

CLIMATE RISK AUDITING IN PUBLIC SECTOR FINANCE: A NEW PARADIGM FOR ACCOUNTABILITY

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Abstract

Climate change has become a systemic risk with a significant impact on the financial stability of the public sector, necessitating a new approach to audit practice to ensure more comprehensive accountability. This study aims to examine the concept of climate risk auditing as a new paradigm in public sector financial auditing using a literature review method. The study analyzes various scientific sources, international institutional reports, and relevant regulations to identify developments, challenges, and implications for implementing climate risk audits. The results indicate that integrating climate risk into the audit process not only broadens the scope of traditional audits but also encourages increased transparency, disclosure of non-financial risks, and strengthened public sector governance. Furthermore, auditors are required to possess new competencies that include an understanding of sustainability issues, environmental risk analysis, and the use of technology-based data. This study also found that there are still limitations in audit standards that specifically address climate risk, necessitating the development of an audit framework that is adaptive and responsive to the dynamics of climate change. Thus, climate risk auditing is a crucial element in strengthening public accountability and supporting sustainable decision-making in the public sector.

Keywords: Climate Risk Audit, Public Sector, Accountability, Climate Change, Public Financial Governance

INTRODUCTION

Climate change has become an increasingly pressing global issue with widespread impacts on various aspects of life, including economic stability and the sustainability of public finances. The increasing intensity of natural disasters, such as floods, droughts, and extreme storms, not only threatens

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public safety but also puts significant pressure on the state budget. As public financial managers, governments are required to allocate resources effectively to address these risks. In this context, climate risk can no longer be viewed solely as an environmental issue but has evolved into a systemic risk that impacts fiscal policy, state asset management, and long-term economic stability.

As global awareness of the impacts of climate change grows, demands for transparency and accountability in public financial management are also growing. Stakeholders, including the public, international institutions, and investors, are demanding more comprehensive information on how governments identify, measure, and manage climate risks in budget planning and execution (Azizov, 2025). However, in practice, conventional audit systems in the public sector still tend to focus on regulatory compliance and the reliability of financial reports, without explicitly incorporating climate risk as an integral part of the audit process. This creates a gap between the need for relevant information and existing audit practices.

Climate risk audits have emerged as a new approach that seeks to bridge this gap. This approach emphasizes the importance of integrating climate risk analysis into the financial and performance audit framework in the public sector. Through climate risk audits, auditors not only evaluate whether financial statements are fairly presented but also assess the extent to which public entities have considered climate risks in decision-making, asset management, and policy formulation (Rana et al., 2022). Thus, audits are no longer reactive but rather proactive in identifying potential losses and ensuring fiscal sustainability.

On the other hand, implementing climate risk audits in the public sector faces various challenges. One of the main challenges is the limited capacity and competence of auditors in understanding the complexity of climate change issues. Climate risk has characteristics that differ from traditional financial risks, as it is long-term, full of uncertainty, and involves various non-financial factors. Therefore, auditors are required to have a cross-disciplinary understanding that encompasses environmental, economic, and public policy aspects. Furthermore, the availability of relevant and reliable data also poses a barrier to accurately measuring and reporting climate risk.

Another challenge relates to regulatory frameworks and audit standards that do not fully accommodate the need for climate risk auditing. Although several international organizations have begun developing guidelines related to climate risk reporting, adoption at the national level, particularly in

developing countries, remains limited. This results in climate risk audit practices that are not yet standardized and tend to vary across institutions (Yamamoto & Schührer, 2023). Consequently, the quality of the information produced is also inconsistent, reducing its effectiveness in supporting decision-making.

In the context of public finance, the importance of climate risk audits is increasingly relevant given the large budget allocations for climate change-related programs, such as mitigation and adaptation. Without adequate audit mechanisms, there is a risk of inefficiency, misuse of funds, and failure to achieve policy objectives. Therefore, integrating climate risk audits into the public financial oversight system is a strategic step to increase accountability and ensure that all public expenditures provide optimal benefits to the public.

