



# **AUDIT SAMPLING: A QUALITATIVE STUDY ON THE ROLE OF STATISTICAL AND NONSTATISTICAL SAMPLING APPROACHES ON AUDIT PRACTICES IN SWEDEN**

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## ABSTRACT

**PURPOSE:** The two approaches to audit sampling; statistical and nonstatistical have been examined in this study. The overall purpose of the study is to explore the current extent at which statistical and nonstatistical sampling approaches are utilized by independent auditors during auditing practices. Moreover, the study also seeks to achieve two additional purposes; the first is to find out whether auditors utilize different sampling techniques when auditing SME's (Small and Medium-Sized Enterprise) and big companies and the second is to find out some common selection methods that are used by auditors for selecting statistical or nonstatistical audit samples during audit sampling practices.

**METHOD:** The population that has been investigated consists of professional auditors residing in Umeå-Sweden. Data for the study was collected by conducting semi-structured interviews and convenient sampling; a non-probability sampling technique was used for respondent's selection. An interviewed guide was sent to respondents in advance with the objective of giving them the opportunity to have both mental and psychological preparations prior to each interview scheduled date. The semi-structured interview technique was adopted because it was a suitable approach to extract valuable information and in-depth explanations from auditors about the current extent of the use of statistical audit sampling and nonstatistical audit sampling during auditing practices. Ultimately, the selected respondents actively participated in which they thoroughly expressed their views and experiences about audit sampling, statistical audit sampling, and nonstatistical audit sampling.

**RESULTS:** Statistical audit sampling and nonstatistical audit sampling were found to be used most often by auditors when auditing the financial statements of big companies compare to SME's where nonstatistical audit sampling is most often used. Therefore, both statistical and nonstatistical samplings are in dominant utilization by auditors in Sweden. Audit samples are selected through random selection method and systematic selection methods when using statistical audit sampling and for nonstatistical audit sampling; items are selected by the use of professional judgment. However, auditors in Sweden are more inclined with the use of random selection method for statistical audit sampling and their professional judgment for nonstatistical audit sampling. The main reasons for the auditors using both statistical audit sampling and nonstatistical audit sampling are to minimize risks and to guarantee high quality audit. The conclusion of the study was that auditors in Sweden use both statistical and nonstatistical audit sampling techniques when auditing big companies, use nonstatistical audit sampling when auditing SME's, select samples using random selection method and systematic selection method for statistical audit sampling and for nonstatistical audit sampling, items are selected within the parameters of their professional judgment.

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**KEYWORDS:** Audit sampling, Statistical Audit Sampling, Nonstatistical Audit Sampling.

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## CHAPTER ONE: INTRODUCTION

### 1.1 PROBLEM BACKGROUND

*“It is important for researchers to monitor the role of sampling in this rapidly changing audit environment (Messier, Kachelmeier, & Jensen, 2001, p.82)”.*

At the beginning days of auditing, it was possible for independent auditors to examine and verify 100% of the records and transactions of a company. However, the historical development of the concept of sampling came into auditing when companies grew in size and complexity. As a result, it became very expensive and time consuming for auditors to examine all the records and transactions of companies, thus, provoking the necessity for the concept of sampling to be brought into the profession. Auditors started using this concept to choose a sample of records and transactions, carry out examination of the sample and use the results to draw conclusions about the fairness of a company’s financial statements. Consequently, auditors can only provide assurance but not absolute assurance that the financial statements are fairly presented (Eilifsen, Messier Jr, Glover, & Prawitt, 2006, p.259).

What does audit sampling involve? Audit sampling just as any other sampling procedure, is a formal process of selecting a sample of records or transactions from a population and using the sample to make generalization to the entire population (Maingot & Quon, 2009, p.217).The objective of taking a sample from the population is primarily to enable the auditor acquire audit evidence. The auditor will then use the results gathered from the sample to make inferences to the entire population. In doing this, the auditor has to take steps to protect himself against risk because the sample cannot absolutely guarantee that the error of distribution is favourable. Therefore, selecting a sample of records and transactions using random sampling will help give protection against any failure to detect material misstatements in the population being audited (Teitlebaum & Robinson, 1975, pp.73-78).

On the other hand, audit sampling might not give a perfect representation of the characteristics of the entire population ,therefore, sampling is said to decrease reliability of results (Hubbard & Colbert, 2001, p.29).In order to enhance reliability, auditors have to select a large sample size so as to control the risk of not discovering material misstatements in the financial statements being audited (Finley, 1989, p.693).The chosen sample size will also determines subsequent evaluation of the strength of audit evidence that the auditor has to gather (Gillett & Peytcheva, 2011, p.66).Sampling will also give effective and reliable results when the population from which a sample is chosen is made up of a large number of similar transactions especially if these transactions are processed in the same manner, an example of which could be accounts payables considering the fact that a good number of transactions are processed and produced using the same method and under the same conditions (Hubbard & Colbert,2001,p.27). Additionally, when using sampling to test accounts balances and classes of transactions, it is necessary for an auditor to identify, separate and examine some key accounts individually. These key accounts may include items that have large book values or items

having special risks associated with them. The items identified have to be examined separately and identification of these items is done by auditors through the use of their professional judgment. In this way the auditor will be able to identify, separate and examine items with significant values before beginning the sampling (Warren, Yates, & Zuber, 1982, pp.62-65).

Moreover, sampling in auditing is not exactly the same as sampling in other disciplines. The difference lies in the fact that in auditing, auditors do not rely completely on the sample chosen to be the only source of information as the sample is usually intended to prove or disprove information that the auditor has already gathered or developed from other sources during the audit process (Kraft, 1968, p.50). In addition, the immediate objective of the auditor is to draw conclusions concerning the occurrence of material misstatements in the entire population which has been previously estimated that in the absence of such material misstatements in the population, the sample will be an instrument to prove or disprove information that has been gathered (Finley, 1989, p.694).

Audit sampling consists of two sampling approaches which are statistical and non statistical sampling. The used of these sampling approaches have been recognize and permitted by the auditing standards (Eilifsen et al., 2006, p.259). Statistical sampling is a probability-based method of analyzing a chosen sample of records and transactions and both internal and external auditor use this sampling approach to make statistically valid opinions from the sample to the entire population (Smieliauskas & Robertson, 2004). Auditors use statistical sampling to test records of transactions, determine whether the sample chosen contains material misstatements or not (Wurst, Neter, & James, 1991, p.335) and in calculating the required sampling size that will be commensurate to the desired statistical precisions. Statistical sampling also guarantees reliability of results as well as greater control of risk (Messier, Kachelmeier, & Jensen, 2001, p.91).

Conversely, over the years, auditors have been reluctant to use statistical sampling and this reluctantness has been attributed to three major reasons which are the cost of sample selection, the cost of sample evaluation, and the cost of training. Though, the cost of sample selection and the cost of sample evaluation have been almost completely eliminated today due to the availability computer software packages (Hitzig, 2004). Statistical sampling has also been battered over the years on the pretext that auditors lack the required training in mathematical statistics and that auditors still use professional judgment in evaluating the internal control systems during auditing and also to determine acceptable degrees of risk (Aly & Duboff, 1971, p.119). On the other hand, it has been argued that statistical sampling is based on solid and sound statistical principles and it is possible for accurate sampling of transactions. Also, statistical sampling produces good measure of risk and also enable audit results to be conveniently accepted (Gavenda, 2001, P.67.)

Nonstatistical sampling, also known as judgmental sampling is a non probability based sampling approach that does not allow the auditor to draw statistically valid view about the entire population (Smieliauskas & Robertson, 2004). A good number of empirical studies attest that nonstatistical sampling selections and evaluations are often associated

with biases ( Hall et al., 2000; Ponemon & Wendell,1995; Butler,1986).This is due to the fact that auditors most often encounter growing pressure to complete the audit on time. Hence, they find nonstatistical sampling as a faster method to enable them complete the audit on time ( Gavenda,2001,P.71.).In addition, audit samples that are selected using nonstatistical sampling procedures are often done haphazardly. Although there are doubts regarding the ability of nonstatistical sampling procedures to yield samples results that are reliable and free from bias, nonstatistical sampling procedures are still acceptable and are used generally in the accounting profession (Hall et al., 2000, p.232).

Furthermore, statistical sampling compare to nonstatistical sampling has been perceived as efficient and independent auditors over the years have always been advised and encouraged to use statistical sampling during auditing. Moreover, with the advent of computers, the difficulties that were known to be associated with statistical sampling have been reduced. Computers now help auditors in performing certain statistical tasks such as calculating the sample size and evaluation of results, both of which are free from errors (Elliott & Rogers, 1972.p.46).Although statistical sampling is a probability based sampling; some judgment is also required, though, nonstatistical sampling requires more judgment but many firms have been unwilling to use statistical sampling (Richardson & Louwers, 2010, p.553).

Additionally, it has been argued that the use of nonstatistical sampling as a replacement for statistical sampling could subject auditors to even bigger professional and legal criticism. Statistical sampling is considered as an aid to the auditor as it helps the auditor to determine the extent of test to be performed, helps in risks minimization and permit the drawing of scientific conclusions that are based on the findings carried out on the sample (Hitzig, 2004).Also, statistical sampling is different from nonstatistical sampling as it uses scientific principles but this does not mean that statistical sampling is completely perfect. Also, nonstatistical sampling has been considered to be more judgmental as a sample that is chosen is based on the auditor's professional judgment (Gavenda, 2001, p.67).

Finally, the literature reviewed so far makes me wonder about the current rate of utilization of statistical and nonstatistical sampling approaches during auditing practices, as well as about the type of sampling approach auditors will prefer to utilize when auditing SME's and big companies and their reasons of utilization. Hence, there is a practical research gap that needs to be fulfilled. Also, we have never had any study at Umeå School of Business written about audit sampling. We have had current studies written within other areas of auditing such as "The impact of extended audit tenure on auditor independence (Chia-Ah & Karlsson 2010)", "What to provide and how to provide it? - a study on small companies' demand for audit and alternative services (Franzén, 2010)", just to mention a few. Furthermore, I have also searched for such studies in Sweden from scientific journals but have not found any. Therefore, this study will fulfill a theoretical research gap within the domain of audit sampling.

## **1.2 RESEARCH QUESTION**

The problem background leads the present study with the following research question:

*To what extent are statistical audit sampling and nonstatistical audit sampling approaches utilized in current auditing practices by independent auditors?*

## **1.3 PURPOSE**

The aim of this study is to explore the current extent at which statistical and nonstatistical sampling approaches are utilized by independent auditors during auditing practices in the process of auditing the financial statements of companies. An additional purpose is to find out whether different sampling techniques are used when auditing SME's and Big Companies. Finally, the study also seeks to find out the common selection methods that are used by auditors for selecting statistical and nonstatistical audit samples during audit sampling practices.

## **1.4 OUTLINE OF THE STUDY**

**CHAPTER 2 (METHODOLOGY):** This chapter will be presenting the methodology of the study beginning with preconception as well as elaborating on research philosophy, scientific approaches, research techniques, respondent selection, interview guide, interview execution, interview technique and how the interviews were transcribed and edited.

**CHAPTER 3 (THEORETICAL FRAMEWORK):** This chapter will be providing review of relevant literature from previous studies mainly relating to audit sampling, statistical audit sampling and nonstatistical audit sampling.

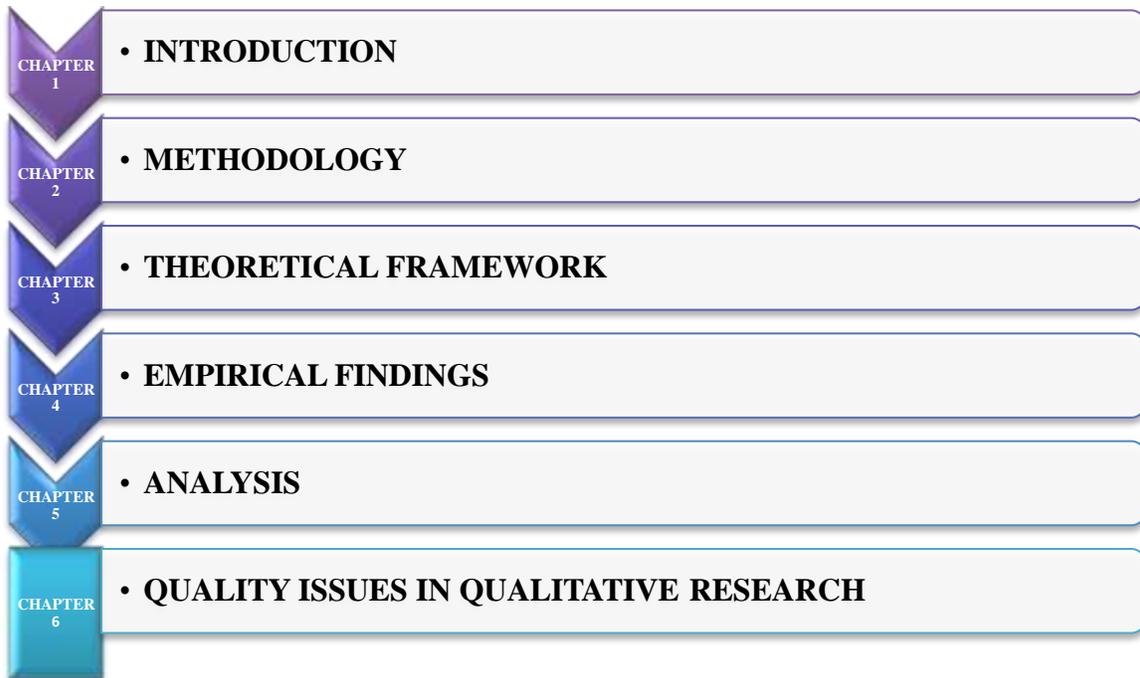
**CHAPTER 4 (EMPIRICAL FINDINGS):** This chapter will be presenting the empirical data that has been collected from respondents. It is based on these empirical findings that discussions, analysis and conclusions shall be drawn.

**CHAPTER 5 (ANALYSIS):** This chapter will be presenting an analysis of the findings. The chapter will also presents the emergence of a proposed audit sampling model as well as presenting the conclusion, limitations and suggestion for further research.

**CHAPTER 6 (QUALITY ISSUES IN QUALITATIVE RESEARCH):** This chapter will be presenting quality issues and ethical considerations that are involved in qualitative research.

A schematic representation of the thesis is presented in figure 1 below:

**Figure 1: A Schematic Representation of the Thesis**



## CHAPTER TWO: METHODOLOGY

### 2.1 PRECONCEPTION

The author of this study is an accounting student but has never worked as an auditor before. Thus; the author basically possesses only theoretical knowledge about audit sampling, statistical audit sampling and nonstatistical audit sampling with no professional or practical working experience relating to the utilization of these concepts during auditing practices. Therefore, the author will like to make readers understand that the results and conclusion of this study have not been affected by the author's theoretical preconceived ideas. This is principally due to the fact that the study is qualitative in nature and the empirical findings are based on the views, perceptions and experiences of professional auditors. Hence, preconceived ideas have not intruded into the results. Although the author does possess previous knowledge about audit sampling, but the ultimate truth is that the knowledge is totally and completely theoretical and not practical. Consequently, as this study relies solely on practical findings, there have been no negative influences of theoretical ideas on the current extent at which statistical audit sampling and nonstatistical audit sampling are utilized by auditors during auditing practices.

### 2.2 RESEARCH PHILOSOPHY

Ontology and epistemology are the two types of research philosophies that are generally considered when conducting research in social sciences. Ontology is concerned about the philosophy of the existence and nature of social phenomena (Gratton & Jones, 2010, p.24). The utilization of the concepts of statistical and nonstatistical sampling techniques during auditing is a social phenomenon and their existence as well as their nature of utilization will be known by investigating the views and perceptions of practicing auditors. Moreover, ontology is also concerned about whether social entities can be or should be considered as objective entities, with reality external to social actors or whether social constructions are built from the perceptions and actions of social actors (Bryman & Bell, 2007, p.22). Constructionism is an ontological consideration that claims that social sciences phenomena and their meanings have to be accomplished continuously by social sciences researchers taking into consideration the fact that social phenomena are constantly changing (Bryman & Bell, 2007, p.23). An ontological social constructionist philosophy to this study is that what has been or is being considered as theoretically and practically acceptable about audit sampling, statistical and no statistical audit sampling in the past will be or may be different in the present or in the future. Thus, the realities about their meanings and their existence have to be known by investigating the views and perceptions of auditors with the objective of understand the current state of utilization of these concepts within auditing.

Epistemology is a branch of philosophy that is concerned on how knowledge about a social phenomenon can be acquired and what is supposed to be counted as knowledge (Gratton & Jones, 2010, p.24). Moreover, epistemology seeks to address the question about what is regarded as acceptable knowledge in a discipline, particularly whether

or not social science researchers have to study the social world by using the same principles and procedures that natural sciences researchers are using. Hence, the epistemological consideration that supports the idea for social sciences researchers to imitate the principles and procedures of natural sciences researchers is positivism. However, interpretivism is also an epistemological consideration having a contrasting meaning to positivism (Bryman & Bell, 2007, pp.16-17). In addition, the positivist approach has been referred to as the approach of the natural sciences and not of social sciences and because of this most people assume that the positive approach is science (Neuman 2006, p.63). Interpretivism focuses on the view that there are differences between people, thus, social science researchers should take hold of the subjective meaning of social action to study social phenomena (Bryman & Bell, 2007, p.19).

