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Suitability or Otherwise of Applying Statistical Sampling Techniques in Auditing

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Abstract

This study critically investigates the suitability or otherwise of applying statistical sampling techniques in auditing, drawing from an extensive theoretical, conceptual, and methodological discourse. As the auditing profession continues to evolve in response to the increasing complexity of business operations, regulatory demands, and the growth of big data, auditors are increasingly confronted with the challenge of obtaining sufficient and appropriate audit evidence within constrained timelines and resources. In this context, statistical sampling emerges as a strategic tool, offering a scientifically grounded approach to selecting representative subsets of data from large populations for examination. The study reviews core auditing concepts and elaborates on the principles, tenets, and procedures of various statistical sampling techniques. Given the conceptual and theoretical nature of this study, the methodology adopts a qualitative, desk-based approach, relying on extensive review and synthesis of existing literature, professional audit guidelines, and international standards such as ISA 530. In conclusion, the study affirms that statistical sampling remains an essential component of modern auditing, particularly where large volumes of data require systematic evaluation. However, its suitability is conditional upon factors such as audit objectives, population characteristics, and audit risk levels. When applied with professional judgment and compliance with standards, statistical sampling can enhance audit efficiency, effectiveness, and assurance quality. The study recommends that auditing firms should invest in continuous training to build their auditors' competencies in statistical sampling design, selection, and evaluation to ensure accuracy and compliance with international standards. Auditors should adopt a hybrid approach that combines statistical sampling with emerging audit technologies such as audit data analytics and full population testing, especially for complex audit environments.

Keywords: Suitability, Statistical, Sampling Techniques, auditing

Introduction

Auditing, as a cornerstone of accountability and transparency in both public and private sectors, has evolved in tandem with the increasing complexity and volume of financial transactions in modern economies. The growing demand for audit efficiency, reliability, and the reduction of audit risk has made the selection of appropriate audit procedures a subject of utmost significance. Among such procedures is statistical sampling, a method rooted in the application of probability theory to draw conclusions about populations based on a subset of data. As business environments have become data-intensive and transaction volumes have soared, auditors have been compelled to embrace methods that ensure optimal resource utilization without compromising audit quality (Messier et al., 2021). Thus, the question of the suitability or otherwise of applying statistical sampling techniques in auditing has become increasingly relevant and widely debated in contemporary audit literature and practice.

More so, statistical sampling is essentially a technique that enables the auditor to obtain and evaluate audit evidence about a population by selecting and examining a portion of the items, known as a sample, in such a way that the findings can be generalized to the entire population. This technique is rooted in mathematical foundations, particularly probability theory, which ensures that the conclusions drawn from the sample are statistically valid and measurable in terms of confidence levels and sampling risk (Arens et al., 2023). The use of

statistical sampling is not merely a matter of convenience, but also a response to practical constraints such as limited time, manpower, and resources. Particularly in audits involving large populations, such as those of multinational corporations or public sector entities, it is often impractical or impossible to conduct a 100% examination of all transactions (IAASB, 2021). Therefore, sampling becomes not only appropriate but necessary.

The inherent logic of statistical sampling lies in its ability to provide a quantifiable measure of risk. This is particularly significant in auditing where the auditor is required to express an opinion on the fairness and reliability of financial statements. By applying statistical sampling, auditors can determine the risk that the sample may not be representative of the population and adjust their audit strategy accordingly. This contrasts sharply with non-statistical (judgmental) sampling, where such risk assessments are based largely on subjective auditor experience and intuition, thus making it more difficult to justify sampling decisions and the level of assurance derived therefrom (PCAOB, 2020). Consequently, statistical sampling enhances audit objectivity, consistency, and the ability to defend audit conclusions under scrutiny, especially in litigation or regulatory reviews.

Despite its numerous advantages, the application of statistical sampling in auditing is not without controversy or limitations. Critics argue that statistical sampling, while theoretically robust, may not be suitable in all auditing circumstances, especially in cases involving non-homogeneous populations, subjective judgments, or qualitative characteristics such as management intent or compliance with laws and regulations (Mock & Wright, 2021). Furthermore, the technical complexity of designing, implementing, and interpreting statistical samples may discourage its adoption among auditors with limited training in quantitative methods. Additionally, some argue that the cost-benefit trade-off of statistical sampling does not always justify its use, especially in small-scale audits or where high-quality audit software and data analytics tools can provide alternative means of assurance (IAASB, 2022).

Given this background, it becomes imperative to critically assess the suitability or otherwise of applying statistical sampling techniques in auditing, by evaluating its theoretical underpinnings, practical applications, limitations, and the evolving technological landscape. This discussion is not only relevant for practicing auditors but also for regulators, standard-setters, academics, and audit clients, all of whom have a stake in ensuring that the audit process remains credible, efficient, and responsive to contemporary risks and expectations.