Furthermore, climate risk audits also play a crucial role in enhancing public trust in the government. Transparency in climate risk management allows the public to assess the extent to which the government is taking responsibility for addressing the challenges of climate change. This not only strengthens the government's legitimacy but also encourages public participation in supporting sustainability-oriented policies. In the long term, this will contribute to better governance that is responsive to global change.

Advances in digital technology also open up new opportunities for climate risk audits. The use of big data, artificial intelligence, and geographic information systems can help auditors collect, analyze, and visualize climate risk data more effectively. This technology enables auditors to conduct more in-depth, data-driven analyses, thereby improving the quality of audit results. However, utilizing technology also requires significant investment and increased human resource capacity for optimal utilization (Brunelli & Falivena, n.d.).

From an academic perspective, the study of climate risk audits in the public sector is still relatively new and evolving. Most research focuses on the private sector, while the public sector has distinct characteristics, particularly in terms of objectives, organizational structure, and accountability mechanisms. Therefore, more in-depth research is needed to understand how climate risk audits can be implemented effectively in the public sector and their impact on improving accountability and the quality of state financial management.

Based on this description, it can be concluded that climate risk audits represent a new paradigm with significant potential for improving public financial accountability in the era of climate change. Integrating climate risk into the audit process will not only strengthen oversight but also encourage the creation of more adaptive and sustainable policies. However, achieving this

requires collaborative efforts between the government, audit institutions, academics, and other stakeholders to develop frameworks, standards, and capacities that support the effective implementation of climate risk audits. Therefore, this research is crucial for comprehensively examining the concepts, challenges, and implications of climate risk audits in the context of public finance as an effort towards more transparent, accountable, and sustainable governance.

RESEARCH METHOD

The research method in the study, "Climate Risk Auditing in Public Sector Finance: A New Paradigm for Accountability," employs a qualitative approach with a literature review. This approach was chosen to comprehensively examine the development of the climate risk audit concept and its implications for public sector financial accountability. The data used is secondary data obtained from various scientific sources, such as reputable international journals, reports from international institutions, audit standards, and policy documents related to climate change and public financial management. Data collection was conducted through searches of academic databases such as Google Scholar, Scopus, and publications from global organizations, using relevant keywords such as climate risk auditing, public sector finance, and accountability.

Data analysis was conducted using content analysis techniques, identifying, categorizing, and synthesizing various previous research findings to build a comprehensive conceptual framework. This study also uses a comparative approach to compare traditional audit practices with the new paradigm that incorporates climate risk as a key element in public sector audits. Furthermore, critical interpretation is conducted to evaluate the extent to which the integration of climate risk into audits can enhance transparency and accountability in public financial management. Thus, this method is expected to provide in-depth understanding and conceptual contributions to the development of audit practices that are adaptive to the challenges of climate change.

RESULT AND DISCUSSION

Integrating Climate Risk into the Budgeting System and Fiscal Policy

Integrating climate risk into the budgeting system and fiscal policy is a strategic step that is becoming increasingly urgent in the context of the increasing frequency and intensity of disasters caused by climate change

(Marinheiro et al., 2024). Climate risk can no longer be viewed solely as an environmental issue, but has evolved into a systemic risk that impacts economic stability, fiscal sustainability, and social welfare. Therefore, the government is required to adopt a more comprehensive approach by incorporating climate risk dimensions into the national planning and budgeting process. This includes identifying potential economic losses due to disasters, analyzing the vulnerability of strategic sectors, and allocating budgets adaptively to the uncertainties posed by climate change.

In practice, integrating climate risk into the budgeting system requires a paradigm shift from traditional, static budgeting to dynamic and responsive, risk-based budgeting. This approach requires strengthening institutional capacity to conduct quantitative and qualitative climate risk analysis, including the use of predictive models to estimate long-term impacts on state revenues and expenditures. For example, changes in rainfall patterns can impact the agricultural sector, which in turn affects food security and price stability. Without integrating these risks into fiscal planning, the government risks experiencing significant budget pressures due to unexpected spending needs for disaster management and economic recovery (Darvas & Wolff, 2023).