The purpose of this study as previously mentioned is to explore the current extent in which statistical and nonstatistical audit sampling approaches are utilized by independent auditors during auditing practices. This will be achieved by investigating the views and opinions of auditors with the goal of increasing understanding about the utilization of these concepts within the auditing profession and this is subjective in nature. Hence, this study has adopted the interpretivist approach and not the positivist approach. The reasons for adopting the interpretivist approach and not the positivist approach are: (1) interpretivism permits a social science researcher to carry out investigation to enable him discover explanations and get the subjective meanings of social phenomena whereas the positivist approach requires the researcher to deduce meanings from measurements, (2) the interpretivist approach will also enable the researcher to describe and explain situations from the viewpoint of those being investigated and (3) an interpretivist approach will also enable the researcher to gain an insider's perspective more than a positivist approach, thus, the researcher will be able to understand the subject matter from within (Gratton & Jones, 2010, p.28).

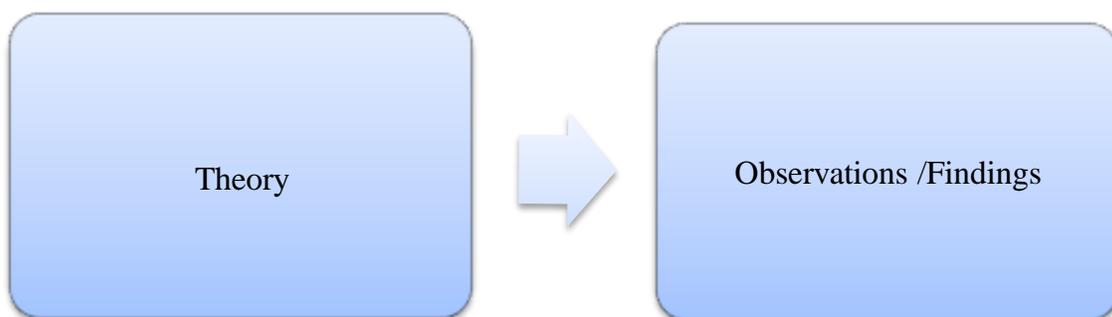
Moreover, the respondents of this study are auditors and are people with the same education but different experiences. Hence, the interpretivist approach is suitable for this study when trying to understand the reality about the extent of statistical and nonstatistical sampling approaches during audit practices. In this perspective, the views and perceptions of auditors will form the foundations on which the results and conclusions shall be made. This implies, this study has taken a subjective approach (interpretivism) and not an objective approach (positivism) as the results will be based on the interpretation of the opinions and experiences of individual auditors. Hence, the interpretivist approach in the process of trying to understand the current role of statistical and non statistical sampling approaches during auditing practices is appropriate for this study. This will be achieved by exploring the subjective views and perceptions of auditors even though complete objectivity will be strived at in the process of transcribing and analyzing the findings for eventual conclusions.

## 2.3 SCIENTIFIC APPROACHES

The discussion about the associated epistemological and ontological considerations leads the present study to two scientific approaches, which are the deductive and inductive approaches. The deductive approach has been adopted for this study. The reason for adopting this approach is that it has a relationship between theory and practice. It is as a result of this that an interview guide has been developed to assist in the accumulation of practical findings and this shall be obtained by interviewing auditors. It is based on the interviews that practical findings relating to audit sampling, statistical sampling and nonstatistical samplings shall be obtained. It is on the foundations of these practical findings that I can give some knowledge contributions about audit sampling.

The deductive approach represents the drawing of conclusions from the general to the specific (Berg & Latin,2007,p.9).In addition, it requires that the researcher should formulate hypotheses based on what is known about a particular domain including the theoretical considerations of that domain and collect data to scrutinize the formulated hypothesis to enable him confirmed or reject the hypothesis. At this stage the social science researcher can then draw conclusions about the findings by relating back to the theory that stirred up the research problem in the first place (Bryman & Bell, 2007, p.11).Moreover, the deductive approach is most often associated with positivism and quantitative research and it involves the creation of an idea or hypothesis and based on existing theory, data is collected to eventually test the idea or hypothesis (Gratton & Jones, 2010, p.36).Nonetheless, Bryman & Bell (2007, p.14),summarize the deductive approach as an approach that moves from theory to observation/findings as shown in figure 2 below:

**Figure 2: Deductive Approach**

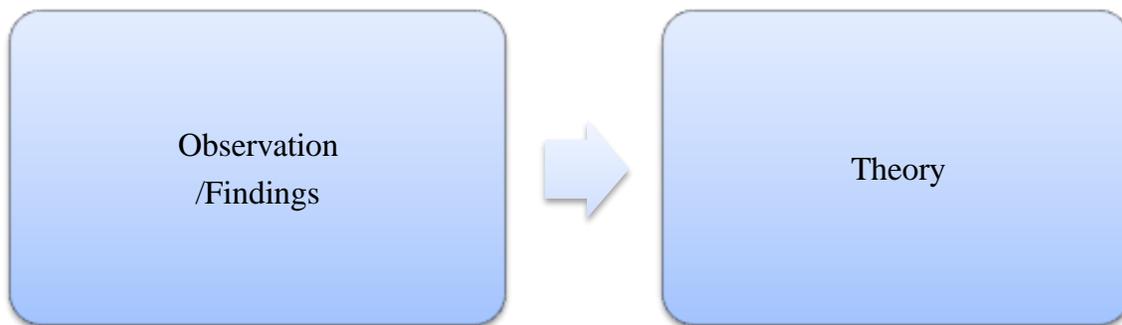


**Source: Bryman & Bell (2007, p.14)**

The inductive approach concerns the drawing of conclusion or generalization based on a limited number of observations (Berg & Latin,2007,p.9).In addition, the inductive approach commences by making generalizable inferences out of observations which can then be explored for the development of theories and conclusions are made (Bryman &

Bell, 2007, p.14).Moreover, the inductive approach is frequently connected with the interpretivist approach when carrying out qualitative studies whereby the objective will be to collect and analysis data for the development of theories, models or explanations (Gratton & Jones, 2010, p.36).According to Bryman & Bell (2007, p.14),the inductive approach is the reverse of the deductive approach and it moves from observations/findings to theory as represented in figure 3 below:

**Figure 3: Inductive Approach**

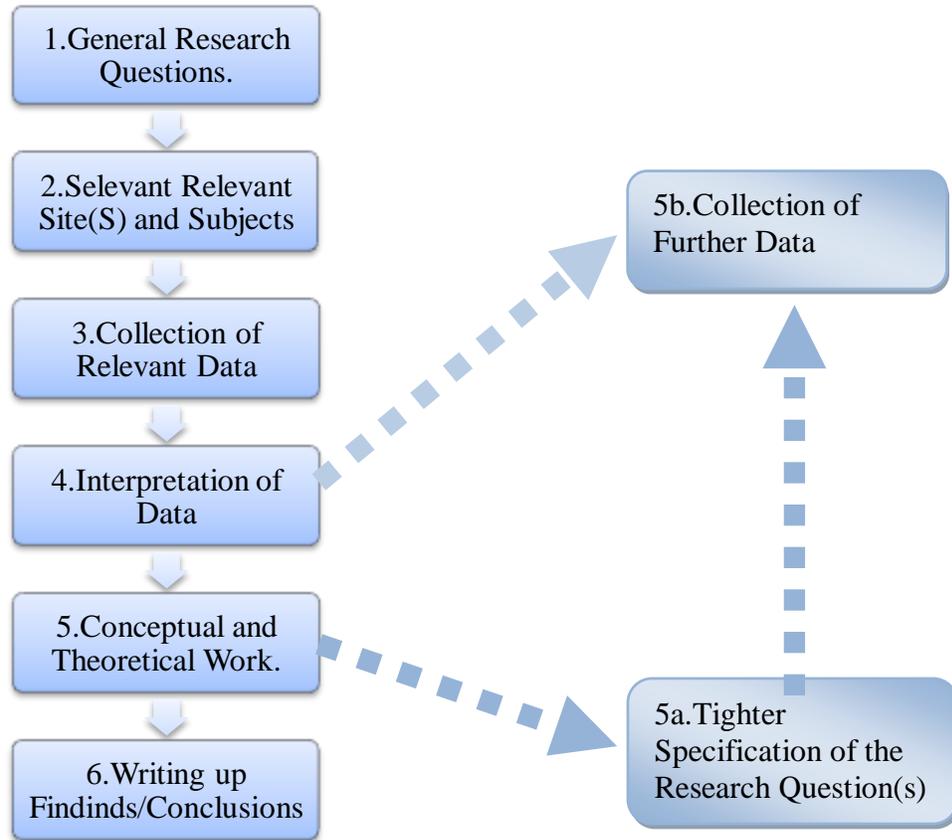


**Source: Bryman & Bell (2007, p.14)**

## **2.4 RESEARCH TECHNIQUE**

The two main types of research techniques that are generally used in business research studies are quantitative and qualitative research techniques. The qualitative research technique has been adopted for this study because it is better suited to enable an in-depth finding by interviewing auditors. The results of these findings will provide answers for the research question which as earlier stated is about the role of statistical and nonstatistical sampling approaches in current audit practices. Moreover, the qualitative research strategies is appropriate for this study as I will be able to gather sufficient information from professional auditors who will have the opportunity to express their opinions and experiences about audit sampling, statistical sampling and nonstatistical sampling. Furthermore, with this approach, richer information shall be uncovered from auditors and their views and perceptions shall form the basis on which conclusions about the research problem shall be made. The detail steps that are involved in qualitative research according Bryman & Bell (2007, p.406) are shown figure 4 below:

**Figure 4: Steps involve in Qualitative Research**



**Source: Bryman & Bell (2007, p.406)**

The qualitative research technique involves exploring and understanding the meaning of individuals or groups that are engaged in a social phenomena or human problem. While the quantitative research technique on the other hand simply involves testing of theories objectively and this is done by examining and measuring the relationship between variables and using instruments to gather numerical data which is then analyzed by applying statistical procedures. (Creswell, 2009, p.5). These two research techniques are utilized under different situations depending on the aim of the research and the nature of the data that has to be collected. Gratton & Jones (2010, p.32), point out the general characteristics and differences under which the two research techniques can be utilized and this is as summarized in table 1 below:

**Table 1: Characteristics of Quantitative and Qualitative Research Techniques**

Quantitative Research	Qualitative Research
<ul style="list-style-type: none"> <li>▪ Use numerical analysis to measure social phenomena to provide facts</li> </ul>	<ul style="list-style-type: none"> <li>▪ Relies on non-numerical analysis to provide understanding</li> </ul>
<ul style="list-style-type: none"> <li>▪ Assumes single, objective social</li> </ul>	<ul style="list-style-type: none"> <li>▪ Assumes social reality is a</li> </ul>

reality	subjective experience
<ul style="list-style-type: none"> <li>▪ Assumes social reality is constant across different times and settings</li> </ul>	<ul style="list-style-type: none"> <li>▪ Assumes social reality is continuously constructed and related to immediate social context</li> </ul>
<ul style="list-style-type: none"> <li>▪ Uses statistical analysis to determine causal relationships</li> </ul>	<ul style="list-style-type: none"> <li>▪ Objectives are description and understanding of meanings</li> </ul>
<ul style="list-style-type: none"> <li>▪ Studies samples with the intention of generalizing to the populations</li> </ul>	<ul style="list-style-type: none"> <li>▪ Data rich and subjective</li> </ul>
<ul style="list-style-type: none"> <li>▪ The researcher is objective and detached from the subject under investigation</li> </ul>	<ul style="list-style-type: none"> <li>▪ The location of the research is often natural</li> </ul>
<ul style="list-style-type: none"> <li>▪ The setting is often arranged</li> </ul>	<ul style="list-style-type: none"> <li>▪ Flexible approach to data collection; often non traditional approaches</li> </ul>
<ul style="list-style-type: none"> <li>▪ Data is collected using inanimate objects ,for example pen and paper</li> </ul>	<ul style="list-style-type: none"> <li>▪ The researcher is the data collection instrument</li> </ul>
<ul style="list-style-type: none"> <li>▪ Associated with positivist approach</li> </ul>	<ul style="list-style-type: none"> <li>▪ Associated with the interpretative approach</li> </ul>
<ul style="list-style-type: none"> <li>▪ Generally deductive</li> </ul>	<ul style="list-style-type: none"> <li>▪ Generally inductive</li> </ul>

**Source: Gratton & Jones, 2010, p.32**

Moreover, the quantitative research technique has been regarded to be dealing more with numerical values and objective in nature rather than just explaining theories compare to the qualitative research technique that is rather more subjective in nature (Bryman & Bell 2007; Saunders, Lewis, & Thornhill, 2009). In addition, the quantitative research technique has been considered suitable in situations where a researcher is interested in the measurement of a particular phenomenon that requires the collection of quantitative data while the qualitative research technique is suitable in situation where a researcher is interested in investigating the thoughts or feelings of people (Gratton & Jones, 2010, p.33).

## **2.5 LITERATURE SEARCH**

The search for relevant literature for this study was done primarily by using the Umeå University Electronic Library. The Umeå University Electronic Library is made up of several databases but the databases that were of frequent utilization when searching for scientific articles were: Business Source Premier (EBSCO) and Business Searching Interface. Majority of the scientific articles were obtained from Business Source Premier as the database has recent academic and scientific articles that are relevant to the topic under consideration. The beginning chapters of this study demanded a lot of literature review. As a result relevant information was collected from scientific articles as well as from reliable peer-reviewed books that are found at the Umeå University Electronic

Library. The scientific articles and books in this library are considered reliable because they have been well reviewed by reputable publishers prior to their publication. In addition the scientific articles and books have been written by renowned authors in the field of accounting and finance and therefore theoretical literature is reliable and credible. Keywords that were used to search for scientific articles in these databases were: **Audit Sampling** (378hits), **Statistical Sampling in Auditing** (231 hits), **Nonstatistical Sampling in Auditing** (16 hits), **Audit Sampling Approaches** (25 hits), **Statistical and Nonstatistical Sampling in auditing** (18 hits). However, additional scientific articles were also obtained from other sources such as the Social Sciences Research Network (SSRN), Social Sciences Citation Index (SSCI), Google Scholar, and SCIRUS.

## **2.6 RESPONDENT SELECTION**

The criterion that was used to select respondents to participate in the study was based mainly on the accessibility of the respondents, availability of the respondents and the professional qualification of the respondents. A convenience sampling approach was used to select and interview five auditors. With the help of my supervisor, each respondent was first contacted by phone and the purpose of the thesis was explained. This was followed by making arrangement for interview date, time and location. The e-mail addresses of the respondents were collected at the end of each call and were used to send the interview guide to them in advance. Convenience sampling is a non-probability sampling approach that is used by researchers conducting qualitative research to select respondents based on accessibility (Bryman & Bell, 2007, p.197; Saunders et al., 2009, p.241). Moreover, convenient sampling entails the selection of sample elements that are more readily available and are willing to participate in the study and to also provide relevant information to the researcher (Hair, Celsi, Money, Samouel, & Page, 2011, p.175). The reason for adopting the convenient sampling approach was because finding auditors who are ready and available to participate in the study was difficult.

The respondents who participated in the study consisted of professional auditors residing in Umeå-Sweden, working with big audit firms such as Ernst & Young (E&Y), KPMG and Grant Thornton. In addition, all the respondents are professionally authorized public auditors. Therefore; they have the necessary theoretical knowledge about audit sampling, statistical audit sampling and nonstatistical audit sampling as well as sufficient practical knowledge about the current extent in which these concepts are utilized during auditing practices. The oldest respondent was of age 63 and has been working as an Authorized Public Accountant for 25 years while the youngest respondent was of age 32 and has been working as an Authorised Public Accountant for  $6\frac{1}{2}$  years. However, the average working experience of all the five respondents was 14 years. In this perspective, table 2 below gives a brief summary of the ages, working experiences, professional qualifications as well as the audit firm from which each respondent is working. The identities of these

respondents have been treated confidentially and anonyms have been used to represent the respondents as: Respondent A, Respondent B, Respondent C, Respondent D and Respondent E.

