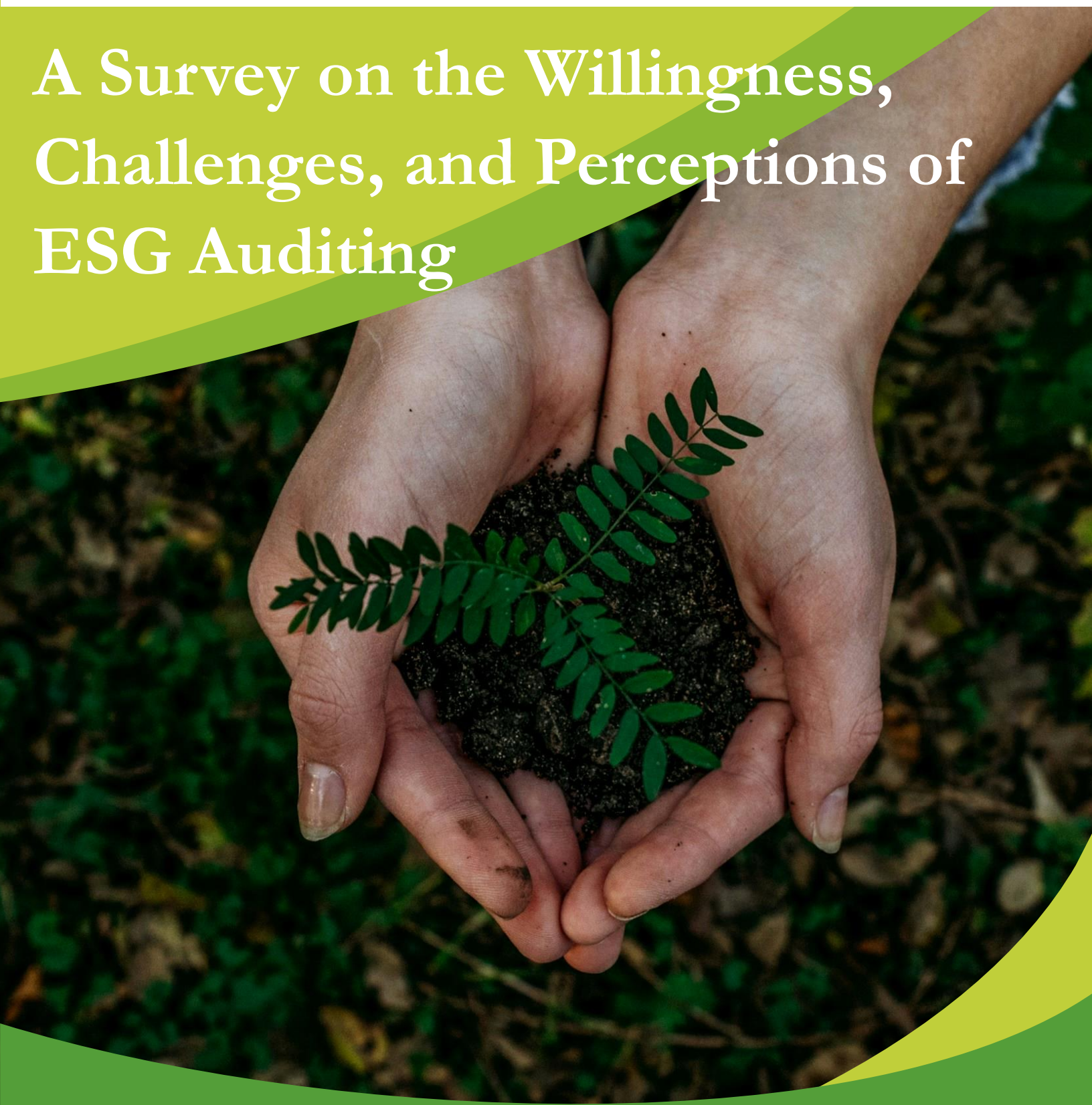
ICAEA INTERNATIONAL

A Survey on the Willingness, Challenges, and Perceptions of ESG Auditing



85% of the global participants have recognized the value and advantages of ESG auditing. However, there are still more to know. 8 key findings are provided by ICAEA, aim to gain insight of future auditing.