Furthermore, climate-sensitive fiscal policy also includes the development of fiscal instruments that support climate change mitigation and adaptation. Fiscal incentives such as renewable energy subsidies, carbon taxes, and green financing schemes are examples of policies that can encourage the transition to a low-carbon economy. Furthermore, the government also needs to reduce budget allocations for activities that contribute to environmental degradation, such as poorly targeted fossil fuel subsidies. Thus, fiscal policy serves not only as a tool for economic stabilization but also as an instrument for transformation towards sustainable development.

This integration also demands greater transparency and accountability in public financial management. Climate-based budget reporting, or climate budget tagging, is an important mechanism for identifying and monitoring budget allocations related to climate change (Avgousti et al., 2023). Through this approach, the government can assess the extent to which fiscal commitments to the climate agenda have been implemented and identify gaps that still need to be addressed. In addition, stakeholder engagement, including civil society and the private sector, is crucial in ensuring that policies are inclusive and responsive to real needs on the ground.

However, the implementation of climate risk integration into budgeting systems and fiscal policies is not without challenges. One key challenge is the

limited data and methodology required to accurately measure climate risk. Many developing countries still face challenges in terms of the availability of integrated data and the technical capacity to conduct complex risk analyses. Furthermore, there are institutional challenges, such as a lack of coordination between ministries and agencies, and the absence of a regulatory framework that explicitly regulates the integration of climate risk into the budget process.

On the other hand, resistance to policy change can also be a barrier, especially when such policies impact short-term economic interests. For example, the elimination of fossil fuel subsidies often faces resistance due to the perception that it will increase the burden on the public's living costs (Islam, 2025). Therefore, effective communication strategies and fair compensation policies are needed to ensure that the transition to sustainable fiscal policies is widely accepted.

Nevertheless, the opportunities offered by integrating climate risk into fiscal policy are significant. With proper planning, governments can reduce potential economic losses from disasters, increase budget efficiency, and encourage investment in sustainable sectors. Furthermore, this integration can also enhance the government's credibility in the eyes of international investors, particularly in the context of increasing attention to sustainability and environmental responsibility. This can open access to international financing sources, such as green bonds and climate funds, which can be used to support environmentally friendly development programs.

Ultimately, integrating climate risk into the budgeting system and fiscal policy is a crucial step towards more adaptive, transparent, and sustainable public financial governance. This process requires strong political commitment, adequate institutional support, and effective cross-sector collaboration. By internalizing climate risk at every stage of fiscal decision-making, the government can not only protect short-term economic stability but also ensure sustainable development for future generations.

The Role of Audit in Identifying and Assessing Climate Risk

The role of audit in identifying and assessing climate risk is increasingly gaining importance as global awareness grows of the impact of climate change on economic stability, organizational sustainability, and public accountability. Climate change is no longer viewed solely as an environmental issue but has evolved into a strategic risk affecting various operational and financial aspects of entities, both in the public and private sectors. In this context, audit serves as an independent mechanism capable of providing an objective assessment of

how organizations identify, measure, manage, and disclose climate-related risks. Through a systematic and evidence-based approach, audits help ensure that information on climate risk is not only available but also reliable and relevant for decision-making (Limba et al., 2025).

In the process of identifying climate risk, auditors are responsible for understanding the entity's operating environment and its exposure to various types of climate risks, both physical and transitional. Physical risks include the direct impacts of climate change, such as floods, droughts, and rising temperatures, which can disrupt operations, damage assets, and increase maintenance costs (Hartlieb & Eierle, 2024). Meanwhile, transition risks relate to changes in policies, regulations, technology, and market preferences toward a low-carbon economy, which can impact the value of an entity's assets and business model. In this context, auditors must not only rely on historical data but also consider long-term projections and uncertain scenarios. This requires auditors to have a broader understanding of environmental and sustainability issues, as well as the ability to integrate non-financial information into the audit process.

The audit role becomes increasingly complex when assessing the extent to which an organization has comprehensively identified climate risks (Okeke et al., 2025). Auditors must evaluate whether management has used an adequate framework to identify these risks, including the use of scenario analysis, risk mapping, and stakeholder engagement. Furthermore, auditors need to assess whether there are gaps in risk identification that could lead to incomplete or misleading disclosures. In this regard, audits serve as a monitoring tool to ensure that management does not ignore or underestimate significant climate risks, either intentionally or unintentionally.