**Table 2: Ages, Working Experiences, Professional Qualifications and Audit Firms of Respondents**

<b>Respondent</b>	<b>Age of Auditor (years)</b>	<b>Working Experience (years)</b>	<b>Professional Qualification</b>	<b>Audit Firm</b>
Respondent A	33	6 $\frac{1}{2}$	Public Authorized Auditor	Grant Thornton
Respondent B	34	10	Public Authorized Auditor	E&Y
Respondent C	63	25	Public Authorized Auditor	Grant Thornton
Respondent D	32	10	Public Authorized Auditor	E&Y
Respondent E	47	20	Public Authorized Auditor	KPMG

## 2.7 INTERVIEW GUIDE AND INTERVIEW EXECUTION

The interview guide was made up of six sections and it was designed to cover series of questions relating to audit sampling, statistical and nonstatistical audit sampling, statistical audit sampling, nonstatistical audit sampling, sample size selection and finally personal information. With regard to audit sampling, questions such as “what is your view about the efficiency of audit sampling?”, “what has happened during the last 10 years about audit sampling” were raised. Also, when designing questions relating to statistical and nonstatistical audit sampling, questions such as “which audit sampling approach do you use during a typical audit process? Statistical, nonstatistical or both and Why?” were raised. Furthermore, concerning statistical audit sampling, questions such as “when is statistical audit sampling appropriate?” was raised. With respect to nonstatistical audit sampling questions such as “which selection method do you use to select samples for nonstatistical sampling?” was raised. About sample size selection, questions such as “which sample size is used after “good auditing” (i.e. discovery of fewer material misstatements) during the 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup> and 10<sup>th</sup> year of auditing the same company?” was also raised. Finally, with regard to personal information, questions such as “how long have you been working as an auditor?” was also raised.

The designed interview guide was sent to respondents ahead of each interview scheduled date. The reason for sending the interview guide in advance was to give the respondents the chance and the time to prepare psychologically as well as have an idea about the questions to be discussed. Each interview was audio taped using a tape recorder and the aim of audio taping the interviews was to ensure accurate transcription as well as to ensure that all relevant information discussed during each interview is well accumulated in order to avoid the problem of missing valuable information. The location of each interview, the date of each interview and the time that each interview was conducted was chosen by each respondent. All the interviews were conducted at the place of work of each respondent precisely in conference rooms. This was necessary for them to express their views and perceptions freely. During each interview the door of the conference room was locked to avoid any background noise as well as to avoid all external disturbance. As a result of this all the interviews were well conducted and the discussions were well audio recorded.

I started each interview by introducing myself and this was followed by telling them the problem statement of the study. After this, we proceeded into discussion the 31 questions on the interview guide which were grouped under six main headings: audit sampling, statistical and no statistical audit sampling, statistical audit sampling, nonstatistical audit sampling, sample size selection and personal information. In addition to discussing the main questions under these headings, sub questions were also raised where possible. By doing this, the auditors had the possibility to release valuable additional information. All the questions were open ended questions and this enabled the respondents to give in-depth explanations. The date that each interview was conducted, the time spent on each interview and the evaluation each of the interviews are shown in the table below:

**Table 3: Date, Time and Assessment of Interview Execution**

<b>Date</b>	<b>Time</b>	<b>Assessment</b>
<b>May 9,2011</b>	08:30 - 09:35	Good
<b>May 10,2011</b>	15:00 - 15:48	Good
<b>May 11,2011</b>	08:30-09:25	Good
<b>May 11,2011</b>	13:00-13:45	Good
<b>May 12,2011</b>	15:00-15:35	Good

## **2.8 INTERVIEW TECHNIQUE**

There are various types of interview techniques that researchers can utilize to interview respondents such as the Structured Interview, the Semi-Structured Interview, the Unstructured Interview, the Narrative Interview and Focus Group, or Group Interview techniques. The *Structured Interview* requires the use of a questionnaire in which the researcher will have to read the questions to the respondents for the respondents to answer. In this way the respondent will be able to seek further clarification about questions that are unclear. The *Semi-Structured Interview* utilizes a standard set of questions or schedule of questions prepared by the researcher in advance. The *Unstructured Interview* requires the researcher to simply have a general idea about the topics to be discussed and the interviewee leads the interview though the researcher can ask further questions as the interview progresses. The *Narrative Interview* refers to a situation where the researcher allows the respondents to describe and develop a story about their experiences and life histories with the researcher having very little involvement in the discussion. The *Focus Group or Group Interview* is a type of interview that involves a group and not a one-to-one type of interviews or interaction (Gratton & Jones, 2010, p.156).

The interview technique that has been adopted for this study is the Semi-Structured Interview. This interview technique is considered appropriate for this study because it is flexible and offers the possibility for more information to be obtained from respondents by asking sub-questions even if the sub-questions were not included on the interview guide (Gratton & Jones, 2010, p.156). This possibility to ask sub-questions as the interview progresses will cause the respondents to reveal adequate and valuable information about audit sampling, statistical sampling and nonstatistical sampling in auditing. Moreover, Bryman & Bell (2007), point out that when conducting a business research interview, the interviewer has the responsibility to bring out from the interviewee all the type of relevant information he wants and that amongst the various types of research interview techniques that are available, the semi-structured interview technique is frequently used in business research. The authors further point out that the semi-structured interview technique requires the researcher to have a list of questions about the specific topics that have to be covered and this is often called interview guide and questions during the interview may not follow exactly the same way as it has been outlined on the interview guide (Bryman & Bell, 2007, p.474). Additionally, with this interview technique, the respondent will also be able to develop and discuss in details on areas that are relevant to him/her base on the interview guide that has been sent in advance.

## **2.9 INTERVIEW TRANSCRIPTION AND EDITING**

All the audio taped interviews were transcribed and this was followed by editing. Transcription was done by playing back the recorded interviews, listening and typing the information into words. Transcribed information from each respondent was edited, rearranged and regrouped under the different sub-headings corresponding to each question on the interview guide in order to give coherency and fluency to readers. The aim of editing the transcribed material was to correct the grammar and also to avoid

repetition of some words or phrases from the respondents. For instance, an original message that was transcribed before editing about how sampling techniques are chosen during auditing practices read as follows:

*Before we choose sampling technique, most of the times, we have to first know the company, in particular if it is a company that we are auditing for the first time..... We do this by talking with the management of the company ....We obtain general information about the company. We obtain this information to understand the business strategy of the company.....We also obtain information about the customers of the company, and the market size of the company.....We have to first gather all this information about the company to enable us get a complete picture about the company. We also have to know the risky parts of the business..... We usually pay more attention on risky parts of a business during auditing. Perhaps if we know the risky parts we will also know the weak parts in the structure of the business. After this we look into the balance sheet of the company and identify key account balances .We also have to identify major increases or decreases perhaps by comparing current balance sheet with the previous year balance sheet. Thereafter, we choose sampling techniques. We use nonstatistical sampling technique most of the times to examine all the key items. Then we use statistical sampling techniques to select additional items.*

The edited transcript now became:

*According to the Respondent, before choosing sampling techniques, they usually have to first know the company, especially if it is a company that they are auditing for the first time and that this is done by talking with the management in order to have general information about the company, understand the business strategy of the company, the customers of the company, and the market size of the company. All the information gathered is to enable us get a complete picture about the company as well as to know the risky parts of the business so as to pay more attention during auditing. This will also enable us to know the weak parts in the structure of the business. After this we look into the balance sheet of the company and identify key account balances as well as major increases or decreases by comparing current balance sheet with the previous year balance sheet. Thereafter, we proceed into the choosing of sampling techniques. We use nonstatistical sampling technique to examine all the key items and statistical sampling is then used to select additional items.*

## CHAPTER THREE: THEORETICAL FRAMEWORK

### 3.1 AUDIT SAMPLING

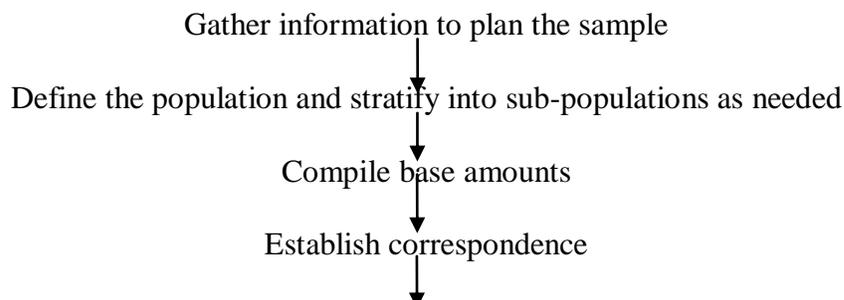
An auditor has the ultimate task of drawing conclusions about the accuracy of a company's transactions as reported by management, but at the same time, he cannot examine all these transactions, hence, all audit will involve some degree of audit sampling as this will enhance and facilitate the collection of audit evidence from classes of transactions or account balances (Rittenberg, Johnstone, & Gramling, 2009, p.350). On the other hand, all audits involve audit sampling but not all audit procedures require the application of audit sampling. As a result, the AICPA (American Institute of Certified Public Accountant) and Accounting Guide pointed out some audit procedures that do not require audit sampling, some of which are: analytical procedures, inquire and observation; where inquire and observation includes the following: (1) interviewing the management and employees of a company (2) understanding the internal control system of a company (3) obtaining written representation from management (4) inspection of land and buildings (5) observing the working behaviour of personnel and the company's procedure of handling cash (Whittington, & Delaney, 2011, p.422).

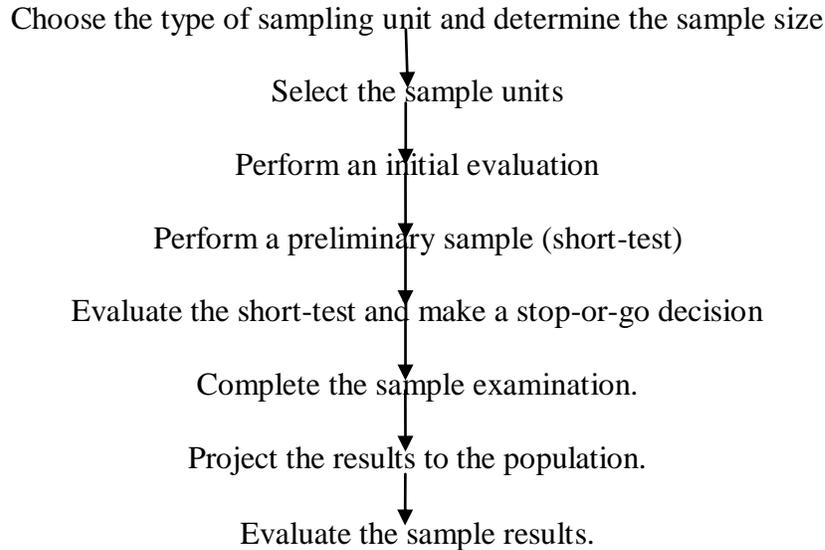
Sadler, Hamel, & Staden (1998, p.360), point out that as far back in the year 1895, a judge in London, United Kingdom, made the following statements about audit sampling:

*Where there is nothing to excite suspicion, very little enquiry will be reasonable and quite sufficient, and in practice, I believe, businessmen select a few cases haphazard, see that they are right, and assume that others like them are correct also.*

Additionally, in order for an audit sampling procedure to be effective, an auditor has to take three elements into consideration. These elements are: (1) deciding on the number of sampling units that have to be selected (2) deciding on how to select the sample units and (3) evaluation of the sample results (Soltani, 2007, p.248). In addition, Texas Comptroller of Public Accounts (2010, p.5) of the United States of America, have given a detailed overview of the audit sampling process with the objective of ensuring efficiency and consistency in the application of audit sampling procedures. The detailed overview for the steps auditors have to adopt when using audit sampling for the accumulation of audit evidence is as follows:

**Figure 5: An Overview of Audit Sampling Process**





**Source: Texas Comptroller of Public Accounts (2010, p.5)**

Moreover, Audit sampling reduces the cost and the time auditors would have used to examine all the records of a company. Nonetheless, audit sampling is also associated with risk and this risk arise from the fact that audit sampling warrants auditors to select and examine a sample of records, leaving other records unexamined, resulting to the risk that some transactions or account balances having material misstatement will not be discovered or the examined sample will not give a complete representation of the characteristics of the population (Rittenberg et al.,2009,p.350).This risk is usually known as sampling risk and it is made up of two categories called type I and type II sampling risks. The type I sampling risk occurs when the auditor concludes that the results from the sample tested is not acceptable when in reality it is acceptable and type II risks occurs when the auditor makes a conclusion that the results from the sample tested is acceptable when in reality it is not acceptable (Eilifsen et al.,2006, p.259).Type I risk is also known as alpha risk while Type II risk is also known as beta risk and audit sampling plans are most often designed to simultaneously control these risks(Smieliauskas,1986,p.103).

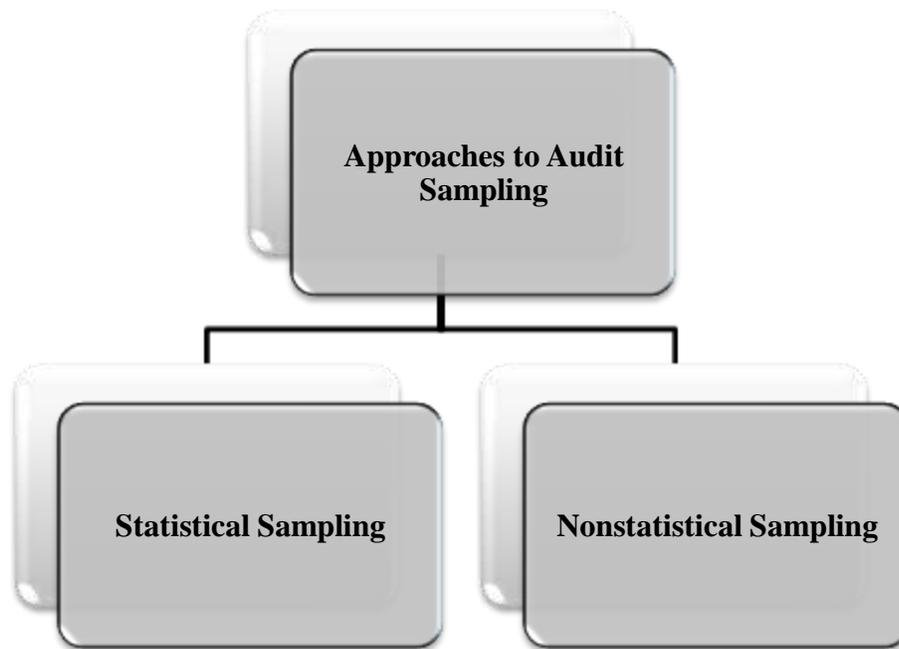
Additionally, when using audit sampling for the accumulation of audit evidence, the amount the risk arising from sampling is said to be directly proportional to the amount of material misstatements that is found in the population. Hence, sampling risk is higher in a population having many material misstatements and smaller in a population having fewer material misstatements (Teitlebaum & Robinson 1975, pp.74-75).However, nonsampling risk arising from factors that can cause the auditor to draw incorrect conclusions based on reasons that are not related to the size of the sample or as a results of human error also exist no matter whether the auditor is using sampling or not. Therefore, auditors have to strive to keep nonsampling risk at a level that is acceptable by ensuring that proper planning, supervision and review procedures become part and parcel of the quality control procedures of the audit firm (Puttick & Esch, 2007, p.293).Also, nonsampling risk refers to all aspects of any risks that are not due to sampling arising from the fact that

the auditor has selected an audit procedure that is not suitable for the attainment of specific audit objectives(Statement on Auditing Standards No.39,1981,p.107).

Furthermore, Dube & Gulati (2005, p.48), presented the two main approaches to audit sampling; statistical and nonstatistical as follows:

**Figure 6: Audit Sampling Approaches**

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**Source: Dube & Gulati (2005, p.48)**

Moreover, an audit sampling approached is considered as statistical if it fulfils the following conditions :(1) if the sample is randomly selected and (2) if it uses the probability theory to evaluate sample results as well as the measurement of sampling risks. Any sampling approach that does fulfil the above conditions is considered as nonstatistical (Puttick & Esch,2007, p.294).Finally, both statistical and nonstatistical sampling approaches can provide sufficient appropriate evidence to enable an auditor draw conclusion about the economic performance of a company (Dauber, Qureshi, Levine, & Siegel, 2009.p.233).

### **3.2 STATISCAL AUDIT SAMPLING**

Over the years, auditors have been encouraged to use statistical sampling procedures to test account balances or classes of transactions. However, this has never been the case as many auditors did not have the necessary statistical knowledge. As a result, majority of the auditors that have been trained during the last decade obtained statistical sampling knowledge during their training (Elliott & Rogers, 1972, p.46).Moreover, statistical

sampling has been once perceived by auditors as a complex audit process requiring a high level of mathematical and computational skills as it necessitated the use of mathematical techniques. Notwithstanding, the emergence and availability of computer software packages today has help to eliminate many of the difficulties that were known to be associated with the use of statistical sampling (Moller, 2009, p.205).Moreover, statistical sampling involves the use of probability to calculate sample size as well as the evaluation of the sample results enabling statistical conclusions to be generalized to the entire population. In addition, statistical conclusions are obtained by using any of the three types of statistical sampling which are attribute sampling, Monetary Unit Sampling(MUS) and Classical Variable Sampling (Eilifsen et al.,2006, p.264).

Attribute sampling is a common type of statistical techniques that is used by auditors for the test of controls in an organization and the objective is to assess whether the internal controls procedures in the organization are functioning as planned. This will enable auditors to obtain evidence about the organization's rate of compliance or noncompliance with established criteria. In addition, when developing an attribute sampling plan the auditor is required to first define the audit test objectives, identify the population involve, define sampling units as well as the control items that have to be tested (O'Regan,2010,p.19).