Methodology

The methodology adopted for this study is rooted in a qualitative, conceptual, and analytical framework, guided by an interpretivist paradigm that emphasizes the systematic examination and synthesis of scholarly literature, auditing standards, theoretical perspectives, and professional guidelines. Given the nature of the study which does not involve empirical data collection, quantitative analysis, or primary fieldwork this study relies heavily on content analysis of secondary sources and an evaluative interpretation of theoretical and professional materials. The justification for this approach lies in the objective of the study, which is to critically assess the suitability or otherwise of applying statistical sampling techniques in auditing, rather than measuring variables through field-based empirical methods.

The study is descriptive and exploratory in nature. It aims to build a deep understanding of the conceptual basis, application principles, types, and influencing factors of statistical sampling in auditing, while also considering its practical implications, benefits, and limitations.

According to Creswell (2014), such a non-empirical, qualitative approach is suitable for research questions that are conceptual, theoretical, or normative questions that seek to understand "how" and "why" a practice works, rather than "how much" or "to what extent." The study explores existing scholarly and professional sources such as International Standards on Auditing (particularly ISA 530), academic journals, audit manuals, auditing textbooks, and industry publications, thereby enabling a comprehensive, multi-perspective analysis.

A documentary analysis method was used, involving the critical review, evaluation, and synthesis of documented materials on statistical sampling and its application in auditing. Bowen (2009) emphasized that documentary analysis is particularly appropriate in conceptual studies where researchers aim to construct meaning and articulate theoretical positions from existing texts. The analysis involved an iterative process of data immersion, thematic coding, theoretical mapping, and synthesis. Key themes and constructs such as types of sampling (simple random sampling, stratified sampling, systematic sampling, monetary unit sampling, and attribute sampling), audit risk, materiality, audit evidence, population characteristics, audit objectives, and professional judgment were identified and analyzed within the context of audit theory and practice.

The methodological approach also integrates theoretical perspectives such as the Decision Theory, Risk-Based Auditing Theory, and Audit Evidence Theory, which provide philosophical and practical grounding for understanding how and why auditors use statistical sampling techniques. The adoption of these theories supports the non-empirical nature of the study, as they offer conceptual lenses for explaining auditor behaviour and sampling decisions without the need for primary data. For instance, Risk-Based Auditing Theory offers insights into how auditors assess and manage audit risk using sampling decisions, while Decision Theory helps in evaluating the rationality behind auditors' choices of sample size, sample selection method, and inference. Theoretical triangulation strengthens the validity of findings by situating them within multiple conceptual frameworks (Saunders et al., 2019).

Another justification for the non-empirical methodology is the normative orientation of auditing practice, which is heavily guided by professional standards and best-practice guidelines rather than only empirical generalizations. Standards such as ISA 530 provide codified rules, principles, and expectations that guide auditors in the application of sampling techniques across diverse audit contexts. Thus, exploring these standards through a conceptual lens contributes to both academic discourse and practical relevance. The study also benefits from historical and contextual perspectives, considering how statistical sampling evolved in auditing and how technological advancements are influencing its current and future relevance.

Furthermore, this conceptual methodology is justified given the study's contribution to theory development and policy implications. By aggregating and synthesizing knowledge from multiple sources, the study provides a critical platform for researchers, auditors, and regulators to understand when and how statistical sampling should be used, where it may be inadequate, and what alternative strategies are emerging in contemporary auditing environments.

Finally, the limitations of this methodology are acknowledged. The absence of primary data or case-specific empirical validation may constrain the generalizability of the findings to specific audit settings. However, the richness of the literature reviewed, the theoretical depth of the analysis, and the logical rigor of the argumentation compensate for this limitation. As recommended by Merriam and Tisdell (2016), conceptual and theoretical studies play a

significant role in framing empirical inquiries, advancing audit pedagogy, and guiding professional decision-making.

Literature Review

Concept of Auditing

Auditing is a fundamental component of the financial reporting framework and serves as critical mechanism for ensuring accountability, transparency, and the credibility of financial information. According to Arens et al. (2023), auditing is the systematic process of objectively obtaining and evaluating evidence regarding assertions about economic actions and events to ascertain the degree of correspondence between those assertions and established criteria, and to communicate the results to interested users. This definition highlights key elements such as evidence, objectivity, assertions, and criteria, which are essential to understanding the scope and nature of auditing.

Auditing extends beyond the traditional examination of financial statements to encompass operational audits, compliance audits, and forensic audits, each tailored to specific organizational goals and stakeholder expectations (Glover et al., 2022). The objectives of auditing can be categorized into primary objectives which involve expressing an opinion on the truth and fairness of financial statements and secondary objectives, which relate to the detection and prevention of errors, fraud, and misstatements (Messier et al., 2021). These objectives underscore the growing complexity of the auditor's role in an era characterized by sophisticated financial instruments, complex business structures, and increased regulatory scrutiny.

Moreover, the attributes of auditing, such as independence, professional skepticism, materiality, evidence sufficiency and appropriateness, and audit risk assessment, are vital in ensuring that audit engagements meet professional standards and stakeholder expectations. Independence, both in fact and appearance, is the bedrock of auditing, as it guarantees unbiased reporting. Professional skepticism defined by ISA 200 as an attitude that includes a questioning mind and a critical assessment of audit evidence is indispensable in detecting material misstatements arising from error or fraud (IAASB, 2021).