After the identification process is completed, the next stage is climate risk assessment, where audits play a critical role in evaluating the methodology used by the organization. Auditors must ensure that the approach used to measure climate risk is based on reasonable assumptions, valid data, and appropriate analytical methods. This assessment includes evaluating the financial impact of climate risk, such as potential asset impairments, increased operating costs, and implications for cash flow and business continuity. In this context, auditors need to adopt a skeptical professional approach, especially when dealing with subjective estimates and assumptions.

Furthermore, audits also play a role in assessing the effectiveness of internal control systems related to climate risk management. Auditors must evaluate whether the organization has adequate policies, procedures, and

control mechanisms in place to mitigate these risks. This includes assessing the governance structure, the role of the board of directors, and the integration of climate risk into the overall risk management system (Choudhary & Trivedi, n.d.). Thus, audits focus not only on the final report, but also on the underlying processes. Evaluation of internal controls is crucial because weaknesses in these systems can increase the likelihood of errors or fraud in climate risk reporting.

In practice, climate risk audits face significant challenges. One key challenge is the limited availability of specific standards and guidelines for climate risk audits. While various sustainability reporting frameworks, such as those developed by international organizations, exist, their implementation varies and has not been fully integrated with conventional audit standards. Furthermore, the lack of consistent and verifiable data also hinders the audit process. Auditors often have to rely on data generated by third parties or internal estimates that may not be highly accurate.

Another challenge is the need for new competencies for auditors. To effectively audit climate risk, auditors need to understand scientific concepts related to climate change and its implications for business and finance. This includes understanding carbon emissions, environmental footprints, and global policies related to climate change (Hoque & Irfan, 2024). Therefore, capacity building and training are crucial aspects of improving audit quality in this area. Without adequate competencies, auditors will struggle to provide accurate and relevant assessments of climate risk.

Despite these challenges, the role of auditing in identifying and assessing climate risk remains crucial for enhancing transparency and accountability. Audits provide stakeholders with assurance that the information presented by an organization has undergone an independent and objective verification process. This is increasingly important in the context of increasing demands for sustainability reporting and corporate social responsibility. Investors, regulators, and the wider public increasingly require reliable information on how organizations manage climate risks and their impact on long-term performance.

Furthermore, audits also contribute to driving continuous improvement in climate risk management. Through their findings and recommendations, auditors can help organizations identify weaknesses and improve risk management practices. An effective audit process is not only evaluative but also provides added value in the form of strategic insights that management can use to make better decisions. Thus, audits act as a catalyst for change,

encouraging organizations to be more proactive in addressing the challenges of climate change.

In the public sector, the role of audits is increasingly crucial given the government's responsibility to manage resources and protect public interests. Climate risk audits can help ensure that government policies and programs adequately consider the impacts of climate change. This includes evaluating budget allocations, the effectiveness of mitigation and adaptation programs, and transparency in reporting. Thus, audits not only contribute to increasing accountability, but also to achieving sustainable development goals.

Policy Recommendations for Strengthening Climate Risk Audits in the Public Sector

Strengthening climate risk audits in the public sector is an urgent need given the increasing complexity of climate change's impacts on fiscal stability, development sustainability, and accountability in public financial management. Climate risk is no longer hypothetical but has become a real factor impacting various sectors such as infrastructure, agriculture, health, and energy (Talbot & Boiral, 2023). Therefore, policies supporting the strengthening of climate risk audits must be designed systematically, integrated, and adaptive to global and local environmental dynamics. One key recommendation is the need to formally integrate climate risk into the public sector audit framework through clear regulations. This includes the development of audit standards that explicitly incorporate climate risk aspects as part of the risk identification, assessment, and reporting process. With structured standards, public sector auditors can have uniform guidelines for evaluating climate impacts on government financial and operational performance.