Moreover, auditors are more familiar in using attribute sampling to test the compliance of the internal accounting controls systems within an organisation. When using attribute sampling for the test of control, the auditor have to define the following quantitatively: the expected error rate, the tolerable error rate, risk of overreliance, and risk of under reliance but defining the risk of under reliance quantitatively is optional (Epstein,1986,p.130).Furthermore, attribute sampling has been seen as an appropriate statistical sampling methods for testing compliance of the internal control systems of a company during auditing and as such the results that is obtained from attribute sampling will provide objective information to help auditors decide whether the internal control system of a company is functioning satisfactorily or not. The importance of attribute sampling lies basically in the fact that it forms the basis for which the auditor have to rely on the internal control system of a company to enable him determine the level of audit test that has to be performed on other account balances(Crosby, 1985, p.119).

MUS is another type of statistical sampling method where the probability of an item selected is proportional to its recorded amount. In order words, each monetary unit in an account has an equal chance of being included into a sample; that is, an account balance with a book value of about \$10,000 is ten times likely to be sampled compare to a different account balance with a book value of \$1000 (Higgins & Nandram,2009,p.174).MUS is a commonly used type of statistical sampling that is used by auditors during auditing to perform substantive tests and also to estimate the monetary amount of material misstatements found in account balances or classes of transactions (Grimlund & Felix, 1987; Hansen, 1993).

Moreover, MUS is a highly used type of statistical sampling when compared to other statistical methods (Smieliauskas, 1986).The third type of statistical sampling is called

classical variable sampling and it can simply be called variable sampling. It is usually used by auditors to determine whether account balances or classes of transactions are materially misstated. Though; it can sometimes be used to estimate the monetary value of a class of transaction or an account balance (Eilifsen et al., 2006, p.265).

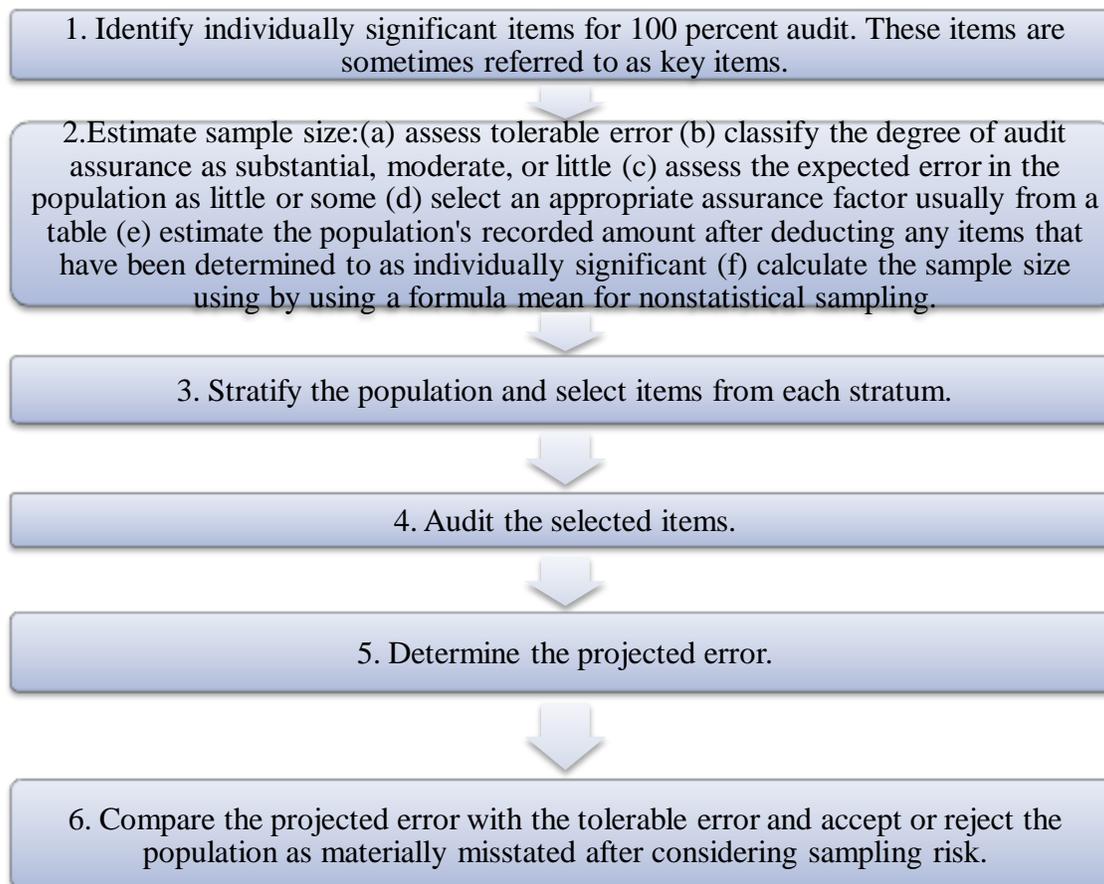
Finally, Gul (2008, pp259-260), mention some principal advantages of statistical sampling and these principal advantages are as follows: (1) statistical sampling will help the auditor to calculate a precise and reliable confidence level (2) statistical sampling demands an auditor to properly plan an audit procedure in a systematic and scientific manner (3) statistical sampling will permit the auditor to interpret sampling results in an objective manner base on the value of statistical precisions and reliability (5) statistical sampling will permit an auditor to rely on a smaller sample than would have been the case if nonstatistical sampling was to be used. Hence, samples are efficiently and effectively examined. Finally, statistical sampling will allow a more intensive examination of sample items taking into consideration the fact that a smaller sample sizes will enable the auditor to carefully examine each item that has been drawn.

### **3.3 NONSTATISTICAL AUDIT SAMPLING**

Nonstatistical sampling requires the auditor to apply his professional judgment in order to draw conclusions about audit test. However, the fact that the auditor has to rely on his professional judgment when using nonstatistical sampling has been considered by some critics as the mean drawback associated with the use of nonstatistical sampling. These critics argue that the use of professional judgments by auditors can differ significantly from sampling theory resulting to an inefficient and ineffective audit tests. To cope with this drawback, most audit firms provides auditors with nonstatistical sampling guidelines and procedures with the objective of promoting consistency during audit engagements (Eilifsen et al., 2006, p.264).

Moreover, when using nonstatistical sampling to test account balances or classes of transactions, sampling risk cannot be quantify and the auditor can only draw conclusions base on his professional judgment (Puncel, 2008). As a result, AICPA has issued nonstatistical sampling guidelines to assist auditor in the effective utilization of nonstatistical sampling. The guidelines as cited by Peek, Neter, & Warren (1991, p.35), is made up of six steps and it is as follows:

**Figure 7: AICPA's Nonstatistical Audit Sampling Guidelines**



**Source: Peek, Neter, & Warren (1991, p.35).**

The authors further point out that over the years little attention has been given to the characteristics of nonstatistical sampling methods and that SAS No. 39 does not compel auditors to use statistical sampling methods, as a result, nonstatistical sampling methods are commonly used in practice (Peek et al., 1991, p.34). Finally, Rittenberg et al., (2009, p.355), point out some costs and benefits associated with the use of nonstatistical sampling as follows:

**Table 4: Some Cost and Benefits Associated with the Use of Nonstatistical Sampling**

Costs	Benefits
<ul style="list-style-type: none"> <li>▪ Require audit judgment to determine an appropriate sample.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Does not require additional software.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Does not provide an objective way to control and measure sampling risk.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Can be based on auditor’s prior expectations about errors in the accounts.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ May take less time to plan, select and evaluate the sample</li> </ul>

Source: Rittenberg et al., (2009, p.355).

### 3.4 STATISTICAL VERSUS NONSTATISTICAL AUDIT SAMPLING

Auditors are permitted to use both statistical and nonstatistical sampling approaches to perform substantives test during auditing (AICPA, 1981,).However, nonstatistical sampling methods are more frequently used in practices especially for sample planning, selection and evaluation compare to statistical sampling methods (Hall,Hunton,& Pierce,2002,p.133).Also, statistical and nonstatistical audit evidences are gathered during auditing. When accumulating audit evidence through the use of nonstatistical sampling, the sufficiency of the audit evidence is determined by the auditor using his professional judgment while the sufficiency of audit evidence gathered from statistical sampling can reliably be measured with a certain degree of assurance based on probability theory (Eilifsen et al., 2006).

Nonetheless, both statistical and nonstatistical sampling approaches have to fulfil the following requirements:(1) the sample selected must be a representative sample (2) the sample size that is selected has to consider materiality, risk and the characteristics of the population when performing substantive test and (3) the must be a consideration about the acceptance level of sampling risk as well as a projection of the errors that can arise from the sample results (Gafford & Carmichael,1984b).In addition, the Statement on Auditing Standards No.39 (1981,p.106),states that statistical and non statistical sampling approaches demand the auditor to use his professional judgment in planning ,performing and evaluating a sample as well as relating the audit evidence gathered to other audit evidences that have been accumulated to permit the drawing of conclusion about other related account balances or classes of transactions.

Moreover, whether using statistical or nonstatistical sampling methods, the auditor has to design and select samples on which to apply audit procedures as well to carry out an evaluation of the sample results. In this way, the auditor will be able to obtain sufficient

appropriate audit evidence (Gupta, 2004, p.1150). Finally, irrespective, of the sampling approach that the auditor chooses to use during audit sampling, the professional judgment of the auditor must always govern the quality of the audit evidence and the auditor also needs to exercise professional judgment in determining a suitable statistical parameters to collect audit evidences (O'Regan, 2010, p.21).

Tate & Grein (2009, p.171), point out some differences between statistical and nonstatistical sampling approaches. These differences are as follows:

**Table 5: Differences between Statistical and Nonstatistical Sampling Approaches**

<b>Statistical Audit Sampling</b>	<b>Nonstatistical Audit Sampling (Judgmental)</b>
<ul style="list-style-type: none"> <li>▪ Uses statistical theory (the laws of probability) to determine sample size and evaluate the sample results</li> </ul>	<ul style="list-style-type: none"> <li>▪ Uses auditor judgment rather than statistical theory</li> </ul>
<ul style="list-style-type: none"> <li>▪ Sample size is automatically calculated using a computer program</li> </ul>	<ul style="list-style-type: none"> <li>▪ Sample size is determined by the auditor; judgment can be used.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Sample sizes can be quite large; no judgment is allowed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Auditor determined sample sizes tend to be smaller than statistically determined sample sizes.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Sampling error is automatically calculated</li> </ul>	<ul style="list-style-type: none"> <li>▪ Sample error cannot be precisely determined.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Permits the auditor to quantify sampling risk</li> </ul>	<ul style="list-style-type: none"> <li>▪ Auditor must approximate sampling risk</li> </ul>
<ul style="list-style-type: none"> <li>▪ Sample selection techniques are limited</li> </ul>	<ul style="list-style-type: none"> <li>▪ All sample selection techniques can be use.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Potentially easier to justify in case of an audit failure in the court of law</li> </ul>	<ul style="list-style-type: none"> <li>▪ More commonly used in practice but difficult to justify in the court of law.</li> </ul>

Source: Tate & Grein (2009, p.171)

### **3.5 A STATISTICAL AUDIT SAMPLING MODEL**

Heimann & Chesley (1977,p.199),developed an audit sampling model by taking into consideration the various types of sampling risks, type I and type II also known as type I and type II errors . The model is useful in calculating the total cost that has to be incurred during audit sampling as well as to determine the alpha and beta levels for aggregate

account and disaggregate account balances. Also, the auditor can also use the model to set limits for the required sample size for disaggregate account balances. The model is made up of four equations: equation 1 is to assist the auditor determine the total cost of the audit sampling process, equation 2 is used to determine the alpha (type I risk) and beta (type II risk) levels for disaggregate accounts balances ,equation 3 is used to determine the alpha and beta level for aggregate account balances.Finally,equation 4 consist of an inequality sign which is useful in setting feasible limits or ranges for the sample sizes of aggregated account balances. The model is as follows:

$$\sum_{i=1}^m c_i n_i \dots\dots\dots\text{Equation 1}$$

$$n_i \geq (n_{iT}^2 s_i^2 (z_{\beta i} + z_{\alpha/2})^2) / M t^2 \text{ for all } i \dots\dots\dots\text{Equation 2}$$

$$\sum_{i \in j} (s_i^2 / n_i) n_{it}^2 \leq M j^2 / (z_{\beta j} + z_{\alpha/2})^2 \text{ for all } j \dots\dots\dots\text{Equation 3}$$

$$0 \leq n_i \leq n_{iT} \text{ for all } i \dots\dots\dots\text{Equation 4}$$

Where, the meanings of the parameters in the model are as follows:

i = disaggregate account in which there are m in number; j = aggregate account; i ∈ j = disaggregate accounts (i) consisting of aggregate account(j); M = material error; n<sub>i</sub>=the sample size for disaggregate account i ; n<sub>iT</sub>=the number of elements in disaggregate account i ; s<sub>i</sub><sup>2</sup> = the preliminary sample variance for disaggregate account i ; α = Type-I error level ;β =Type-II error level ; z<sub>α/2</sub> =value of yielding α/2 and z<sub>β</sub>=the value of z yielding β.

### 3.6 DETERMINATION OF SAMPLE SIZE FOR STATISTICAL AND NONSTATISICAL AUDIT SAMPLING

O'Regan (2010, p.19), the auditor has to consider four parameters in the process of determining a sample size for an audit procedure. These parameters are confidence level, expected deviation rate, tolerate rate and the population. Heimann & Chesley (1977, p.194), point out that the classical statistical approach to sample size determination involve the use of the mean value estimator to determine the sample size. However, the mean value estimator ignores some important additional information that the auditor would have used during audit sampling such as the actual recoded value of an account balance. As a result, the use of the mean value estimator in determining sample size can reduce the required sample size that was supposed to yield efficient results. However, Ridilla (1960, p.550), developed the following model to be used to calculate sample size when using statistical sampling:

$$N = \left( \frac{1/4R(A)}{AAT} \right)^2$$

Where;  
N= the determined sample size, R= the Range of values represented by the customer account,

¼ R =the estimation of the standard deviation, AAT=Average Account Tolerance and A=the desired degree of accuracy

Moreover, Gillett & Srivastava (2000, p.146), also developed a formula to determine sample size when using statistical sampling. This sample size is determined by simultaneously solving equation 1 and 2 as shown below:

$$P(\text{number of occurrence} \leq cv/np_2) = \sum_{r=0}^{cv} \left( \frac{n!}{r!(n-r)!} \right) p_2^r (1 - p_2)^{n-r} = \beta \quad (1)$$

$$P(\text{number of occurrence} \leq cv/np_1) = \sum_{r=0}^{cv} \left( \frac{n!}{r!(n-r)!} \right) p_1^r (1 - p_1)^{n-r} = 1 - \alpha \quad (2)$$

Where, the meanings of the parameters in the equations are as follows:

P= the rate of occurrence of an attribute in the population which is also equal or not equal to a certain  $P_1$  and  $P_2$  is expressed in terms of a null hypothesis : $P = P_0$ , where  $P_1 \leq P_0 \leq P_2$  and alternative hypothesis:  $P \neq P_0$  where  $P_0$  lies outside the interval.  $P_1 ; P_2$  =lower and upper precision limits of occurrence rate respectively and is decided by the auditor by using his or professional judgment;  $\alpha$  =type I error;  $\beta$  = type II error; CV =the critical value of the number of occurrences in the sample for acceptance and rejection of the null hypothesis.

If CV=0, then the null hypothesis will be rejected and the required sample size (N) will then be computed by using the following model:

$$N = \frac{\log \beta}{\log(1 - p_2)}$$

Finally, in using the above model, when CV=0, the type I error will automatically become zero as well .However, all other values for CV are computed by using a binomial distribution table or a computer.

Concerning the determination of a sample size for nonstatistical sampling, a formula issued by AICPA Audit Sampling Guide, cited by Messier, Kachelmeier, & Jensen (2001, p.83) is as follows:

$$\text{Sample Size} = \frac{\text{Population Book Value}}{\text{Tolerable Misstatement}} \times \text{Assurance Factor}$$

Moreover, Gafford & Carmichael (1984b, p.125), wrote this same formula for sample size determination as follows:

$$\text{Sample Size} = \frac{\text{Remaining Population Recorded Amount}}{\text{Basic Allowance}} \times \text{Risk Factor}$$

The population book value has been referred to as remaining population recorded amount, tolerable misstatement has been referred to as basic allowance and the assurance

factor has been referred to as risk factor. A numerical example for sample size determination using the formula above is as follows: According to Gafford & Carmichael (1984b, p.125), the determination of sample size for inventory having a remaining population recorded amount or population book value is 1,000,000 SEK, tolerable misstatement or basic allowance is 75,000 SEK, and assuming a maximum assurance factor or risk factor of 3 is as shown below:

$$\begin{aligned} \text{Sample Size} &= \frac{\text{Remaining Population Recorded amount}}{\text{Basic Allowance}} \times \text{Risk Factor} \\ &= \frac{1,000,000}{75,000} \times 3 \\ &= 40 \end{aligned}$$

Gafford & Carmichael (1984b, p.130), further point out that the risk factor can be determined by using a rule of thumb formula as shown in the table below. The table below is used to determine the assurance factor to be used in the formula as follows: if no reliance is placed on accounting control procedures and no reliance on other relevant audit procedures the risk factor that has to used in the formula above will be 3.0. Also, if moderate reliance is placed on accounting control procedures as well as on other relevant audit procedures the risk factor that has to used in the formula above will be 2.1.