The auditing process is also driven by adherence to auditing standards and ethical guidelines, notably those issued by the International Auditing and Assurance Standards Board (IAASB), the Public Company Accounting Oversight Board (PCAOB), and national standard setters such as the Financial Reporting Council of Nigeria (FRCN). These standards provide structured frameworks for risk assessment, planning, evidence gathering, and reporting, thereby ensuring consistency, comparability, and credibility of audit outputs across jurisdictions (IAASB, 2022).

As the audit environment continues to evolve, driven by digital transformation, globalization, and heightened stakeholder expectations, auditors are required to adopt innovative techniques and tools, including statistical sampling, data analytics, and artificial intelligence, to improve audit quality and efficiency (Kokina et al., 2021). Among these, statistical sampling has garnered significant attention for its potential to address the challenges of auditing large data volumes while maintaining audit effectiveness.

Concept of Statistical Sampling Technique

Statistical sampling is a technique that involves the selection and evaluation of a representative subset of a population using probability-based methods, enabling the auditor to

draw conclusions about the entire population. According to ISA 530 – Audit Sampling (IAASB, 2021), audit sampling is the application of audit procedures to less than 100% of items within a population, such that all sampling units have a known probability of selection, to obtain and evaluate audit evidence. This approach contrasts with non-statistical or judgmental sampling, where selection is based on auditor experience and intuition rather than probability theory.

Types of Statistical Sampling Techniques in Auditing

There are several types of statistical sampling techniques commonly applied in auditing. These include:

Simple Random Sampling

Simple Random Sampling (SRS) is one of the most fundamental and widely recognized statistical sampling techniques. It is based on the principle that every item or unit in the population has an equal and independent chance of being selected. Every item in the population has an equal chance of being selected. It is easy to understand and implement, especially with the aid of audit software (Arens et al., 2023). This technique ensures that the sample is unbiased and representative of the population, provided the population is well-defined and homogeneous.

In auditing, Simple Random Sampling is typically employed in substantive testing, especially where the population consists of numerous transactions or account balances of similar nature. For example, it may be applied in verifying sales invoices, expense vouchers, or inventory items. The auditor uses a random number generator or audit software to select items from the population, which eliminates human bias in the selection process (Arens et al., 2023).

The strength of Simple Random Sampling lies in its statistical purity and theoretical soundness. Because each item has an equal probability of selection, it allows for the use of standard statistical formulas to estimate sampling error, determine confidence levels, and calculate precision (Messier et al., 2021). This means that the auditor can quantify the risk that the sample results do not represent the entire population.

However, its application in auditing is not without limitations. Simple Random Sampling is most effective when the population is homogenous and free from systemic patterns. It is less efficient in situations where transactions vary significantly in value or risk. Moreover, if the population size is large, simple random sampling can be logistically challenging, as it may require access to the entire population database and complex data extraction procedures. Despite these limitations, Simple Random Sampling remains a reliable and valid technique for ensuring objectivity and representativeness in audit sampling, especially when supported by modern audit software tools.

Systematic Sampling

Systematic Sampling is a more structured variant of random sampling, where the auditor selects every kth item from a population after choosing a random starting point. The sampling interval, k, is determined by dividing the population size by the desired sample size (i.e., $k = N/n$). For example, if there are 1,000 invoices and the auditor needs samples of 50, the interval will be 20, and every 20th invoice will be selected after a random starting point between 1 and 20.

The primary advantage of Systematic Sampling is its simplicity and efficiency. It is easier to implement than simple random sampling, particularly in manual environments or where records are sequentially numbered (Glover et al., 2022). It also provides uniform coverage across the population and ensures that the sample is spread throughout the entire population rather than clustered in one section.

However, Systematic Sampling is only effective if the population is free from hidden patterns or periodicity that coincides with the sampling interval. If, for instance, a company processes large transactions at regular intervals and the sampling interval matches this pattern, the auditor may inadvertently select only high-value or low-value items, resulting in a biased sample. Such hidden patterns violate the assumption of randomness and undermine the validity of the sample results (Knechel & Salterio, 2022).

To mitigate this risk, auditors are advised to examine the ordering of the population before applying systematic sampling. Where possible, audit software should be used to randomize the order or evaluate for periodicity. When applied carefully, Systematic Sampling can be a powerful tool for balancing ease of use with statistical integrity.

Stratified Sampling

Stratified Sampling is a technique where the auditor divides the population into mutually exclusive subgroups (strata) based on specific characteristics such as monetary value, transaction type, or risk level. Separate samples are then drawn from each stratum, either proportionately or disproportionately, depending on the audit objective.