Furthermore, strengthening human resource capacity is a crucial element in supporting the effectiveness of climate risk audits. Auditors need to be equipped with multidisciplinary competencies that encompass an understanding of climate change, risk analysis, and the use of relevant analytical technology. Therefore, training and continuing professional development policies should focus on improving auditors' climate literacy and technical skills. These training programs could cover the use of climate data, risk modeling, and the interpretation of sustainability indicators. Without this capacity building, climate risk audits have the potential to become mere formalities without providing significant added value to public policy decision-making (Bostan, 2024).

Another policy recommendation is strengthening the information systems and data infrastructure that support the climate risk audit process. Accurate, integrated, and real-time data is essential for identifying potential risks and evaluating their impact on public finances. The government needs to develop a data platform that connects information from various sectors, such as meteorological, environmental, economic, and social sectors. This data integration will enable auditors to conduct more comprehensive and evidence-based analyses. Furthermore, the use of technologies such as big data analytics and artificial intelligence can improve predictive capabilities in identifying long-term climate risks.

In an institutional context, coordination between agencies involved in climate risk management is needed. Climate risk audits cannot be conducted in isolation by a single institution but require collaboration between audit institutions, technical ministries, and planning and budgeting bodies (Georgiou, 2024). Therefore, policies that encourage synergy between institutions are crucial. Establishing a coordination forum or dedicated task force focused on climate risk audits could be one solution to ensure policy alignment and effective information exchange. With effective coordination, audit results can be more relevant and support strategic decision-making at the government level.

Furthermore, transparency and accountability in reporting climate risk audit results also need to be strengthened. The government must ensure that audit results are communicated not only to internal stakeholders but also openly to the public. This is crucial for increasing public trust and encouraging public participation in monitoring climate change-related policies. A transparent reporting policy can also be a tool to encourage improvements in government performance in managing climate risk. In this regard, the use of sustainability-based reports that integrate financial and non-financial aspects can be an effective approach.

The next policy recommendation is the integration of climate risk audits into the budgeting and development planning process. Audits serve not only as an evaluation tool but also as a preventative mechanism that can identify potential risks early in the planning stage. Therefore, climate risk audit results should serve as the basis for budgeting and development policy formulation. This will enable more efficient resource allocation and focus on mitigation and adaptation to climate change. This approach will also help the government avoid greater economic losses in the future due to poorly managed climate impacts.

Furthermore, incentive and disincentive policies are needed to encourage the effective implementation of climate risk audits. Government agencies that effectively manage climate risk can be given incentives in the form of additional budgets or performance awards. Conversely, agencies that fail to address climate risk in their financial management can be subject to administrative sanctions (Šalienė et al., 2024). This mechanism will encourage government agencies to more seriously integrate climate risk into their financial management systems. These incentives and disincentives can also be a tool to accelerate organizational culture change towards more sustainable governance.

Finally, strengthening the national legal and policy framework related to climate risk audits is a key foundation for ensuring the sustainability of their implementation. The government needs to establish regulations that are not only normative but also operational and can be effectively implemented in the field. These regulations should include a definition of climate risk, the scope of the audit, the methodology used, and mechanisms for reporting and following up on audit results. With a strong legal framework, climate risk audits can become an integral part of a modern public financial management system that is responsive to global challenges.

CONCLUSION

The conclusion of the study "Climate Risk Auditing in Public Sector Finance: A New Paradigm for Accountability" demonstrates that climate risk auditing is a new approach that is increasingly relevant in strengthening public sector accountability amidst the increasing pressures of global climate change. Integrating climate risk aspects into public financial audit practices not only broadens the scope of traditional audits but also encourages public institutions to be more transparent in managing the environmental, social, and economic impacts of fiscal policies. Thus, climate risk auditing serves as a strategic instrument to ensure that state financial management is oriented not only toward efficiency but also toward long-term sustainability.

Furthermore, this study confirms that the successful implementation of climate risk audits depends heavily on institutional readiness, an adaptive regulatory framework, and auditor competence in understanding complex environmental issues. Cross-sector collaboration, strengthening human resource capacity, and utilizing analytical technology to more accurately identify and measure climate risks are required. By adopting this new paradigm, the public sector has a significant opportunity to improve the quality of financial

governance while contributing to the achievement of sustainable development goals and resilience to climate change.

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