level of significance, reject Ho and accept H1, and where calculated value is less than tabulated value, accept Ho and reject H1.

Result of Test

Under the computation above, the computed or calculated value of 90.79 is greater than the tabulated value of 9.49 at 5% level of significance. Therefore, we reject the null hypothesis (i.e. Ho) and accept the alternative hypothesis (i.e. H1) which implies that there is a relationship between efficiency and effectiveness of an auditor and the adoption of computer based Auditing

Findings

This section encompasses all findings retrieved from the field through administration of questionnaires, interviews and other data collected in the course of the research. The scope upon which the findings were arrived at was highly restrictive in view of the number of notable audit firms in the country for which we can base decisions on. This study has investigated many issues, both empirically and in literature. Findings are summarized as follows:

1. Auditors are familiar with the use of the audit software
2. Auditors are consistently trained on the use of the audit software and this will help to improve the quality of staff thereby making them more efficient.
3. Audit firms make use of computer assisted audit technique.
4. The adoption of computer assisted audit techniques is economical
5. The procedures involved in the use of computer assisted audit techniques are not cumbersome
6. The adoption of computer based auditing has brought about saving of time in the carrying out of audit assignment.

7.   The inadequacies of the manual system of auditing has necessitated the development of computer based auditing

8.   The adoption of computer based auditing has increased the level of accuracy of the auditor.

9.   There is a relationship between easy retrieval of data and the adoption of computer based Auditing.

10.   There is a relationship between efficiency and effectiveness of an auditor as the adoption of computer based Auditing has brought about an increase in the desired result of audit assignment.

Conclusion

The recent development in technology has left no aspect of the accounting profession untouched and the auditing field is no exception. There have been dramatic changes in this profession over the years, right from the methodology of carrying out various job functions with the use of pen and paper to the use of typewriters and then recently the use of computers. Even with the use of computers, there have been evolutions from the use of the first generation of computer known as Macro computer to the fifth generation of computer known as Micro computer which is currently in use now. There is hardly anything that needs to be done in the audit profession now that the computer can not be used to do. This is to show the importance of computer in the audit profession. Software have been developed in the audit profession to help the auditor make the job easier with the use of computer. Most audit functions are embodied in this audit software and auditors most times do everything they need to do within the software.

The impact of computer based auditing on the auditing profession cannot be over emphasized. As revealed in the survey carried out, it has made the job of the auditor easier, faster and even gone further to reduce the risk in the job of the auditor by guaranteeing a greater level of accuracy, it has brought about increase in the efficiency and effectiveness of an auditor and has helped the auditor in meeting deadlines for audit assignments by saving time.

Recommendations

This study has investigated many issues, both empirically and in literature and based on the findings, certain conclusion has been drawn. This section further extends frontiers of the study by putting up some recommendations generally intended towards the adoption of the computer based auditing. The following specific recommendations are deemed appropriate at this point;

- Audit firms should ensure they have audit software in use for those who have not started using any, in order to enhance the job of the auditor as discovered in the study above.

- Adequate training should be given to the auditor regularly on the use of the audit software. As seen in the discussion so far, the need for computer literacy is very important and that is to say that the Auditor should be computer literate for him to be able to perform effectively in the firm today. The firm in which the auditor works has a part to play in the computer literacy of the auditor by ensuring that adequate training is given to the auditor.

- Computer assisted audit techniques should be adopted. In the discussion above, it was discovered that the adoption of computer assisted audit techniques is economical and not only that, the procedures involved in the use is not cumbersome. Therefore, it is suggested that audit firms that have not done that already should do so.
- Audit firms should ensure that they have adequate and current information on current issues such as technological development as this would go a long way in improving the job done by the auditor.

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