This method is especially valuable when the population is heterogeneous, that is, made up of subgroups with different characteristics. For example, an auditor auditing receivables may divide them into strata based on age brackets (e.g., current, 30–60 days, 60–90 days, over 90 days) or value levels (e.g., above or below materiality thresholds). By applying different sampling intensities to each group, the auditor can focus attention on high-risk or high-value strata while using smaller samples for lower-risk groups (Messier et al., 2021).

Stratified Sampling improves sampling efficiency and precision by reducing variability within each stratum and allowing the auditor to draw more reliable conclusions about the entire population. It also helps reduce overall sample size without sacrificing audit assurance, as high-risk strata can be sampled more intensively (IAASB, 2021).

However, Stratified Sampling requires in-depth knowledge of the population structure and careful planning. Incorrect stratification either by selecting inappropriate criteria or misclassifying items can result in misleading conclusions. It also involves additional steps in population analysis and data preparation, which may be time-consuming and require advanced audit software capabilities. Nonetheless, in high-stakes audits involving complex financial data, Stratified Sampling is highly suitable and provides a strategic advantage by enhancing the auditor's ability to target risk effectively and optimize audit resources.

Monetary Unit Sampling (MUS)

Monetary Unit Sampling (MUS), also known as Probability-Proportional-to-Size (PPS) Sampling, is a specialized statistical sampling technique where each monetary unit in the

population has an equal chance of selection, rather than each individual transaction. As a result, larger-value items have a proportionally higher probability of selection.

MUS is particularly well-suited for detecting overstatements in account balances, which is a common audit concern. It is most effective in auditing assets such as receivables, revenues, and inventory, where the objective is to verify the existence and valuation of items rather than completeness. Because high-value items are more likely to be selected, MUS tends to yield samples that are rich in audit relevance while still statistically valid (Arens et al., 2023).

One of the major benefits of MUS is that it combines the principles of stratification and random sampling without requiring the auditor to define explicit strata. This implicit stratification results in greater efficiency and fewer sample items, especially in populations where high-value transactions account for the bulk of the total balance (Mock & Wright, 2021). Additionally, MUS is conservative, meaning it is more likely to identify material overstatements, making it a preferred technique for accounts subject to a high degree of audit scrutiny.

Despite its strengths, MUS has several limitations. It is less effective in identifying understatements because smaller-value items are less likely to be selected. Moreover, it is not ideal for populations with numerous zero or negative balances, such as refunds or adjustments, as these can distort the sampling process. Also, its statistical evaluation requires specialized calculations, including expansion of misstatements and determination of confidence intervals, which may be challenging without the use of audit software (Glover et al., 2022).

Nonetheless, MUS remains one of the most rigorous and defensible sampling methods in auditing, especially for high-volume, high-value financial accounts where the risk of material misstatement is concentrated in a few large transactions.

Attribute Sampling

Attribute Sampling is primarily used in tests of controls, where the auditor is interested in the presence or absence of a specific characteristic (attribute) within a population. For example, the auditor may want to determine the frequency with which purchase orders are approved by authorized personnel or whether sales invoices are properly matched to dispatch notes.

In this technique, each transaction is evaluated as either a "pass" or "fail" depending on whether it meets the defined control attribute. The sample results are then used to estimate the rate of deviation (error rate) in the population, which is compared to a pre-set tolerable deviation rate to determine whether the control is effective (IAASB, 2021).

Attribute Sampling is essential in internal control testing because it provides a quantitative basis for concluding on control effectiveness. For example, if the sample indicates a 2% deviation rate and the tolerable deviation rate is 5%, the auditor may conclude that the control is operating effectively. However, if the error rate exceeds the tolerable level, the auditor may need to perform additional substantive procedures or increase the assessed level of control risk.

The advantages of Attribute Sampling include its simplicity in application, especially in binary testing environments, and its usefulness in compliance audits, where adherence to policies and procedures is the primary audit objective. It also allows the auditor to quantify sampling risk and determine confidence levels in control assessment (Knechel & Salterio, 2022).

However, Attribute Sampling is not suitable for evaluating monetary misstatements, as it does not consider transaction amounts. It also assumes that errors are randomly distributed across the population, which may not always be the case in practice. Moreover, the design of attribute tests requires a clear definition of control attributes and tolerable error rates, which may be subjective or based on limited precedent.

Nonetheless, when properly designed and executed, Attribute Sampling provides a robust framework for evaluating control systems and forming a defensible opinion on their effectiveness. Its application is fundamental to risk-based auditing approaches, where the reliability of controls determines the nature, timing, and extent of substantive testing.

Each of these techniques serves a specific purpose within the audit process and must be aligned with audit objectives, risk assessments, and materiality thresholds. The choice of sampling method depends on the nature of the population, the audit assertions being tested, and the desired level of confidence.

Advantages of Statistical Sampling

The adoption of statistical sampling in auditing offers multiple advantages. Firstly, it provides quantifiable assurance by allowing auditors to measure the sampling risk and determine the confidence level of their conclusions. Secondly, statistical sampling enhances objectivity and defensibility of audit conclusions, especially in regulatory reviews or litigation scenarios, as the methodology can be scientifically justified (Mock & Wright, 2021). Thirdly, it improves efficiency, particularly in large-scale audits, by focusing audit efforts on representative samples rather than attempting exhaustive testing.