**Table 6: Rule of Thumb for Detection of Risk factor**

Reliance on other relevant audit procedures				
Reliance on accounting control procedures	None	Little	Moderate	Substantial
None	3	3	2.6	2.1
Little	3	2.6	2.3	1.9
Moderate	2.6	2.3	2.1	1.6
Substantial	2.1	1.9	1.6	1.2
None	3	2.6	2.3	1.9
Little	2.6	2.3	2.1	1.6
Moderate	2.3	2.1	1.9	1.4
Substantial	1.9	1.6	1.4	0.9
None	2.6	2.3	2.1	1.6
Little	2.3	2.1	1.9	1.4
Moderate	2.1	1.9	1.6	1.2
Substantial	1.6	1.4	1.2	0.7
None	2.1	1.9	1.6	1.2
Little	1.9	1.6	1.4	0.9
Moderate	1.6	1.4	1.2	0.7
Substantial	1.2	0.9	0.7	***

Source: Gafford & Carmichael (1984b, p.130)

## 2.7 AUDIT SAMPLE SELECTION METHODS

A sample selection method that an auditor will prefer to use in the process of selecting a sample will largely depend on whether the auditor is using statistical or a nonstatistical sampling approach. However, there are some sample selection methods that can be used for both statistical and nonstatistical audit sampling approaches such as random sample selection method, systematic sample selection method or stratified sample selection method. On the other hand, haphazard, block, or directed sample selection methods are usable in situations where the auditor has chosen to use a nonstatistical sampling approach (Tate & Grein, 2009, p.171).

*Random sample selection method* involves the selection of a sample by matching random numbers generated by a spreadsheet program or an audit sampling software program. The advantage of using the random number selection method is that all sampling units in the population will have equal chances of being selected (Eilifsen et al., 2006, p.265). *Systematic sample selection method* involves the selection of an nth term after a random start. The nth term is obtained by dividing the population size by the sample size and this selection method offers the opportunity for every sample unit in the population to be selected (Whittington & Delaney, 2011, p.353). Additionally, it also involves the categorization of the population into uniform intervals and as such one item is selected from each of the uniform intervals. However, in order to use systematic sampling, the auditor must first determine the population, the sample size, sample size interval by dividing the population by the sample size, select a random start and finally, the sample is selected by successively adding the interval to a random starting point (Georgiades, 2007, p.4).

*Stratified sample selection method* requires the auditor to divide the population to be audited into sub-units or sub-populations so that items having similar characteristics are put in the same sub-unit or sub-population thereby making it suitable for the auditor to randomly select and examine a sample from each sub-group. This selection method will improve audit efficiency because the objective of stratification is to reduce the variation found in each stratum, as a result, permitting sample sizes to be reduced without increasing sampling risk (Malaysian Institutes of Accountants, 2009).

*Haphazard sample selection method* is used in selecting samples for a nonstatistical sampling approach. With this method, the auditor selects an item to be included into the sample without any justification or reason for including or excluding a given item from the sample. For this reason, haphazard selection method cannot be used in statistical sampling because the selection of items from the population is not based on defined probability concepts or theory. Haphazard selection method is permitted in nonstatistical sampling, as long as the auditor expects the selected sample to represent the characteristics of the population (Whittington & Delaney, 2011, p.353).

*Block sample selection method* involves the selection of blocks(s) that are continuous with a population. However, this method of sample selection is not commonly used in audit sampling because most populations are structured in such a way that sample units that are in a sequence can be expected to have similar characteristics. However, there are certain circumstances where, a suitable audit procedure to enable the auditor obtained audit evidence will be to examine a block of items. But block sample selection method has hardly ever be an appropriate method to select a samples for examination so that the results can be used to make inferences to the entire population (Malaysian Institutes of Accountants, 2009, p.14).

Additionally, Warren, Yates, & Zuber (1982, p.68), developed the following table to help auditors know the conditions that can cause them to select a smaller sample size or a larger sample size.

**Table 7: Conditions for Sample Size Selection**

Factor	Conditions leading to smaller sample size	Conditions leading to larger sample size
Reliance on internal accounting controls	Greater reliance on internal accounting controls	Less reliance on internal accounting controls
Reliance on other substantive tests (including analytical review procedures)	Substantial reliance	Little or no reliance
Measure of tolerable error for a specific account or class of transactions	Larger tolerable error	Smaller tolerable error
Expected size and frequency of errors	Smaller errors or lower frequency	Larger errors or higher frequency
Division of population into homogeneous groups	Larger number of homogeneous groups	Smaller number of or no homogeneous groups
Number of items in population	Little effect on sample size unless the population is small	

**Source: Warren, Yates, & Zuber (1982, p.67).**

### **3.8 AUDIT SAMPLING AND AUDIT TEST**

After an auditor has selected a sample of records and transactions, the auditor have to test these records and transactions to collect sufficient audit evidence in a timely manner. Thus, auditors usually take into consideration the timing of audit test seriously because of

the fact that the behaviour of an auditee can distort the scheduled time about audit testing and as a result affects the audit evidence to be collected as well as the cost of the audit (Patterson, 1993, p.283). Some types of audit tests in which audit sampling may be used according to Whittington & Delaney (2011) are as follows:

- **Tests of controls:** The auditor has to test those controls systems in an organization that are directed towards the design or operation of transactions and also assesses if these control systems are effective and efficient to prevent or detect material misstatements in the financial statements of a company.
- **Substantive Tests:** Substantive tests are tests that the auditor has to use to enable him obtain evidence about the validity and correctness of the accounting treatment of the company's transactions and account balances.
- **Dual Purpose Tests:** Dual purpose test is a type of test in which the auditor uses a single sample to test a control and also for the sample to serve as a substantive test of an account balance or class of transactions (Whittington, & Delaney, 2011, p.424).

Finally, Puncel (2008), mention that there are five steps that are involved when using audit sampling on both substantive tests and tests of controls which are (1) *Planning the sample* and the purposes of planning the sample are to be sure that the audit tests should be performed in such a way that the desired sample risk is obtained as well as to minimize the possibility of nonsampling error. For instance, a confidence level of 95% will provide a 5% sampling risks.(2)*Determining the sample size* and this entails predefining some factors that can affect the sample size such as tolerable rate and expected population deviation rate.(3)*Selecting the sample*; which warrants an auditor to decide on how to select sample items from the population and that an auditor should select an adequate sample size as well as taking into consideration materiality, audit risk and characteristics of the population.(4)*Performing the tests* which basically entails the examination of documents as well as performing other audit procedures. Finally, (5)*Evaluating the sample results* and this is concerned with the drawing of conclusions pertaining to the likely effect on the total population based on the audit tests that have been performed on the sample.

## CHAPTER FOUR: EMPIRICAL FINDINGS

### 4.1 HOW SAMPLING TECHNIQUES ARE CHOSEN DURING AUDITING

With regard to the choosing of sampling techniques during auditing, Respondent A said that the criteria for choosing sampling techniques during auditing depends largely on the risk and nature of transactions that have to be examined because if the population is made up mostly of large items, then nonstatistical sampling is used and if the population is made up of large items as well as many small items, then both nonstatistical and statistical techniques are chosen. Moreover, Respondent B pointed out that sampling techniques are chosen by using their professional judgement, though most often the two sampling techniques; statistical and nonstatistical are combined. In addition, Respondent B adds that they do this by using their professional judgment to first consider key items and based on the threshold which they have set during audit planning, key items are chosen and this of course implies using judgmental sampling.

*We usually decide whether the key items that have been chosen are sufficient and if they are not sufficient we have to combine nonstatistical sampling with statistical sampling. However, when using statistical sampling to select samples we have an audit tool that is used and that tool is basically an audit software package.*

According to Respondent C, before choosing sampling techniques, they usually have to first know the company, especially if it is a company that they are auditing for the first time and that this is done by talking with the management in order to have general information about the company, understand the business strategy of the company, the customers of the company, and the market size of the company.

*All the information gathered is to enable us get a complete picture about the company as well as to know the risky parts of the business so as to pay more attention during auditing. This will also enable us to know the weak parts in the structure of the business. After this we look into the balance sheet of the company and identify key account balances as well as major increases or decreases by comparing current balance sheet with the previous year balance sheet. Thereafter, we proceed into the choosing of sampling techniques. We use nonstatistical sampling technique to examine all the key items and statistical sampling is then used to select additional items.*

Moreover, Respondent D mentioned that they usually start by using their professional judgment as well as taking into consideration how big are the accounts balances found in the company's balance sheet and what risk is associated with the accounts balances.

*In fact, we start with nonstatistical sampling by using our professional judgment, take into consideration risk and materiality as well as tolerable error. Thereafter, we use the statistical sampling technique.*

Finally, Respondent E pointed out that they choose sampling technique during auditing by first carrying out audit planning and determine a threshold which is used in deciding what is important to look at, assess risk and materiality and look at the figures in the income statement and the balance sheet.

All these we take into consideration before choosing a sampling technique and we also talk to the management, assess risk and use nonstatistical sampling for key and risky items follow by statistical sampling for items with small monetary amounts.

**Table 8: Considerations when chosen Sampling Techniques**

<b>Respondents</b>	<b>Considerations when choosing sampling technique</b>	<b>Audit sampling technique used</b>
<b>Respondent A</b>	Risky items, large items as well as small items	Statistical & nonstatistical
<b>Respondent B</b>	professional judgment is used to first select key items (judgmental sampling) followed by statistical sampling to select more items	statistical & nonstatistical
<b>Respondent C</b>	General information about the company, understand its business strategy, the customers, and the market size	statistical & nonstatistical
<b>Respondent D</b>	How big are the accounts balances, risk associated with the accounts balances, materiality as well as tolerable error	statistical & nonstatistical
<b>Respondent E</b>	Perform audit planning and determine thresholds which is used in deciding what is important to be examined, assess risk and materiality	statistical & nonstatistical

## 4.2 OPINIONS ABOUT AUDIT SAMPLING

Respondent A's opinion about audit sampling was that audit sampling is of course very necessary for an audit because they have to choose what to audit as it is hard to audit everything. If they have to read all the invoices and examine all the transactions, the audit will become very expensive for our clients and time consuming for us as well. In addition, Respondent A also mentioned that audit sampling will lead to audit efficiency because it is a suitable way to examine what is risky.

*Audit sampling is very necessary during auditing and it makes an audit efficient and cost effective to the client.*

Moreover, Respondent B's opinion was that audit sampling is necessary in an audit because it enhance the effectiveness and efficiency of the audit process and that this depends also on whether the person using the concept is using it in a good way following what is supposed to be done.

*If audit sampling is done correctly, then the audit will be effective and efficient.*

Furthermore, Respondent C's opinion was that audit sampling enables auditors to examine all the financial statements components on time.

*Without the use of audit sampling, auditors will have to spend many hours in examining a company's records and transactions of which the company will not be able to pay for all the hours spent.*

With respect to whether audit sampling is therefore efficient considering the fact that not all transactions are audited, Respondent C said that audit sampling is efficient because they have been using it to discover material misstatements that are found in the financial statements of companies. Also, Respondent D's opinion about audit sampling was that audit sampling gives a higher quality in an audit and it is an efficient audit tools because they have to review only the things that are necessary.

*Audit sampling permits us not to do too much and not to do very little. It is an efficient way to do auditing as well as to serve cost and time. If we have to audit everything, our clients will not be able to pay for all the time we have spent. We ourselves do not have the time to read all the invoices of a company though it could be possible for a small company.*

Finally, Respondent E's opinion about audit sampling was that audit sampling is a good and independent way of choosing what to review and that audit sampling has to be used when auditing companies that are large because large companies always have lots of transactions. With regard to audit sampling efficiency, Respondent E said that audit sampling is actually efficient because they have been using it to gather sufficient and reliable evidence that are used in forming an audit opinion.

**Table 9: Auditor's opinions about audit sampling**

<b>Respondents</b>	<b>Opinion about Audit Sampling</b>
<b>Respondent A</b>	Audit sampling is very necessary for an audit because it makes an audit efficient and cost effective to a client
<b>Respondent B</b>	Audit sampling enables auditors to examine all the financial statements components on time.
<b>Respondent C</b>	Without the use of audit sampling, auditors will have to spend many hours in examining a company's records and transactions of which the company will not be able to pay for all the hours spent
<b>Respondent D</b>	Audit sampling permits us not to do too much and not to do very little. It is an efficient way to do auditing as well as to serve cost and time
<b>Respondent E</b>	Audit sampling is a good and independent way of choosing what to review and that audit sampling has to be used when auditing companies that are large

### **4.3 NON-RECURRING ITEMS DISCOVERED IN SAMPLES**

With regard to the treatment of high value non-recurring transactions that are found in a sample, Respondent A pointed out that such items are sorted and treated separately because it is possible for clients to have some high value non-recurring items in its income statement or balance sheet.

*All items that usually are of large monetary amounts but they do not occur frequently are sorted from the samples and examined separately.*

Respondent B said that they have a computer software programs that is used to search for high value non-recurring transactions to remove them from samples.

*For instance, we can put figures like 5,000, 000SEK, 6,000,000SEK and the computer program will detect the high value non recurring transactions so that there are examined separately because such items are very risky and they must be dug or investigated deeper.*

According to Respondent C they usually carry out a lot of test of details and verify all source documents related to all high value non-recurring items to understand the nature of transactions as well their riskiness.

*We always make sure that all high value non recurring transactions are audited.*

Respondent D mentioned that they have to go into the details and examine all high value non-recurring items with large amounts and there are always tested.

*We check everything about the high value non-recurring items and then proceeds into testing of details. That is how such items are treated and therefore high value non recurring transactions are always sorted from the sample and examined separately.*

Finally, Respondent E's views about the treatment of high value non-recurring transactions discovered in samples was that test of details is used on such items.

**Table 10: Treatment of high values non-recurring items discovered in samples**

<b>Respondents</b>	<b>How high value non-recurring items discovered in samples are treated</b>
<b>Respondent A</b>	All items that usually are of large monetary amounts but they do not occur frequently are sorted from the samples and examined separately
<b>Respondent B</b>	Audit sampling enables auditors to examine all the financial statements components on time.
<b>Respondent C</b>	A computer software programs is used to search for high value nonrecurring transactions and remove them from the samples and separately examined
<b>Respondent D</b>	High value non-recurring transactions are always sorted from the sample and examined separately or are checked in details
<b>Respondent E</b>	Test of details is used on high value non-recurring transactions discovered in samples.

#### **4.4 AUDIT PROCEDURES NOT REQUIRING AUDIT SAMPLING**

According to Respondent A, an audit procedure not requiring audit sampling is when they have to audit the bank account of a company by inquiring from the bank whether the bank balance on the company's balance sheet conforms to the amount of money it has in the bank as of a particular date and they called this process inquire and investigation.

*We do this without using audit sampling by requesting a bank statement from the bank to confirm whether the balance in the books matches with the balance in the bank statement. When we have received confirmation from the bank, audit sampling could be used to examining a few withdrawals to know whether they were authorized as well as signed by appropriate authorities.*

Respondent B said that a common example of an audit procedure that does not require audit sampling is an analytical audit procedure but all substantive tests of transactions on account balances require audit sampling procedures except cash.

*We always look at the company's cash balance and compare it with other documents from third parties such as the company's bank statements.*

#### **4.5 AUDIT SAMPLING OVER THE LAST 10 YEARS**

With regard to what has happened with audit sampling over the last 10 years, Respondent B said that the concept of audit sampling has become very clearer and easy to use because of the availability of better tools (computerized software packages) thereby making the concept efficient and effective than it was during the last 10 years. Moreover, Respondent C pointed out that during the last 10 years as well as in the 80s and 90s, the way in which audit sampling was used is different.

*There were loose regulations about the concept and it was up to an auditor to choose how to use audit sampling. Though there were regulation as well as some manuals about audit sampling (working Guide), there were not directly pin pointed.*

Respondent C further adds that this continues until after the Arthur Anderson and the Enron accounting scandal that occurred in the United States sending shocking waves across the world about the efficiency of audit sampling.

*Auditing sampling practices became much more regulated and emphasize were made on how to use audit sampling techniques effectively and efficiently. Also, when Sweden joined the European Union, audit sampling became more documented and it was not longer as free and loose as before. We have a lot of documents that we must compile to keep regulatory bodies informed about the usage of audit sampling and the government also comes and asks questions.*

Furthermore, Respondent D said that audit sampling over the last ten years has become more focused and easier now.

*At first nonstatistical sampling was commonly used. But now we use both statistical and nonstatistical sampling and the difference lies in the fact that nonstatistical sampling is used to examine key items and then if it is necessary to look at more items statistical sampling is used compare to the past where nonstatistical sampling was commonly use.*

In addition, Respondent D said that although audit sampling has become more focused now compared to the last 10 years, it also requires much more knowledge. Also, the events that have happened during the last 10 years in accounting such as the Arthur Anderson-Enron accounting scandal have contributed to the availability of better audit sampling tools in the market.

