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MODERN STATISTICAL AND ECONOMETRIC APPROACHES TO EVALUATING AUDIT EFFICIENCY

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Abstract: This study highlights the scientific and practical significance of applying modern statistical and econometric methods in evaluating audit efficiency. The research substantiates the possibilities of quantitatively assessing audit quality, error probability, and the effectiveness of control mechanisms based on regression analysis, panel data models, and probabilistic methods. It is demonstrated that under conditions of digital transformation and increasing complexity of risks, the econometric approach enhances the objectivity, reliability, and reproducibility of audit results. This approach provides a foundation for shaping audit not only as a control tool but also as a strategic management instrument.

Key words: audit efficiency, statistical methods, econometric models, regression analysis, panel data, audit quality, risk assessment, digital audit, evidence-based analysis.

INTRODUCTION

Modern statistical and econometric methods enable the evaluation of audit efficiency by moving away from subjective conclusions toward evidence-based analysis. In the current environment, where large volumes of financial and non-financial data are generated within audit processes, regression analysis, panel data models, and probability and variance analyses serve as important scientific tools for determining audit quality, the likelihood of errors, and the effectiveness of control mechanisms. The audit system operates under conditions of digital transformation, complex corporate structures, and increasing risks. Traditional audit evaluation approaches often fail to identify dynamic risks and hidden interdependencies. Therefore, the quantitative assessment of factors influencing audit efficiency—such as the quality of internal control, auditor independence, and digital audit tools—through econometric models is emerging as a relevant scientific and practical issue. Statistical and econometric methods make it possible to evaluate audit efficiency through integral indicators, as well as to compare and rank audit results. This approach:

- increases the reliability of audit outcomes;
- ensures the accuracy and reproducibility of audit conclusions;
- enhances the value of audit information in managerial decision-making.

As a result, the audit system evolves beyond a control mechanism into a strategic management instrument. At both macro and micro levels, the econometric evaluation of audit efficiency has strategic importance in strengthening public financial control, corporate governance, and investor confidence. In the long term, this approach:

- increases financial transparency;
- reduces the risk of systemic errors and fraud;
- contributes to sustainable economic development.

It also provides a scientifically grounded platform for harmonizing the audit system with national and international standards. The essence of this approach lies in determining audit efficiency through multivariate statistical relationships. Indicators such as audit quality, cost efficiency, the number of detected violations, and their financial impact are modeled using econometric equations. This enables a deeper analysis of the internal mechanisms of the audit process and supports their optimization. In the context of increasing complexity of audit activities, human factor-based evaluations cannot fully ensure objectivity. Statistical and econometric methods, on the other hand, reduce randomness and enhance the scientific validity of results. Therefore, the transition to quantitative assessment of audit efficiency represents an objective and inevitable necessity. This approach is grounded in probability theory, regression analysis, information asymmetry theory, and agency

theory. Audit is considered an integral institution of economic relations, and its efficiency is explained through statistical regularities. This enriches audit theory with empirical evidence and ensures the reliability of scientific conclusions.

LITERATURE REVIEW

The application of statistical and econometric methods in evaluating audit efficiency has emerged as an important direction in foreign scientific research. Sheu G.-Y. and Liu N.-R. substantiated the possibilities of improving audit efficiency in complex data environments by integrating audit sampling processes with the Naive Bayes classifier. Their study demonstrates that combining statistical sampling with modern data analysis approaches enhances the accuracy and timeliness of audit procedures. In the works of Elumilade O. O., the impact of statistical sampling methods (random, stratified, and monetary unit sampling) on audit efficiency is analyzed. The findings confirm that these methods are essential tools for optimizing audit resources, reducing time and costs, and improving audit quality. Tarkh A. S. examined the relationship between the quantitative assessment of material misstatement risks and sample size determination in auditing. The study concludes that quantitative risk assessment contributes to balancing the efficiency and effectiveness of the audit process. Bednarek P. analyzed audit efficiency indicators using statistical approaches based on the example of public audit institutions in Poland. The research justifies the need for a comprehensive evaluation of process, output, and impact indicators. Li B. and Kaplan applied unsupervised outlier detection models to audit data, demonstrating the potential for detecting anomalies and improving audit efficiency in a big data environment. Overall, foreign literature confirms that approaches based on statistical, probabilistic, and Big Data technologies transform auditing into a proactive, data-driven management instrument, particularly within internal audit systems.