Limitations of Statistical Sampling

However, statistical sampling is not without limitations. Its effectiveness is contingent upon the availability of a complete and reliable population, which may not always be the case, particularly in environments with poor documentation or internal controls. Moreover, the technical complexity and training requirements may hinder its effective implementation, especially among small audit firms (Knechel & Salterio, 2022). Additionally, sampling may not be effective in identifying anomalies or outliers, especially in cases of fraud, where irregular transactions may be intentionally concealed or randomly distributed.

Factors that Influence Statistical Sampling Technique in Auditing

The application of sampling techniques in auditing is influenced by a range of interrelated factors that directly shape the effectiveness, reliability, and appropriateness of audit evidence obtained through sampling. Sampling in auditing is not a one-size-fits-all approach; it is a strategic process that demands careful consideration of the audit environment, the objectives of the audit procedure, and the characteristics of the data population. The effectiveness of sampling techniques in an audit engagement depends largely on these underlying factors, which include population characteristics, audit objectives, materiality and audit risk, nature of internal controls, auditor's professional judgment, audit cost and time constraints, technological capabilities, and the regulatory or professional standards guiding the audit process.

Population

One of the most critical factors influencing the selection and application of a sampling technique in auditing is the characteristics of the population. Population refers to the entire set of data items or transactions from which an auditor intends to draw conclusions. Key population attributes such as size, homogeneity, complexity, and distribution of values significantly impact the choice of sampling method. For instance, if the population is large and homogeneous, statistical techniques like simple random sampling or systematic sampling may be appropriate, as each item has an equal or periodic chance of selection (AICPA, 2022). Conversely, where the population is heterogeneous such as in transactions of varying financial values or risk levels stratified sampling or monetary unit sampling (MUS) is often more effective in ensuring that significant items are adequately represented (ISA 530, 2020).

Objective of the Audit Procedure

Another key factor is the objective of the audit procedure. Sampling methods are applied based on whether the auditor seeks to test controls or perform substantive testing. For tests of controls, attribute sampling is often employed to assess the rate of deviation in the performance of internal controls (Arens et al., 2021). However, for substantive tests of details, particularly those concerned with verifying monetary misstatements, monetary unit sampling or stratified sampling becomes more appropriate. The audit objective dictates not just the type of sampling technique but also the sample size and the nature of evidence to be collected.

Materiality and audit risk

Materiality and audit risk are additional influential elements in sampling decisions. Materiality determines the threshold above which misstatements are considered significant, while audit risk relates to the possibility that the auditor may unknowingly fail to detect material misstatements. According to ISA 320 and ISA 530, as the assessed audit risk increases, the auditor is expected to increase the sample size or use more rigorous sampling techniques to reduce detection risk (IFAC, 2020). In high-risk engagements or when the internal control environment is weak, auditors may apply larger and more stratified samples to obtain sufficient audit evidence, thereby minimizing the risk of issuing an inappropriate audit opinion.

The Nature and Effectiveness of Internal Controls

The nature and effectiveness of internal controls in place also influences the auditor's choice of sampling methods. Strong internal controls typically reduce the extent of substantive testing required, allowing auditors to rely more on tests of controls, which are often assessed using attribute sampling (Messier et al. 2020). In contrast, where internal controls are deficient or non-existent, auditors must compensate by expanding the scope of substantive procedures and applying sampling techniques that offer a higher level of assurance.

The Professional Judgment of the Auditor

The professional judgment of the auditor plays a central role in determining the most suitable sampling technique. Auditing standards emphasize that sampling requires subjective judgment, particularly in areas such as defining the population, setting tolerable error levels, determining sample size, evaluating misstatements, and projecting errors to the population. Auditors must assess the implications of sampling errors, misstatement variability, and the potential for bias in the selection or evaluation of samples. Thus, experience, training, and

familiarity with statistical principles are key personal attributes that influence sampling decisions (PCAOB, 2022).

Cost and Time Constraints

Cost and time constraints are pragmatic yet powerful considerations that shape audit sampling. Given that auditing is a resource-limited exercise, auditors often face trade-offs between the extent of testing and the cost of evidence collection. Sampling offers a solution to this challenge by allowing the auditor to test a subset of transactions rather than the entire population. However, the choice of technique must align with resource availability. For instance, monetary unit sampling, although statistically rigorous, may require more advanced software tools and training, whereas simple random sampling is relatively cost-effective and easier to apply manually (Eilifsen et al., 2020). Auditors must balance efficiency with effectiveness to achieve optimal audit outcomes.

The Technological Capabilities of the Audit Firm

The technological capabilities of the audit firm also influence sampling practices. The integration of Computer-Assisted Audit Techniques (CAATs), audit analytics, and artificial intelligence has revolutionized the sampling process. These technologies allow auditors to perform more sophisticated sampling procedures, handle larger datasets, and apply techniques such as systematic sampling or data stratification with greater accuracy and speed. Technological tools also enable the use of predictive models to identify high-risk transactions for targeted sampling, thus improving audit quality and reducing detection risk (Alles, 2021).