*Such events have equally made us to be efficient and thus do our job well and government regulations have become much more severe now on audit sampling practices because of what has transpired over the last 10 years.*

Finally, Respondent E said that they have been using audit sampling before but it was mostly nonstatistical and not very statistical and that audit sampling has become more statistical today because of the availability of computers software than it was in the last 10 years.

**Table 11: Audit sampling over the last 10 years**

<b>Respondents</b>	<b>Audit sampling over the last 10 years</b>
<b>Respondent B</b>	Audit sampling today compare to audit sampling over the last 10 years has become very clearer and easy to use thanks to the availability of better tools (computerized software packages) making the concept to be more effective and efficient.
<b>Respondent C</b>	There were loose regulations about the concept and it was up to an auditor to choose how to use the concept. This continues until after the Arthur Anderson and Enron accounting scandal in the United States that sent shocking waves across the world about the efficiency of audit sampling. As a result auditing sampling became more regulated.
<b>Respondent D</b>	At first nonstatistical sampling was commonly used, but now both statistical and no statistical sampling are used.
<b>Respondent E</b>	Audit sampling was mostly nonstatistical and not very statistical but today it has become both statistical and nonstatistical because of the availability of computers software than it was in the last 10 years.

#### **4.6 AUDIT SAMPLING TECHNIQUES FOR SME'S AND BIG COMPANIES**

Concerning whether different sampling techniques are used when auditing SME's and big companies, Respondent A said that they do not use different sampling techniques for SME's and bigger companies and that the same sampling techniques are used, though it could be different depending on the routines of the company's transactions.

*When auditing small companies, we mostly use judgmental sampling to identify key items and if these key items constitute a greater proportion of the balance sheet, then we do not need to use statistical sampling. For bigger companies, judgmental sampling is first used to identify key items and this is followed by applying statistical sampling technique on the remaining transactions that are found in the population. Otherwise, the sampling techniques for SME's and bigger companies are quite the same. The only difference arises in the sample sizes because in bigger companies, we take larger samples and for smaller companies we take smaller samples.*

Moreover, Respondent B mentioned that they do not use different sampling techniques when auditing companies no matter whether the company is a small company or a large company. *We audit all companies the same through the use of both techniques.* Respondent C said that nonstatistical sampling technique is most often used for smaller companies having fewer transactions and both statistical and no statistical audit sampling techniques are used for bigger companies having many complex transactions.

Furthermore, Respondent D said that nonstatistical sampling technique is used most often for smaller companies and for bigger companies both statistical and nonstatistical sampling techniques are used.

*For instance, if a small company has a population that is made up of five items worth 5 million SEK and two of those items are worth in total the sum of 4.5 million SEK, and the remaining three items are worth 5 hundred thousand SEK, it means that only*

*nonstatistical sampling technique shall be used to audit the large items and statistical will not be used because the value of the smaller items relative to the big items is small.*

Finally, Respondent E said that big companies usually have large items as well as many other smaller items.

*Therefore, we use statistical and nonstatistical sampling for larger companies and the nonstatistical sampling for smaller companies.*

**Table 12: Audit Sampling Techniques for SME’s and Big Companies**

<b>Respondents</b>	<b>Audit Sampling Techniques for SME’s and Big Companies</b>
<b>Respondent A</b>	When auditing small companies, judgmental sampling is used to identify key items and if these key items constitute a greater proportion of the balance sheet, then it will not be necessary to use statistical sampling. For bigger companies, judgmental sampling is first used to identify key items and this is followed by applying statistical sampling technique on the remaining transactions to select additional items.
<b>Respondent B</b>	Different audit sampling techniques are not used when auditing companies no matter whether the company is a small company or a large company. All companies are audited using both techniques.
<b>Respondent C</b>	Nonstatistical sampling technique is most often used for smaller companies having fewer transactions and both statistical and nonstatistical audit sampling techniques are used for bigger companies having many complex transactions.
<b>Respondent D</b>	Nonstatistical sampling technique is used most often for smaller companies and for bigger companies both statistical and nonstatistical sampling techniques are used.
<b>Respondent E</b>	Statistical and nonstatistical sampling is used for larger companies and the no statistical sampling for smaller companies.

## **4.7 STATISTICAL AUDIT SAMPLING**

### **4.7.1 WHEN STATISTICAL AUDIT SAMPLING IS APPROPRIATE**

With regard to when statistical sampling is appropriate, Respondent A said that statistical audit sampling is appropriate when there are many transactions or account balances that are worth almost the same value with no transaction being very different from one another or there are no postings that have been assessed to be very risky.

*For instance statistical audit sampling is appropriate in such situations where they are auditing a supermarket in which there are lots of merchandizes that are worth not much money individually but in total are worth much money.*

According to Respondent B statistical audit sampling is appropriate when there is a population that is made up of very or only small items. *That is a population in which there are no key items or a population in which all the key items have been sorted and removed.* Moreover, Respondent C said that statistical sampling is appropriate in big companies in which there are lot of transactions.

*When there are many transactions, the transactions are uploaded into the software and by using the statistical sampling techniques; the computer software will select the transactions to be audited, perform the necessary calculations and thus serves times because we work with the clock as time is money. Therefore, statistical sampling is more appropriate if the company is a big company.*

Furthermore, Respondent D said that it is appropriate almost always in situations where there are many account balances with amounts below the threshold and when there are no key item or when all the key items having values above the threshold have been sorted, then statistical sampling is appropriate. Finally, Respondent E said that statistical sampling is appropriate when there are big volumes of transactions especially in big companies where usually there are lots of data.

**Table 13: When Statistical Audit Sampling is Appropriate**

<b>Respondents</b>	<b>When Statistical Audit Sampling is Appropriate</b>
<b>Respondent A</b>	Statistical sampling is appropriate when there are many transactions or account balances that are worth almost the same value with no transaction being very different from one another or there are no postings that have been assessed to be very risky.
<b>Respondent B</b>	Statistical sampling is appropriate when a population is made up of very or only small items in a population in which there are no key items or a all the key items have been sorted and removed.
<b>Respondent C</b>	Statistical sampling is appropriate in big companies in which there are many transactions and for small companies because it is easier for key items to be identified using professional judgment.
<b>Respondent D</b>	Statistical sampling is appropriate in situations where there are many account balances with amounts below the threshold and when there are no key item or when all the key items having values above the threshold have been sorted.
<b>Respondent E</b>	Statistical sampling is appropriate when there are big volumes of transactions especially in big companies where usually there are lots of data.

#### **4.7.2 SELECTING SAMPLES FOR STATISTICAL AUDIT SAMPLING**

With regard to how audit samples are selected when using statistical sampling, Respondent A said that the selection method that is used in selecting samples when using statistical sampling is the systematic selection method and what is done practically is that every 10<sup>th</sup> item is selected and this is followed by taking every 20<sup>th</sup> item from the population.

*For instance if we have a population containing one hundred items, then we select every 10<sup>th</sup> item, 20<sup>th</sup> item, 30<sup>th</sup> item just like that. However, during the next year of auditing the same company, we do not choose the 10<sup>th</sup>, 20<sup>th</sup> or 30<sup>th</sup> items. We usually change it and select for example the 13<sup>th</sup> item, the 26<sup>th</sup> item and so on.*

Moreover, Respondent B said that audit samples are selected randomly and this done through the aid of a computer software program that is used to randomly select samples. In addition, about how many samples have to be selected in order to fulfil good statistics, Respondent B said that it depends on their risk assessment, how big the population is and whether there are key items in the accounts or not.

*Depending on the risk assessment and how big the population is the computer program tells us how many samples we have to examine in order to fulfil good statistics. However, before selecting samples using statistical sampling, we have to first identify and select all the key items and then use statistical random sampling to select more items to have the total number of items that have to be tested or examined. The program tells us the sample size that is needed to fulfil good statistics.*

Furthermore, Respondent C said that in order to select the samples, they have to start by looking at the company's balance sheet, get information about the products of the company, the customers and suppliers.

*We judge which posts are essential for the business and most often such post are selected first using our professional judgement. Then remaining transactions are then selected using statistical random sampling.*

With regard to the number of samples that needs to be selected to fulfil good statistics, Respondent C said that there is no unique or precise number of samples that can be selected as it depends on size and riskiness of the transaction of the company that is being audited. According to Respondent D samples are randomly selected when using statistical audit sampling and this is done using the computer software package. With regard to the number of samples that have to be selected in order to fulfil good statistics when using statistical sampling technique, Respondent D said that it depends on the population because if a population has many smaller items, then the sample size will be greater and the if the population has less items, then the sample size will be smaller and it also depends on the risk involve. Finally, Respondent E said that the systematic selection method is used in which they select every 10<sup>th</sup> and 20<sup>th</sup> items in that order if more wrongs are discovered in that sample then they will have to go ahead and select more items.

**Table 14: Selecting Samples for Statistical Audit Sampling**

<b>Respondents</b>	<b>Selecting Samples for Statistical Audit Sampling</b>
<b>Respondent A</b>	The selection method that is used in selecting samples when using statistical sampling is the systematic selection method and what is done practically is that every 10 <sup>th</sup> item is selected and this is followed by taking every 20 <sup>th</sup> item from the population.
<b>Respondent B</b>	Audit samples are selected randomly and this done through the aid of a computer software program that is used to randomly select samples.
<b>Respondent C</b>	Posts that are essential for the business are first selected using professional judgment and the remaining posts are selected using statistical random sampling.
<b>Respondent D</b>	Samples are randomly selected when using statistical sampling and this is done using the computer software package.

<b>Respondent E</b>	Systematic selection method is used by selecting every 10 <sup>th</sup> and 20 <sup>th</sup> items in that order.
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### **4.7.3 PROBLEMS ASSOCIATED WITH STATISTICAL AUDIT SAMPLING**

With regard to some problems that are associated with the use of statistical audit sampling, Respondent A said that the major problem is that some postings that contain lots of errors or material misstatements might be missed and it is risky if such postings are left unchecked. Respondent A further adds that using only statistical sampling causes the risk of not selecting big and risky items found in the population that is why it is good to combine both techniques to guarantee high quality audit.

According to Respondent B, the major difficulty with statistical sampling is that if you do not have a computer software program, then it is quite hard to use statistical sampling during auditing. Respondent C said that another difficulty that is associated with the use of statistical sampling could be perhaps the fact that there is also the problem of interpretation or understanding the outputs because the software can do calculations but you have to interpret the output yourself. Another difficult could be that you might not really know how to use the tools in a competent way though many younger auditors nowadays are more efficient in using the computer packages.

*The tools have pre-asked questions and auditors can simply click yes or no to have answers and that is a big risk in itself. We always advice young auditors during seminars that they must argue also for how they have obtained results and understand how the computer has treated a particular post and not just to click yes or no to have answers without understanding what has been done. When I started this profession, we had to perform statistical calculations manually by using our knowledge to calculate sample sizes and other things were done using our brains compare to now that there are already made formulas or tools.*

Furthermore, Respondent D said that the major difficulty associated with statistical audit sampling has been solved because there are computer tools to do the calculations especially when working with really big companies, but the only difficulty now is the problem of time.

*The time factor usually makes us to be little bit stressed up but on the other hand it also makes us work faster and harder. So time factor is like a problem to me but basically the computer tools have removed the major difficulty of manual statistical calculations.*

Finally, Respondent E said that the computer tools at our disposals have made the use of statistical sampling easier but a current problem is that newly recruits will not be well equipped with the use of professional judgment because professional judgment is based on what you can do with your head and not depending upon computer tools to do it for you.

*For instance, the computer tools can say that they should take 20 items, whereas professional judgment would have helped in some scenarios where you need to take more than 20 items.*

**Table 15: Difficulties Associated with Statistical Audit Sampling**

<b>Respondents</b>	<b>Difficulties Associated with Statistical Audit Sampling</b>
<b>Respondent A</b>	The major problem is that some postings that contain lots of errors or material misstatements might be missed and it is risky if such postings are left unchecked
<b>Respondent B</b>	The major difficulty with statistical sampling is that if there is no computer software program, then it is quite hard to use statistical sampling during auditing.
<b>Respondent C</b>	There is also the problem of interpretation or understanding the outputs because the software can do calculations but you have to interpret the output yourself. In addition, the tools have pre-asked questions and auditors can simply click yes or no to have answers and that is a big risk in itself.
<b>Respondent D</b>	Time factor is like a problem to me when auditing large companies but basically computer tools have removed the major difficulty of manual statistical calculations.
<b>Respondent E</b>	The current problem is that young auditors using computer tools will not be well equipped with the use of professional judgment because professional judgment is based on what you can do with your head and not depending upon computer tools to do it for you.

#### **4.7.4 EXTENT OF TRAINING FOR THE USE OF STATISTICAL AUDIT SAMPLING**

About the extent of training for the use of statistical audit sampling, Respondent A said that auditors obtain additional training about statistical audit sampling on the job when working in an audit firm.

*They are not trained to have advanced mathematical statistical knowledge because we have a computer tool that assists us in statistical calculations.*

In addition, Respondent B said that every auditor gets formal training as well as on the job training on how to use the audit software packages. Respondent C said that statistical sampling is based on computer tools and as results auditors obtain formal education on the use of computerized statistical audit sampling.

*We invest a lot of money in education because competence is what we sell and thus we consider continuous training in all areas as very important not only in statistical sampling.*

Furthermore, Respondent D said that they have about three weeks of education that all recruits have to undertake on the use of computerized statistical audit sampling and its application in determining sample sizes, selecting samples, determining risk and materiality. Then after that they have to go into practical training whereby they will have to apply their knowledge in a real life scenario. Finally, Respondent E said that all auditors that are employed are usually placed under training for five years and during this period they are equally trained on how to use computerized statistical audit sampling.

Besides every year we attend refresher courses and concepts such as audit sampling techniques are also discussed.

**Table 16: Extent of Training for the use of Statistical Audit Sampling**

<b>Respondents</b>	<b>Extent of Training for the use of Statistical Audit Sampling</b>
<b>Respondent A</b>	Auditors obtain additional training on the job but they are not trained to have advanced mathematical statistical knowledge because there is a computer tool that assists in statistical calculations.
<b>Respondent B</b>	Every auditor gets formal training as well as on the job training on how to use the audit software packages.
<b>Respondent C</b>	Statistical sampling is based on computer tools and auditors obtain formal education on the use of computerized statistical audit sampling. Moreover, we invest a lot of money in education because competence is what we sell and thus we consider continuous training in all areas as very important not only in statistical sampling.
<b>Respondent D</b>	They have about three weeks of education that all recruits have to undertake on the use of computerized statistical audit sampling and its application in determining sample sizes, selecting samples, determining risk and materiality.
<b>Respondent E</b>	All auditors that are employed are usually placed under training for five years and during this period they are equally trained on how to use computerized statistical audit sampling. Besides, every year we attend refresher courses whereby concepts such as audit sampling techniques are also discussed.

## **4.8 NONSTATISTICAL AUDIT SAMPLING**

### **4.8.1 WHEN NONSTATISTICAL AUDIT SAMPLING IS APPROPRIATE**

Concerning when nonstatistical sampling is appropriate, Respondent A said that it is appropriate to use nonstatistical sampling technique whenever a company has risky items as well as accounts balances that have large values. Also, Respondent B mentioned that it is appropriate whenever a population contains big items or whenever the population is a small population. Moreover, Respondent C pointed out that nonstatistical sampling is appropriate in smaller firms that do not have many transactions and appropriate in large firms for the selection of unusual transactions.

Furthermore, Respondent D said that nonstatistical sampling is appropriate when there are key items.

*For instance if all items in the balance sheet are worth 5 million SEK and key items comprise 4.5 million SEK, then you can audit only this key items and assume that remaining items worth 5 hundred thousand SEK cannot be that wrong and in such situations you do not need to apply statistical sampling.*

Finally, Respondent E said that, nonstatistical sampling is appropriate when there are unusual items in the balance sheet and when the company to be audited is a very small company in which you can just review most transactions.

*In large companies you need to use both sampling techniques. So it depends actually on the size of the company. If the company is very small then nonstatistical audit sampling technique is used most often.*

**Table 17: When Nonstatistical Audit Sampling is Appropriate**

<b>Respondents</b>	<b>When Nonstatistical Audit Sampling is Appropriate</b>
<b>Respondent A</b>	It is appropriate to use nonstatistical audit sampling technique whenever a company has risky items as well as accounts balances that have large values.
<b>Respondent B</b>	It is appropriate whenever a population contains big items or whenever the population is a small population.
<b>Respondent C</b>	Nonstatistical sampling is appropriate in smaller firms that do not have many transactions and appropriate in large firms to select unusual transactions.
<b>Respondent D</b>	Nonstatistical sampling is appropriate when there are key items. For instance if all items in the balance sheet are worth 5 million SEK and key items comprise 4.5 million SEK, then you can audit only this key items and assume that remaining items worth 5 hundred thousand SEK cannot be that wrong and in such situations you do not need to apply statistical sampling.
<b>Respondent E</b>	Nonstatistical sampling is appropriate when there are unusual items in the balance sheet and when the company to be audited is a very small company in which you can just review most transactions.