RESEARCH METHODOLOGY

The study is based on the application of statistical and econometric methods to evaluate audit efficiency. Audit data are analyzed within the framework of an evidence-based approach, employing statistical sampling, regression analysis, panel data models, and probabilistic methods. Quantitative risk models are used to assess the risk of material misstatements and to determine audit sample sizes. In analyzing large volumes of data, the Naive Bayes classifier and outlier detection techniques are applied. This methodology ensures an objective and scientifically grounded evaluation of audit efficiency.

ANALYSIS AND RESULTS

In the context of the modern digital economy, as the activities of business entities become increasingly complex, the requirements for internal audit systems are undergoing fundamental changes. Traditional audit approaches are often characterized by reliance on limited data sets and a retrospective nature. In contrast, the use of Big Data analytics enables internal audit to evolve into a proactive, continuous, and data-driven management instrument. From this perspective, analyzing the application of Big Data technologies in internal audit across the stages of planning, examination, and reporting has significant scientific and practical importance (Figure 1).

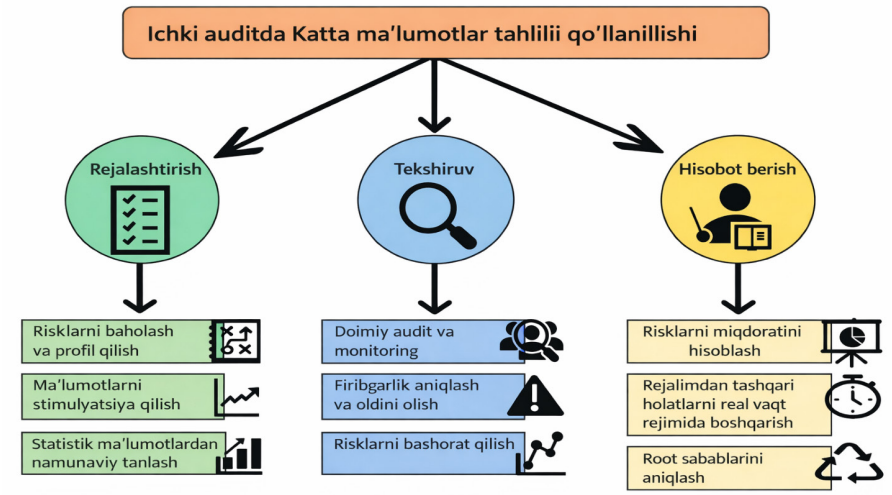

Figure 1. Conceptual Model of Using Big Data Analytics in the Internal Audit Process