Regulatory and Professional Auditing Standards

Finally, regulatory and professional auditing standards provide a normative framework that governs the application of sampling in auditing. Standards such as ISA 530 (Audit Sampling) and AU-C Section 530 (AICPA) specify the auditor's responsibilities regarding the design, selection, and evaluation of audit samples. These standards underscore the need for auditors to use sampling techniques that produce audit evidence that is both sufficient and appropriate. Compliance with professional standards ensures consistency, accountability, and defensibility of the audit process, particularly in regulated industries or in audits subject to external quality reviews (IFAC, 2020).

Suitability or Otherwise of Applying Statistical Sampling Technique in Auditing

The suitability of statistical sampling in auditing has been the subject of extensive discourse in both academic and professional circles. On one hand, its suitability is evident in contexts where large, homogenous populations are involved such as payroll, inventory, and accounts receivable making it both practical and efficient for drawing inferences about population characteristics. In such settings, auditors can achieve high levels of audit assurance with reduced effort and cost, while maintaining compliance with professional auditing standards (IAASB, 2021; PCAOB, 2020).

Furthermore, the technique is instrumental in implementing risk-based audit approaches, which are mandated by ISA 315 and ISA 330. By focusing on significant accounts and transactions through stratified and monetary unit sampling, auditors can allocate resources more effectively, ensuring that high-risk areas receive greater attention (Glover et al., 2022). The use of statistical sampling also aligns with the increasing emphasis on audit quality and transparency,

especially in response to public expectations and regulatory reforms following corporate scandals.

However, the suitability of statistical sampling is challenged in certain audit environments. For example, in audits involving judgment-based assertions such as goodwill valuation, legal contingencies, or management estimates, sampling is often impractical, as the auditor must exercise professional judgment rather than statistical inference (Messier et al., 2021). Likewise, in non-recurring or qualitative events, such as suspected fraud or regulatory violations, full population testing or forensic techniques may be more appropriate.

Additionally, technological advancements in auditing, particularly the use of computer-assisted audit techniques (CAATs) and data analytics, are reshaping the role of sampling in audits. Tools that enable full population testing and pattern recognition may reduce the reliance on traditional sampling techniques. Nonetheless, even in such contexts, statistical sampling remains relevant, especially when data volumes are too large for full analysis, or when sampling provides a more efficient means of risk mitigation (Kokina et al., 2021).

It is also important to consider the audit firm's resources and capacity. While large firms may possess the technological infrastructure and expertise to conduct statistical sampling effectively, smaller firms may find it cost-prohibitive and may prefer judgmental sampling, despite its limitations. As such, suitability is not merely a question of methodological preference, but also one of contextual fit, resource availability, and professional competence.

Theoretical Review

This study is theoretically anchored on the Audit Risk Theory and the Decision Theory, both of which offer robust explanatory frameworks for understanding the rationale and implications of applying statistical sampling techniques in auditing. These theories not only provide conceptual clarity but also reinforce the methodological appropriateness and professional judgment required in audit engagements involving sampling.

The Audit Risk Theory

The Audit Risk Theory, developed primarily through the works of researchers such as Arens and Loebbecke (1976), posits that the objective of an auditor is to minimize the risk of issuing an inappropriate audit opinion. Audit risk is conceptualized as a function of three interrelated components: inherent risk, control risk, and detection risk. Inherent risk refers to the susceptibility of an assertion to material misstatement, control risk is the risk that a material misstatement will not be prevented or detected by the entity's internal controls, and detection risk is the risk that the auditor's substantive procedures will fail to detect a material misstatement.

The theory emphasizes that while auditors cannot eliminate inherent and control risks, they can manage detection risk through carefully designed audit procedures. This is where statistical sampling becomes integral. By using sampling techniques grounded in probability theory, auditors can quantify the risk of drawing incorrect conclusions from a sample and adjust the sample size or nature of audit procedures to maintain an acceptable level of detection risk (Arens et al., 2023). Therefore, statistical sampling aligns directly with the propositions of Audit Risk Theory by enabling auditors to gather sufficient and appropriate evidence in a manner that supports a reasonable assurance opinion, while managing detection risk effectively.

Moreover, Audit Risk Theory underlines the need for professional skepticism and audit planning, both of which are fundamental when applying statistical sampling. The auditor must assess the level of risk in various account balances or transactions and determine whether a statistical sample will yield reliable evidence for that area. This decision-making process requires an understanding of the population characteristics, materiality thresholds, and acceptable confidence levels all of which are embedded in statistical sampling design (Messier et al., 2021). In this regard, the theory justifies the use of statistical sampling as a risk-mitigating tool and reinforces its suitability when the audit objective is to form an opinion based on a structured risk assessment approach.