#### **4.8.2 SELECTING ITEMS FOR NONSTATISTICAL AUDIT SAMPLING**

With regard to the method that is used to select samples when using nonstatistical audit sampling, Respondent A pointed out that they use mostly their professional judgment to select key and risky items. Concerning the number of samples that have to be examined in order to achieve sufficiency of audit evidence when using nonstatistical audit sampling, Respondent A mentioned that it depends on the company as well as on the number of key items on the company's balance sheet. Also, Respondent B pointed out that they use their professional judgment and based on the performance of materiality that has been set, key items are selected.

*For instance, if we set a performance level for materiality at one million Swedish Krona, then we have to look at all items that are bigger than this amount and then sort all these items for examination.*

Respondent B further said that in practice, an appropriate sample size when using nonstatistical sampling depends on the number of key items found in the population and the most common method is to choose all the biggest transactions by using our professional judgment. As concerns the number of samples that have to be selected in order to achieve sufficiency of audit evidence when using nonstatistical sampling,

Respondent B said that it depends on the number of key items that are found in the population and how risky the items are.

Furthermore, Respondent C mentioned that the selection method that is used for selecting samples when using nonstatistical audit sampling is professional judgment in selecting and an appropriate sample size is determined by making sure that all the big posts are selected.

*We also have to discuss with management about the company and assess risks associated with the key items.*

Moreover, Respondent D said that it is based on threshold, risk and materiality that key items are selected by the use of professional judgment.

*An appropriate sample size is determined by taking all the key items and it depends the risk and materiality. However, this can be increased depending on the threshold that has been set.*

Finally, Respondent E said that professional judgment is used to select samples when using nonstatistical audit sampling and this also depends on the threshold, risk and materiality.

**Table 18: Selecting Items for Nonstatistical Audit Sampling**

<b>Respondents</b>	<b>Selecting Items for Nonstatistical Audit Sampling</b>
<b>Respondent A</b>	Professional judgment is used to select key and risky items
<b>Respondent B</b>	Professional judgment is used and based on the performance of materiality that has been set, key items are selected.
<b>Respondent C</b>	The selection method that is used for selecting samples when using nonstatistical audit sampling is professional judgment and an appropriate sample size is determined by making sure that all the big posts are selected.
<b>Respondent D</b>	It is based on threshold, risk and materiality that key items are selected by the use of professional judgment.
<b>Respondent E</b>	Professional judgment is used to select samples when using nonstatistical audit sampling and this depends on the threshold, risk and materiality.

### **4.8.3 RISK ASSOCIATED WITH NONSTATISTICAL SAMPLING**

Concerning the risk that is associated with the use of nonstatistical sampling technique, Respondent A said that the only possible risk is that a client could figure out and understand that auditors are always focusing on large and risky transactions and as a result make the large items to be always correct while cheating with the small ones and such frauds are hard to uncover. In addition, Respondent B pointed out that the risk associated with nonstatistical audit sampling could arise from the fact that errors that are found in small items are missed but if nonstatistical sampling is combined with statistical sampling the risk will be neutralized.

Moreover, Respondent C said that the risk depends largely on the auditor making the decision on how to choose key items because if wrong key items are chosen it implies

greater risk especially if an auditor chooses key items by looking at the company's balance sheet without taking time to assess risks. Furthermore, Respondent D mentioned that the risk associated with the use of nonstatistical sampling is that some key items selected might be left unreviewed but if all the key items are selected and examined, then errors that are left in the small items cannot be that material. Finally, Respondent E said that possible risk is that if the auditor's judgment about key items and risky items is wrong, then most errors will be left undiscovered.

**Table 19: Risk Associated with Nonstatistical Audit Sampling**

<b>Respondents</b>	<b>Risk Associated with Nonstatistical Audit Sampling</b>
<b>Respondent A</b>	A client could figure out and understand that auditors are always focusing on large and risky items, as a result make the large items correct while cheating with the small ones and such frauds are hard to uncover
<b>Respondent B</b>	The risk associated with nonstatistical audit sampling could arise from the fact that errors that are found in small items are missed but if nonstatistical sampling is combined with statistical sampling the risk will be neutralized.
<b>Respondent C</b>	Possible risk depends largely on the auditor making the decision on how to choose key items because if wrong key items are chosen it implies greater risk especially if an auditor chooses key items by looking at the company's balance sheet without taking time to assess risks.
<b>Respondent D</b>	The risk associated with the use of nonstatistical sampling is that some key items selected might be left unreviewed but if all the key items are selected and examined, then errors that are left in the small items cannot be that material.
<b>Respondent E</b>	Possible risk is that if the auditor's judgment about key items and risky items is wrong, then most errors will be left undiscovered.

#### **4.9 SAMPLE SIZE AFTER "GOOD AND BAD AUDITING"**

As concerns the sample size that is used after "good auditing" (i.e. discovery of fewer material misstatements) for the 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup> and 10<sup>th</sup> year of auditing the same company, Respondent A said if the company's accounts have been showing a true and fair view consistently after the 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup> and even 10<sup>th</sup> year of "good auditing" the sample size will still remain the same but it will increase after each year of "bad auditing". Respondent B mentioned that the sample size stays the same after each year of "good auditing" but if material misstatements are always discovered after each year of "bad auditing", then the sample size will continue to be increased each year until there are fewer material misstatements.

In addition, Respondent C pointed out that if the risk in the accounts is the same for the first 6 years of auditing a company, then the sample size will continue to be the same but if after the 10<sup>th</sup> year of auditing the same company and no material misstatements are discovered, then it is more likely that the risk is lower and the sample size will still stay the same. But if we have audited and find some errors every year, then the risk will be

high and the sample size will be increased. Furthermore, Respondent D said that there is actually no difference in sample size for the 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> year, but if “good auditing” is performed up to 8<sup>th</sup> and 10<sup>th</sup> year, then the company will be well known, risk assessment will be low and the sample size might go down but it is the reverse after each year of “bad auditing”.

Finally, Respondent E mentioned that if after each year the company audited is having lot of errors or material misstatements in its financial statements, then usually the risk is assessed as high and a bigger sample size is used each year but the sample size also stays the same after each year of “good auditing”.

**Table 20: Sample Size after “Good and Bad Auditing”**

<b>Respondents</b>	<b>Sample Size after “Good and Bad Auditing”</b>
<b>Respondent A</b>	If the company’s accounts have been showing a true and fair view consistently after the 2 <sup>nd</sup> , 4 <sup>th</sup> , 6 <sup>th</sup> and even 10 <sup>th</sup> year of “good auditing” the sample size will still remain the same but it will increase after each year of “bad auditing”.
<b>Respondent B</b>	The sample size stays the same after each year of “good auditing” but if material misstatements are always discovered after each year of “bad auditing”, then the sample size will continue to be increased each year until there are fewer material misstatements.
<b>Respondent C</b>	If the risk in the accounts is the same for the first 6 years of auditing a company, then the sample size will continue to be the same but if after the 10 <sup>th</sup> year of auditing the same company and no material misstatements are discovered, then it is more likely that the risk is lower and the sample size will still stay the same. But if we have audited and find some errors every year, then that the risk will be high and the sample size will be increased.
<b>Respondent D</b>	There is actually no difference in sample size for the 2 <sup>nd</sup> , 4 <sup>th</sup> and 6 <sup>th</sup> year, but if “good auditing” is performed up to 8 <sup>th</sup> and 10 <sup>th</sup> year, then the company will be well known, risk assessment will be low and the sample size might go down but it is the reverse after each year of “bad auditing”.
<b>Respondent E</b>	If after each year the company audited is having lot of errors or material misstatements in its financial statements, then usually the risk is assessed as high and a bigger sample size is used each year but the sample size also stays the same after each year of “good auditing”.

## CHAPTER FIVE: ANALYSIS

### **5.1 HOW SAMPLING TECHNIQUES ARE CHOSEN DURING AUDITING**

The findings showed that the choosing of sampling techniques during auditing depends largely on the risk and nature of transactions that have to be examined. In addition, before sampling techniques are chosen, auditors have to first know the company, understand the business strategy of the company, the customers of the company, and the market size of the company. This will enable them to get a complete picture of the company and also know the risky parts of the business so as to pay more attention during auditing. Moreover, the balance sheet of the company is used to identify unusual account balances as well as to major increases or decreases by comparing current year figures with the previous year figures.

Furthermore, when the population is made up mostly of large items, nonstatistical audit sampling is used and if the population is made up of large items as well as many small items both nonstatistical audit sampling and statistical audit sampling are used. Based on the level of materiality that has been set during audit planning, key items are selected by the use of professional judgement. Gavenda (2001, p.67), points out that nonstatistical audit sampling is more judgmental and as a results samples are selected by the use of professional judgment.

Finally, when the total value of the key items selected is sufficiently large relative to the balance sheet value, then there will be no need to use statistical samplings and when the total value of the key items is small relative to the balance sheet value the two techniques are combined. Therefore, both statistical audit sampling and nonstatistical audit sampling are used during auditing practices with nonstatistical audit sampling widely used because of the availability of audit software computer packages. Additionally, Hitzig (2004), points out that statistical audit sampling is considered as an aid to the auditors as it helps the auditor to determine the extent of test to be performed helps in risks minimization and permit the drawing of scientific conclusions that are based on the findings carried out on the samples.

### **5.2 SAMPLING TECHNIQUES FOR SME'S AND BIG COMPANIES**

The findings continue to show that auditors use nonstatistical audit sampling most often when auditing SME's and when auditing bigger companies, statistical audit sampling and nonstatistical audit sampling are combined. When auditing small companies, nonstatistical sampling is mostly used to identify key items and if these key items constitute a greater proportion of the balance sheet, then there will be no need to use

statistical sampling. However, Ruppel (2008), argues that sampling may not be useful when auditing small companies as auditors generally do not consider tests of controls and the use of sampling to obtain documentary evidence to determine if the controls are working as required. In addition, the author argues that small businesses generally have small population of accounting data in both account balances and classes of transactions and as a result sampling may not be useful.

For bigger companies, judgmental sampling is first used to identify key items and this is followed by applying statistical sampling technique because there are always and most often many remaining transactions that are found in the population having almost the same monetary values. If not, the sampling techniques for SME's and bigger companies would have being quite the same as the only difference would have being in the sample sizes because in bigger companies the sample size is larger because of many transactions and for smaller companies the sample size is smaller because of fewer transactions.

### **5.3 WHEN STATISTICAL AUDIT SAMPLING IS APPROPRIATE**

With regard to when statistical sampling is appropriate, the empirical findings showed that statistical audit sampling is appropriate when there are many transactions or account balances that are worth almost the same value with no transaction being very different from one another or there are no postings that have been assessed to be very risky. For instance statistical sampling is appropriate when auditing a supermarket in which there are lots of merchandizes that are worth not much money individually but in total are worth much money. What this means is that statistical audit sampling is appropriate in situations where the population to be investigated is made up of only small items. That is a population in which there are no key items or a population in which all the key items have been sorted and removed.

Moreover, Hitzig (2004, p.31), points out that statistical audit sampling “is appropriate when the auditor has no prior knowledge as to which specific items in a population are misstated”. However, statistical sampling has been once perceived by auditors as a complex audit process requiring a high level of mathematical and computational skills as it necessitated the use of mathematical techniques. Notwithstanding, the emergence and availability of computer software packages today has help to eliminate many of the difficulties that were known to be associated with the use of statistical sampling (Moller, 2009, p.205).

Finally, the theoretical chapter (chapter three) of this study presents an audit sampling model developed by Heimann & Chesley (1977,p.199).In addition, the chapter also presents two mathematical formulas for the determination of sample sizes when using statistical audit sampling developed by Ridilla (1960, p.550) and another developed by Gillett & Srivastava (2000, p.146).However, the auditors of this study did not find those complex mathematical models and formulas useful during auditing practices.According

to the auditors, the availability of audit computer software packages have made it easier for the use of statistical audit sampling as the computer tool now computes all complex mathematical calculations.

#### **5.4 SELECTING SAMPLES FOR STATISTICAL SAMPLING**

Concerning the selection method that is used in selecting samples when using statistical audit sampling the empirical findings showed that auditors use the systematic selection method and random selection method. With the systematic selection method, what auditors do practically is that they select every 10<sup>th</sup> item, 20<sup>th</sup> item, 30<sup>th</sup> item in that order. But during the following year of auditing the same company, the order of selecting the items is changed and instead of selecting the 10<sup>th</sup> item, 20<sup>th</sup> item and so on, the 13<sup>th</sup> item, the 26<sup>th</sup> item, 39<sup>th</sup> item in this order are selected. The random selection of samples is done with the aid of an audit software computer program that is used to randomly select samples. However, Hitzig (2004, p.31), suggests that if the records in the population are arranged in a numerical order, then the items should be selected randomly by using a computer tool but if the records in the population are not arranged in a numerical order, then the systematic selection method should be used to select the items whereby there will be the selection of every  $K^{th}$  item after a random start.

Depending on the risk assessment and how big the population is the computer program selects samples that have to be examined in order to fulfil good statistics. However, before the samples are selected, auditors have to first identify and sort all the key items before using the computer tool to randomly select additional items to have the total number of items that have to be examined. Moreover, when selecting samples, auditors take into consideration the time frame and tolerable error and also consider how likely the risk that material misstatements that are found in the accounts shall not be discovered. In this regard, auditors usually take into consideration the timing of audit test seriously because of the fact that the behaviour of an auditee can distort the scheduled time about audit testing and as a result affects the audit evidence to be collected as well as the cost of the audit (Patterson, 1993, p.283).

#### **5.5 WHEN NONSTATISTICAL AUDIT SAMPLING IS APPROPRIATE**

The findings showed that nonstatistical audit sampling is appropriate in situation where a population has risky items as well as accounts balances that have large values. Moreover, nonstatistical audit sampling is appropriate in smaller firms that do not have many transactions because a greater proportion of the transactions can be reviewed using professional judgment and the results will still give a representation of the characteristics of the entire population. For instance if all items in the balance sheet are worth 5 million SEK and key items comprise 4.5 million SEK, then you can audit only this key items and assume that remaining items worth 5 hundred thousand SEK cannot be that wrong

and in such situations you do not need to apply statistical sampling. Furthermore, nonstatistical audit sampling is also appropriate in situations where there are unusual items in the balance sheet because the auditor has to use his/her professional judgment to identify those unusual items by comparing previous year balance sheet with current year balance sheet. Finally, Hitzig (2004,p.35), points out that the auditor's judgement is very fundamental for deciding about tolerable misstatements, method of samples selection, analysing and assessing the characteristics of the population, determining appropriate risk level and in deciding about the method of estimation.

## **5.6 SELECTING ITEMS FOR NONSTATISTICAL SAMPLING**

With regard to the method that is used to select samples when using nonstatistical audit sampling, the empirical findings showed that auditors use mostly their professional knowledge to select key and risky items. Concerning the number of samples that have to be examined in order to achieve sufficiency of audit evidence when using nonstatistical audit sampling, the findings showed that it depends on the company as well as on the number of key items on the company's balance sheet.

Moreover, the use of professional judgment is based on the level of materiality and the threshold that has been set to select key items. If the threshold has been set at one million Swedish Krona, then all items that are bigger than this amount have to be selected and examined. In addition, the findings continue to show that an appropriate sample size when using nonstatistical sampling depends on the number of key items that are found in the population with the most common method of determining an appropriate sample size being the selection of all the biggest transactions by the use of professional judgment.