The planning stage, which is the first phase of the internal audit process, is elevated to a qualitatively new level through the use of Big Data analytics. At this stage, risk assessment and the formation of risk profiles are based not on subjective expert judgments, but on a comprehensive set of historical, operational, and external data. As a result, audit objects and processes are clearly segmented according to their priority levels. The ability to simulate data enables the modeling of potential risks that may arise during the audit process, thereby ensuring the efficient use of audit resources. Moreover, the application of statistical sampling methods based on data analysis helps expand audit coverage while minimizing time and costs. Overall, Big Data analytics transforms the planning stage into a strategically oriented and goal-driven management system within internal audit. The second stage of internal audit-the examination phase-becomes a continuous, real-time activity through the application of Big Data analytics. Continuous auditing and monitoring mechanisms ensure that financial, operational, and managerial processes remain under constant observation. This approach allows audits to go beyond periodic reviews and enables the immediate detection of deviations and inconsistencies. In particular, Big Data analytics plays a crucial role in fraud detection and prevention by identifying unusual transactions, repetitive suspicious operations, and hidden relationships within large datasets. Risk management is no longer limited to identifying existing issues but is extended to analyzing their root causes and developing preventive measures. As a result, the examination stage enhances the operational and proactive nature of internal audit. The final stage of the internal audit process—reporting—acquires a new qualitative dimension based on Big Data analytics. At this stage, audit results are presented to management in the form of precise, measurable, and comparable indicators through quantitative risk assessment. This increases the reliability of audit conclusions and their applicability in managerial decision-making. The ability to manage unplanned situations in real time transforms internal audit from a purely control function into a key source of information for decision-making. Additionally, the application of root cause analysis allows for the identification of systemic rather than superficial causes of detected deficiencies. This contributes to eliminating recurring errors and improving the internal control system. The use of Big Data analytics in internal audit integrates the planning, examination, and reporting stages into a unified system. This approach enhances audit efficiency, improves the quality of risk management, and strengthens the strategic importance of the audit function within the overall management system of the organization. Therefore, the implementation of Big Data technologies in internal audit is one of the most important scientific and practical directions in modern economic conditions. The planning stage represents the initial and most critical phase of the internal audit process, ensuring that audit activities are organized systematically and in a goal-oriented manner. By assessing risks and developing profiles based on Big Data analytics, priority areas of the audit object are identified. This approach enables fact-based decision-making instead of traditional subjective assessments. The examination stage constitutes the practical and operational core of internal audit. At this stage, continuous auditing and monitoring are carried out using Big Data analytics, meaning that financial and operational processes are observed in real time. This approach transforms audit into a continuous control mechanism rather than a periodic one. Furthermore, the ability to detect and prevent fraud is significantly enhanced, as hidden patterns and anomalies can be identified within large datasets. Risk management is not limited to recording problems but is oriented toward developing proactive measures to prevent them.

CONCLUSION AND RECOMMENDATIONS

The research findings demonstrate that the use of statistical and econometric methods in evaluating audit efficiency provides more objective and reliable results compared to traditional subjective approaches. Regression analysis, statistical sampling, probabilistic models, and Big Data-based methods enable the quantitative assessment of audit quality, the probability of errors, and the effectiveness of control mechanisms. This approach transforms audit from a purely control function into a strategic management instrument.

Based on these findings, the following recommendations are proposed:

– to widely implement statistical sampling and risk-based quantitative assessment methods in audit practice;

– to gradually introduce Big Data and automated analytical models into internal audit systems;

– to strengthen professional development programs for auditors in statistical and econometric analysis;

– to develop a system of integral and comparative indicators for evaluating audit efficiency.

These recommendations will contribute to increasing the reliability of audit results, reducing the risk of errors and fraud, and enhancing financial transparency.

References:

1. Sheu, G.-Y., & Liu, N.-R. Statistical audit sampling integrated with Naive Bayes classifier for audit decision-making // International Journal of Accounting Information Systems. – 2019. – Vol. 33. – P. 1–15.

2. Elumilade, O. O. Statistical sampling techniques and audit efficiency: Evidence from financial statement audits // Journal of Accounting and Auditing Research. – 2018. – Vol. 7, № 2. – P. 45–62.
3. Tarkh, A. S. Quantitative assessment of material misstatement risk and audit sample size determination // Managerial Auditing Journal. – 2017. – Vol. 32, № 6. – P. 601–620.
4. Bednarek, P. Measuring the effectiveness of public sector auditing: Statistical indicators and evaluation models // Public Money & Management. – 2016. – Vol. 36, № 5. – P. 345–352.
5. Li, B., & Kaplan, S. E. Outlier detection models in auditing: Applications for large-scale audit data // Accounting Horizons. – 2019. – Vol. 33, № 3. – P. 23–45.
6. Alles, M. G., Kogan, A., & Vasarhelyi, M. A. Big Data and analytics in auditing: A practical framework // Accounting Horizons. – 2018. – Vol. 32, № 3. – P. 1–20.

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