Decision Theory

Complementing the Audit Risk Theory is the Decision Theory, originally formulated by Leonard J. Savage in 1954, which focuses on how decisions are made under conditions of uncertainty. The central tenet of Decision Theory is that decision-makers such as auditors should select options that maximize expected utility or minimize potential losses, given the probabilistic nature of outcomes. The theory distinguishes between decisions under certainty, risk, and uncertainty, and promotes the use of decision-making frameworks that incorporate statistical inference and probability estimates.

In the auditing context, Decision Theory supports the application of statistical sampling by viewing it as a rational and economically efficient decision tool. Since auditors often work with incomplete information and limited resources, statistical sampling enables them to make evidence-based decisions about the financial statements with an acceptable level of audit risk (Knechel & Salterio, 2022). This aligns with the theory's proposition that rational choices should be based on probabilistic assessment of outcomes, which is exactly what statistical sampling provides. By determining sample sizes and evaluation methods based on acceptable risk levels and confidence intervals, auditors are essentially applying decision-theoretic principles.

Furthermore, Decision Theory provides a rationale for evaluating the trade-off between the cost of audit procedures and the benefits of risk reduction. In many audit scenarios, testing 100% of the population is not only impractical but also uneconomical. Therefore, sampling becomes a justifiable decision when the cost of testing exceeds the marginal benefit of additional assurance (Mock & Wright, 2021). This cost-benefit analysis is intrinsic to Decision Theory and illustrates why statistical sampling is often the optimal audit strategy under conditions of resource constraints and uncertainty.

Both theories converge in their treatment of uncertainty and risk two realities that dominate the audit landscape. While Audit Risk Theory is more focused on structuring audit planning and evidence gathering to reduce audit risk, Decision Theory provides a broader framework for rational decision-making in uncertain environments. In the context of this study, these theories jointly justify the application of statistical sampling techniques by demonstrating their relevance in managing detection risk, improving decision quality, and enhancing audit efficiency.

The adoption of statistical sampling, as supported by these theories, is particularly crucial in contemporary auditing where audit environments are characterized by complex transactions, large volumes of data, and heightened stakeholder expectations for audit transparency and accountability. These challenges make it impractical to test every transaction, thereby

reinforcing the theoretical basis for sampling as a scientifically sound and economically rational audit procedure (Glover et al., 2022).

Conclusion

The review of literature on the suitability or otherwise of applying statistical sampling techniques in auditing reveals a rich discourse rooted in both theoretical and practical considerations. Auditing, as a discipline, requires the acquisition of sufficient and appropriate evidence to support the expression of an independent opinion on the financial statements. As organizations expand in size and complexity, and as financial transactions increase in volume and diversity, auditors face greater challenges in applying audit procedures efficiently, effectively, and within the constraints of limited time and resources. In response, statistical sampling has emerged as a critical tool for enhancing audit quality, objectivity, and defensibility.

Statistical sampling techniques, including simple random sampling, systematic sampling, stratified sampling, attribute sampling, and monetary unit sampling, offer a probabilistic framework for selecting representative samples and quantifying the risks associated with audit conclusions. This framework aligns with international auditing standards such as ISA 530, which promote the use of sampling in obtaining audit evidence, especially in cases where 100% testing is not feasible. Through its ability to provide quantifiable assurance, minimize sampling bias, and enhance audit efficiency, statistical sampling is particularly suitable in audits involving large and homogeneous data populations such as accounts receivable, inventory, or payroll.

Nevertheless, the suitability of statistical sampling is not absolute. It is context-dependent and influenced by several factors, including the nature of the population, the specific audit objectives, the structure of the organization, the availability of complete records, and the competence of the audit personnel. In environments where qualitative judgments, unique transactions, or anomalies predominate such as the detection of fraud or assessment of fair value estimates statistical sampling may be inadequate or even misleading. Additionally, the technical complexity of designing and interpreting statistical samples may pose challenges for auditors who lack specialized training or access to advanced audit tools.

Moreover, the rapid adoption of emerging technologies such as data analytics, artificial intelligence, and full population testing tools is reshaping the audit landscape. While these technologies may complement or even reduce the reliance on statistical sampling in some instances, they do not render it obsolete. Instead, statistical sampling continues to serve as a valuable methodological option within the broader audit toolkit, especially when audit objectives require probabilistic conclusions, defensibility under audit reviews, and alignment with regulatory expectations.

In conclusion, statistical sampling is a highly suitable and indispensable technique in modern auditing, particularly when applied with professional judgment and in appropriate contexts. However, its use must be carefully evaluated against the nature of the audit task, the characteristics of the client's financial data, and the technological capabilities of the auditor. Its suitability increases where efficiency, objectivity, and measurability of audit risk are paramount, but it becomes less appropriate in scenarios requiring comprehensive or judgment-based evaluations. The ultimate value of statistical sampling lies not in its universal applicability, but in its strategic deployment as part of a comprehensive and risk-based audit approach.