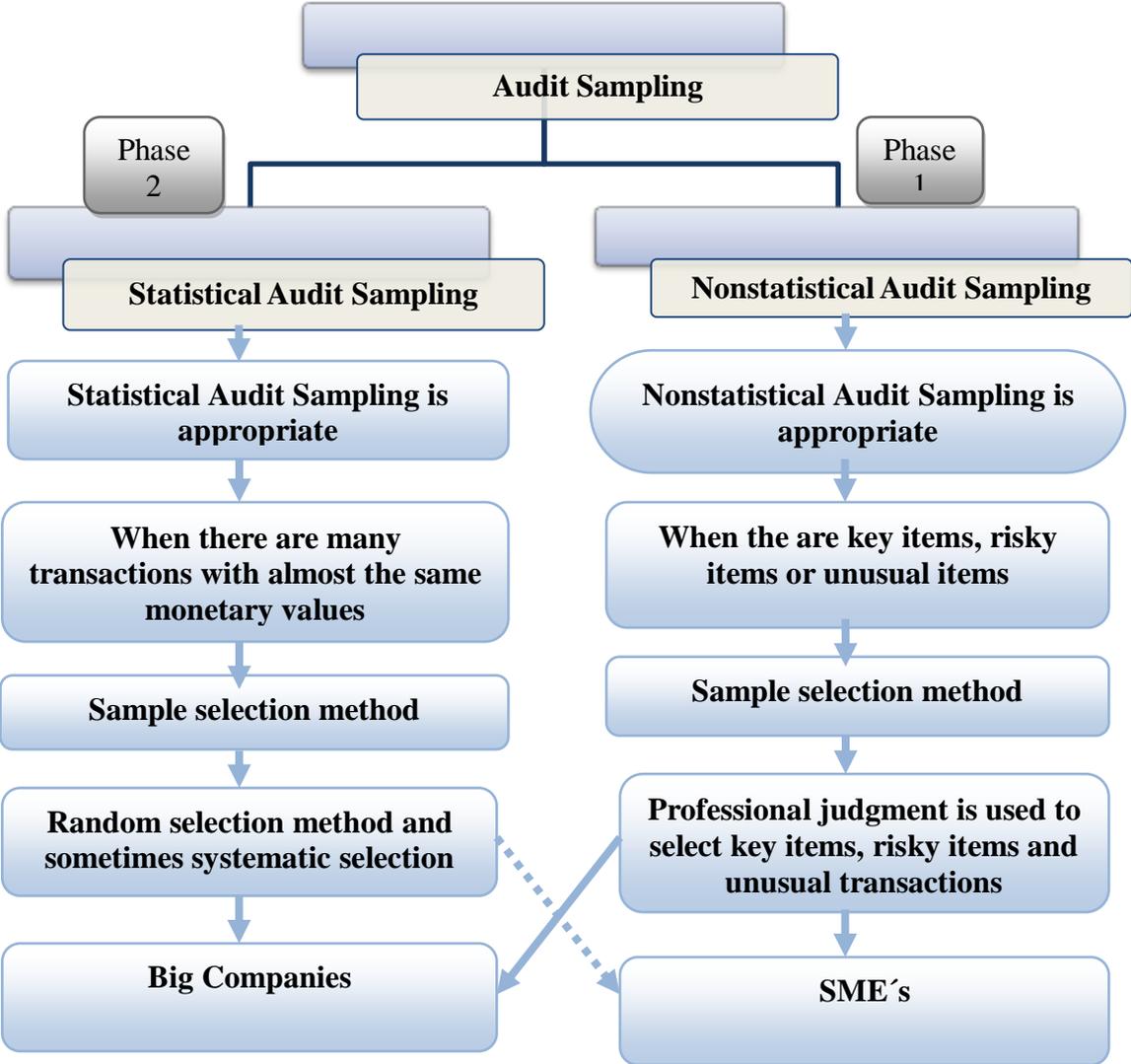
Furthermore, the sufficiency of audit evidence to be obtained when using nonstatistical sampling depends on the number of key items that are found in the population and how risky the items are. Therefore, the selection method that is used in practice to select samples when using nonstatistical audit sampling is based on professional judgement and when using professional judgement to select samples, the threshold and the risk are taken into consideration because it is based on these factors that the key items are selected. Finally, Hitzig (2004,p.30), points out that audit samples that are selected when using nonstatistical audit sampling are never selected by chance but are selected through the exercise of professional judgement.

## **5.7 KNOWLEDGE CONTRIBUTION**

Based on the empirical findings obtained from this qualitative study, it is possible to recommend a proposed audit sampling model. It is expected that auditors can use this model as a guide not only in Sweden but also in other countries as the proposed model can be a useful tool for proper accumulation of audit evidence. The model is as shown in figure 8 below. The proposed model starts by showing that audit sampling is made up of

two approaches; statistical audit sampling and nonstatistical audit sampling. According to the proposed model, statistical audit sampling is appropriate when there are many transactions having almost the same monetary values while nonstatistical audit sampling is appropriate when a company's financial statement contains key items, risky and or unusual items. Furthermore, the model indicates that when using statistical audit sampling, the sample selection methods are random selection method and sometimes systematic selection method. As concerns the sample selection method when using nonstatistical audit sampling, the model indicates that auditors have to use their professional judgment to select key items, risky items and unusual transactions.

**Figure 8: Proposed Model for Audit sampling**



Source: Author

In addition, the model indicates that both statistical audit sampling and nonstatistical audit sampling are used when auditing big companies as indicated using the two full arrows and nonstatistical audit sampling is used most often when auditing SME's as indicated with a full arrow, though sometimes statistical audit sampling can be used as indicated by a dotted arrow.

**Phase 1** of the model is used when auditing SME's whereby nonstatistical audit sampling is used in which key items, risky items and unusual transactions are selected. When the total worth of the key items, risky items and unusual transactions selected is far greater than the total monetary value of the smaller items that are remaining, then, an auditor have to use only **phase 1** of the model, but if the total monetary value of the key items, risky items and unusual transaction is less than the total amount of the smaller items then the auditor need to use **phase 1** and **phase 2**. Moreover, when auditing big companies, the auditor have to use both **phase 1** and **phase 2** whereby **phase 1** (nonstatistical audit sampling) warrants the auditor to use his/her professional judgment to sort all key items, risky items and unusual items in order to examine them separately. Thereafter, **phase 2** of the model (statistical audit sampling) is then used and items are selected by using the random selection method and sometimes systematic selection method.

## 5.8 CONCLUSION

With regard to the research question which was to find out to what extent statistical and nonstatistical sampling approaches are utilized in current auditing practices by independent auditors, the empirical findings show that both techniques are used. Nonstatistical sampling technique is used in selecting key items and the statistical sampling technique is used especially when there are many small transactions. Computer software programs are used to facilitate the application of statistical sampling and professional judgment is used to assist in the application of nonstatistical sampling. Moreover, both techniques are used when auditing big companies, but for smaller companies, nonstatistical sampling is most often used though statistical sampling could be used sometimes depending on whether there are many transactions with small values. When using audit sampling to audit big companies, the procedure begins with nonstatistical sampling technique in which professional judgment is used to select all transactions that are risky and have big monetary values and then examine these transactions separately. After this the statistical sampling technique is then applied on the rest of the smaller items by employing the computer tools to determine sample sizes, select samples, measure risk and evaluate results. Their reason for using both approaches is to minimize risk and to guarantee high quality audit.

The conclusion from the findings is that both statistical and nonstatistical sampling techniques are used during a typical audit process in Sweden. Nonstatistical audit sampling is used in situations where they are key items that are having large monetary values and statistical sampling technique is used on account balances having small monetary values. Professional judgment is used to easily identify large values or key

values because high values are usually risky and have to be well examined before using statistical sampling to randomly select and examine account balances having smaller monetary values. Therefore, both statistical and nonstatistical sampling techniques are used during a typical audit process but this usually begins by the use of nonstatistical sampling to select key items, risky items or unusual transactions and this is followed by using statistical sampling to select additional items. If the key items carry a very big part of the population, then it will not be necessary to use statistical sampling, but if the key items do not carry that much of the population then statistical sampling have to be used. In a nut shell, using both techniques in a typical audit process will guarantee that the quality of an audit is high and risk will be minimized as well. By combining these two techniques, it is more likely that most transactions are audited and the results that will be obtained from the samples will guarantee but not guaranteeing absolutely the true characteristics of the economic performance of the company that is being audited.

## **5.9 LIMITATIONS OF THE STUDY**

The main limitations of this study can be seen in terms of three categories; which are financial limitation, time limitation and theoretical limitation. The financial limitation stems from the fact that the author had limited financial resource for the collection of empirical data from other regions of Sweden. As a result, the collection of data was limited only to one region. The time limitation stems from the fact that the study ought to be completed within a shorter time frame of approximately three months. Interview schedules were decided by respondents and the process was also challenging and time consuming thereby making it difficult for the arrangement of many interviews.

Finally, the theoretical limitation stems from the fact that it was difficult to find theoretical literature written about audit sampling in Sweden. However, relevant literature has been reviewed in general about audit sampling, statistical audit sampling and nonstatistical audit sampling, though, some of the reviewed literature with respect to an audit sampling model developed by Heimann & Chesley (1977, p.199) and two mathematical formulas for the determination of sample sizes when using statistical audit sampling developed by Ridilla (1960, p.550) and another by Gillett & Srivastava (2000, p.146) were found not to be useful during auditing practices as auditors now rely on computer software packages to execute complex mathematical calculations.

## **5.10 SUGGESTION FOR FURTHER RESEARCH**

One of the results of this study showed that the availability of audit computer software packages in Sweden have made it easier for auditors to easily understand and use statistical audit sampling as complex mathematical calculations have been simplified to a great extent. Is this the same situation in other countries? This question can only be answered by conducting further research in other countries. Therefore, it will be appropriate to carry out a similar research in other countries with the aim of finding out the extent at which statistical audit sampling and nonstatistical audit sampling are utilized during audit practices by interviewing auditors working in other countries taking into

consideration the fact that the respondents of this study (auditors) work in companies which have offices located in most parts of the world for the purpose of comparison.

## **CHAPTER SIX: QUALITY ISSUES IN QUALITATIVE RESEARCH**

### **6.1 CREDIBILITY**

Credibility in qualitative research refers to how believable the findings and interpretation of a research study are (Bryman & bell, p.43, Gratton & Jones, 2010, p.97). It is also concerned about how the researcher has fully and accurately represented what the respondents think, feel and do about the research problem in the research report (Lodico, Spaulding, & Voegtle, 2010). Before carrying out the interview for this study, the interview guide was sent to the respondents in advance to enable them put together their thoughts and ideas about the questions to be discussed as well as to have both mental and psychological preparations. In this way, all the questions were well understood by the respondents thereby facilitating discussions during the interview. The interviews were conducted in quiet locations and the respondents were happy to discuss willingly. As a result, the respondents were very frank in narrating their opinions and experiences about audit sampling, statistical audit sampling and nonstatistical audit sampling. Moreover, the respondents made additional explanations on every occasion that was necessary.

Thus, the credibility criteria is fulfilled in this study because the findings and interpretations accurately represent the views and perceptions of the respondents and the respondents can testify that the findings and conclusions presented represent their views and perceptions. Additionally, all the respondents are qualified professional auditors and therefore their views, perceptions and experiences about audit sampling, statistical audit sampling and nonstatistical audit sampling are believable and thus credible. Although credibility criteria in qualitative research can be distorted when it comes to analyzing and interpreting results, much effort and due care was taken during the process of transcribing, analyzing and interpreting to avoid the distortion of the credibility criteria. Thus, the findings and interpretation of the research study are credible.

### **6.2 TRANSFERABILITY**

Transferability is the second criteria that is used to judge the trustworthiness of qualitative research and it is concerned about whether the results and conclusions obtained would be useful to those in other settings or other researchers conducting research in similar settings (Thomas, Nelson, & Silverman, 2010, p.364). In other words, do the findings apply to other context? (Bryman & Bell, 2007, p.43). In order to achieve transferability, five auditors that were selected from different audit firms have been interviewed, all of which have honestly supplied extensive and valuable information about their views, their perceptions as well as their experiences about the extent of utilizing audit sampling, statistical and nonstatistical audit sampling during auditing practices. Many of the auditors have provided similar answers which have given precise comprehension on the role of statistical and nonstatistical sampling techniques during auditing practices. In addition, the respondents are professional auditors working with big audit firms having branches located in other parts of Sweden and they audit large companies as well as SME's. Therefore, no matter whether the auditors are from the North or from the South of Sweden, they will have similar practical methods about audit

sampling, statistical audit sampling and nonstatistical audit sampling during audit practices. This means that the results and conclusions of this study are applicable as well as useful to those in other settings, hence transferable. Therefore, the transferability criteria is fulfilled in this study as the findings would be applicable to other context if carried out by other researchers provided all else stays same.

### **6.3 DEPENDABILITY**

Dependability entails that the researcher keeps a complete records of all the phases that are involved in the research process such as the procedure of selecting research participants, interviews transcripts, data analysis decisions and so on; and should be made accessible so that peers can act as auditors on the records (Bryman & Bell, 2007, p.414).All the materials utilized in this study are accessible for peers to act as auditors. The method of data collection has been well explained and the interview guide that was used in collecting data has been attached as an appendix. Moreover, the tape of the recorded interview can be provided to peers for reviews upon request. Also, the interviews were transcribed in a careful and cautious manner, thus, the study fulfils the dependability criteria.

### **6.4 CONFIRMABILITY**

Conformability in qualitative research requires the researcher to act in good faith and avoids personal values from swaying the conduct of the research findings as well as strives for objectivity though complete objectivity is difficult to be achieved in quality research (Bryman & Bell, 2007, p.414).The results and findings of this study represents the product of the interviews that were conducted. When transcribing and analyzing the interviews, the conformability criterion was serious taking into consideration. This was done by striving for objectivity and not allowing personal ideals to intrude into the interpretations and analysis of the findings.

### **6.5 AUTHENTICITY**

A qualitative study is considered as authentic if the researcher has used suitable strategies to truly report the ideas of the respondents and if the study will actually help the respondents and other readers to better understand the social phenomena (Gratton & Jones, 2010, p.97).I believe that this study perfectly fulfils this criteria considering the fact that all the strategies that have been utilized in the study have been disclosed. This is to indicate that the views of the respondents have been truly reported. All the interviewed respondents were professional auditors and their ideas represent the current state of the extent in which statistical audit sampling and nonstatistical audit sampling are utilized during auditing practices. The findings have been truly reported and will help readers to better understand the current role of statistical audit sampling and nonstatistical audit sampling in auditing practices, thus, the study fulfils the authenticity criteria.

## **6.6 ETHICAL CONSIDERATIONS IN QUALITATIVE RESEARCH**

The most important ethical considerations that researchers have to consider when conducting qualitative research are: informed consent, voluntary participation, confidentiality, protection from harm, and maintenance of the well-being of the respondents (Klenke, 2008, p.50). This study is qualitative in nature, involving the collection of data by using semi-structured interview technique; hence, ethical considerations were seriously taken into consideration. In this regard, informed consent was obtained from the auditors that were interviewed. This was done by informing the auditors about the overall purpose of the research and also sending the interview guide to them in advance. Moreover, the respondents were also informed during the interview that the discussion will be audio recorded so that they can decide if they do not want it to be audio recorded. Also, the ethical principle of voluntary participation was also taken into consideration as all the respondents participated voluntarily. Furthermore, the principle of confidentiality has been seriously taken into consideration as the identities of the respondents have been treated anonymously. In addition, all information that was obtained from the respondents has been used basically for the purpose of the research and has not or will not be used for any other purpose. Furthermore, all the interviews were conducted in a manner that was very friendly as sensitive questions were avoided because certain sensitive questions can cause emotional harm to the respondents. Finally, the recorded discussions were replayed at the end of each interview for each respondent to listen.

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## **APPENDICES**

### **APPENDIX 1: EMAIL SENT TO RESPONDENTS**

Dear XXXXXX,

Thank you for accepting to be my respondent following your conversation over the phone this morning with Owe R.Hedström, my supervisor. My name is Rufus Tekoh Ayam, Masters Student in Accounting at Umeå School of Business, Umeå University, writing a 15 Credit Thesis on Statistical and Nonstatistical Audit Sampling. Please find attached an Interview Guide containing questions relating to Audit Sampling, Statistical Audit Sampling and Nonstatistical Audit Sampling. I will be in your office on the following agreed time and date:

Time: XX

Date: XXXXXXXX

Best Regards,  
Rufus.

### **APPENDIX 2: INTERVIEW GUIDE**

#### **A) AUDIT SAMPLING**

1. How do you choose sampling techniques during auditing?
2. What is your opinion about audit sampling?
3. What is your view about the efficiency of audit sampling?
4. Which audit procedures are used in dealing with high value non-recurring transactions discovered in a sample?
5. What are some audit procedures that do not require audit sampling?
6. What has happened during the last 10 years about audit sampling?
7. How can you guarantee high quality audit if you do not use audit sampling?
8. Different sampling techniques with SME's and bigger companies?

#### **B) STATISTICAL AND NONSTATISCAL AUDIT SAMPLING**

9. Which audit sampling approach do you use during a typical audit process? Statistical, nonstatistical or both? Why?
10. Which audit sampling technique do you think is more efficient when auditing the various components of financial statements? Why?
11. How can we justify the argument that there is a tendency among auditors to use nonstatistical sampling more than statistical sampling?

#### **C) STATISTICAL AUDIT SAMPLING**

12. When is statistical sampling appropriate?

13. How do you select audit samples for statistical sampling?
14. Which selection method do you use to select samples for statistical sampling?
15. If you use statistical audit sampling how many samples to you need to fulfil good statistics?
16. What are some major difficulties associated with the use of statistical sampling approach?
17. What is the extent of formal training for the use of statistical sampling technique for Auditors?
18. How can we justify the argument that statistical sampling in some way will prevent auditors from using their professional judgments because everything with statistical sampling depends on mathematical formula?

#### **D) NONSTATISTICAL AUDIT SAMPLING**

19. When is nonstatistical sampling appropriate?
20. When using nonstatistical audit sampling technique how many samples to you need to examine in order to achieve sufficiency of audit evidence?
21. Which selection method do you use to select samples for nonstatistical sampling?
22. How do you determine an appropriate sample size when using nonstatistical sampling?
23. How do you minimize selection biases associated with the use of nonstatistical sampling in auditing?
24. What is the risk associated with the use of nonstatistical sampling technique?
25. How do you assess tolerable error when using nonstatistical sampling?

#### **E) SAMPLE SIZE SELECTION**

26. Which sample size is used after “good auditing” (i.e. discovery of fewer material misstatements) during the 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup> and 10<sup>th</sup> year of auditing the same company?
27. Which sample size is used after “bad auditing” (i.e. discovery of many material misstatements) during the 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup> and 10<sup>th</sup> year of auditing the same company?
28. How many transactions are the least to be examined in either situation?

#### **F) PERSONAL INFORMATION**

29. How long have you been working as an auditor?
30. Your qualification?
31. Your age



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