Recommendations

In light of the findings and conclusions of this study on the application of statistical sampling techniques in auditing, it is imperative to offer well-grounded, strategic, and actionable recommendations that can enhance the effectiveness, appropriateness, and practical integration of statistical sampling methods in audit engagements. These recommendations are directed at professional auditors, audit firms, standard-setting bodies, educational institutions, and regulators, particularly within the Nigerian context, while maintaining global applicability.

Encourage Comprehensive Training and Capacity Building on Statistical Sampling Techniques

One of the key challenges identified in the application of statistical sampling in auditing is the knowledge gap and inadequate expertise among some audit practitioners. Therefore, audit firms particularly small and medium-sized practices (SMPs) should prioritize continuous professional development (CPD) programs that provide in-depth training on statistical sampling, including the mathematical foundations, application procedures, and interpretation of results. The Institute of Chartered Accountants of Nigeria (ICAN) and other professional bodies such as the Association of National Accountants of Nigeria (ANAN) should intensify their efforts in incorporating modules on audit sampling into their curricula and mandatory CPD frameworks. Training should extend beyond theoretical understanding to include practical case simulations and data analytics, given the increasing relevance of technology-driven audit tools.

Promote the Integration of Statistical Sampling with Audit Software and Technology

In today's digital audit environment, the use of computerized audit tools and techniques (CAATs) and artificial intelligence has become indispensable. Therefore, auditors should be encouraged to integrate statistical sampling methods with audit software to enhance efficiency, precision, and data-driven decision-making. Audit firms should invest in audit management systems such as ACL, IDEA, and CaseWare, which facilitate real-time data extraction, stratification, and probabilistic selection of samples. The use of such tools reduces human error, increases objectivity, and supports compliance with International Standard on Auditing (ISA) 530. Furthermore, regulatory bodies such as the Financial Reporting Council of Nigeria (FRCN) and ICAN should develop frameworks that encourage digital literacy and technology adoption in the audit profession.

Revise and Contextualize Audit Guidelines for the Nigerian Audit Environment

There is a growing need to tailor international audit guidelines, including ISA 530, to reflect the peculiarities of the Nigerian business environment. This includes variations in accounting systems, weak internal controls in some organizations, the prevalence of informal business practices, and resistance to documentation. Standard-setting bodies and professional associations in Nigeria should collaborate to issue technical guidance notes that contextualize the application of statistical sampling in Nigerian audit engagements, especially for listed firms, public sector audits, and small and medium enterprises. Such guidance should provide sector-specific case examples, risk assessment matrices, and decision trees that guide auditors in determining when statistical sampling is most appropriate.

Develop a Decision-Making Framework for Choosing Between Statistical and Non-Statistical Sampling

This study reveals that the appropriateness of statistical sampling is contingent on multiple factors, including population size, audit objective, materiality threshold, risk assessment, and resource availability. To facilitate evidence-based decision-making, audit firms should develop and adopt standardized decision-making frameworks or sampling matrices that guide auditors in choosing the most suitable sampling method for each engagement. These frameworks should consider audit efficiency, cost-effectiveness, sample representativeness, and the level of audit assurance required. Such structured approaches will reduce subjectivity and enhance audit quality and defensibility of audit evidence.

Improve Quality Assurance Mechanisms and Regulatory Oversight

Regulatory bodies such as the FRCN and the Office of the Auditor-General of the Federation (OAuGF) should strengthen quality assurance reviews to ensure that audit engagements, particularly those involving public interest entities, comply with sampling standards. Quality reviews should assess whether sampling methodologies are appropriately applied and documented, whether audit risks were properly assessed, and whether conclusions drawn from the samples are logically sound and supported by sufficient evidence. Where deficiencies are found, appropriate sanctions and corrective actions should be enforced. The aim is not only to enforce compliance but also to uphold public trust in the auditing profession.

Encourage the Use of Hybrid Sampling Approaches in Complex Audits

In highly complex or multi-faceted audit engagements, it may be beneficial for auditors to combine statistical and non-statistical sampling approaches to optimize the efficiency and reliability of audit outcomes. For instance, while statistical sampling may be used for revenue or inventory verification, judgmental sampling may be applied to sensitive areas such as related party transactions or high-value estimates. Training and guidelines should include hybrid models that show how to blend different sampling strategies effectively.

Engage Stakeholders in Audit Sampling Policy Formulation

To improve the overall effectiveness of audit sampling practices, professional bodies, audit firms, and regulators should adopt a multi-stakeholder approach in developing audit sampling policies. Input should be solicited from practitioners, academics, industry experts, and users of audit reports to ensure that the developed policies are relevant, pragmatic, and widely acceptable. Such engagements will also help build a culture of accountability, trust, and professional excellence.

Promote Ethical Considerations and Professional Judgment in Sampling Decisions

Finally, auditors must uphold ethical standards and exercise sound professional judgment when applying statistical sampling techniques. This includes ensuring transparency in documenting sample selection criteria, being objective in interpreting sampling results, and avoiding manipulative practices that could distort audit conclusions. Audit firms should enforce internal ethical guidelines that align with the IFAC Code of Ethics and ensure that sampling practices are not only technically correct but also morally and professionally justifiable.

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