ICAEA 2025 Whit Paper

Acknowledgments

We would like to extend our heartfelt gratitude to the Japan, Korea, Taiwan, and Middle East chapters, as well as other contributors, for their invaluable assistance in the publication of *A Survey on the Willingness, Challenges, and Perceptions of ESG Auditing*.

Your enthusiastic participation and contributions were instrumental in the successful completion of this significant endeavor. Without your expertise and insightful input, we would not have been able to accomplish the publication of this White Paper. We truly appreciate your selfless dedication, which allowed us to explore together the application of AI in auditing and contribute further value to the global auditing and corporate governance landscape.



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Executive Summary

ESG is increasingly shaping the auditing landscape. In response, regulatory and professional bodies have taken action to equip auditors with ESG-related competencies. The AICPA introduced the Fundamentals of ESG Certificate to provide foundational knowledge on ESG reporting and assurance, while the International Federation of Accountants (IFAC) has revised its International Education Standards (IES) to incorporate sustainability competence into professional accountancy training. These developments underscore the growing need for auditors to acquire sustainability-related knowledge and skills.

To assess the current state of ESG auditing, its challenges, and industry perspectives, the International Consortium for Advanced Audit and Evaluation (ICAEA) conducted the *ICAEA2024: ESG Auditing Survey*. The survey, consisting of 11 questions, was conducted anonymously and gathered responses from professionals across various industries, providing valuable insights into ESG auditing trends. The final survey responses were collected on February 19, 2025.

Key Findings：

1. Mandatory ESG reporting is expanding, and transparency is crucial.

73% of respondents indicate that publicly listed companies in their countries are required to issue ESG reports. This reflects the growing trend of regulation aimed at ensuring corporate transparency regarding environmental, social, and governance (ESG) matters.

2. Greenwashing is widespread, making effective ESG audits essential.

Only 10% of respondents consider greenwashing rare, highlighting its prevalence and the need for robust ESG audits to ensure the accuracy of ESG reports.

3. Regulation is still in its early stages, making proactive ESG audits crucial for businesses to prepare for future changes.

The regulatory landscape for ESG practices and corporate greenwashing is still in its early stages. While 66% of respondents' countries have established legal frameworks, many regulations are either in development or have not yet been implemented.

4. Stricter greenwashing regulations are anticipated in the next 3 years.

A significant majority (84%) of respondents expect that regulations addressing corporate greenwashing will become stricter within the next three years. This anticipated regulatory tightening reflects growing global concerns about environmental sustainability and increasing demands for transparency in corporate social responsibility.

5. ESG auditing is increasingly recognized as a crucial skill for the future.

ESG auditing is gaining recognition as a critical skill for the future, with 85% of respondents acknowledging its growing importance. Despite concerns about added responsibilities, the majority of auditors recognize the potential value of ESG auditing in shaping the profession.

6. Data, technical complexity, and expertise are the main challenges in using computer-assisted audit techniques (CAATs) for ESG audits.

Data quality, technical complexity, and the lack of ESG expertise are the primary challenges identified by respondents in using computer-assisted audit techniques (CAATs) for ESG audits. ESG data is often fragmented, and many auditors lack the specialized technical skills needed to effectively analyze ESG reports. Overcoming these challenges will be crucial for improving the accuracy and effectiveness of ESG audits and ensuring the reliability of ESG data.

7. The focus on new audit commands to assist in ESG auditing remains centered on Data Analysis, Text Mining, and Machine Learning.

Respondents indicate that the primary focus for new audit commands should be on data analysis, text mining, and machine learning, with more than half of them emphasizing the need for these capabilities in ESG audits. These tools can help auditors process large volumes of ESG data, identify discrepancies, and enhance the overall accuracy of audits. Leveraging advanced technologies will be key to improving the efficiency and transparency of ESG audits.

8. Python-Based CAATs Are Becoming the Main Tools for ESG Auditing

Excel remains dominant in ESG analytic, but its limitations—such as lack of audit trails, vulnerability to human error, and limited text analytic—are increasingly apparent. In contrast, Python-based CAATs offer automation, data validation, advanced analytics, text mining, and robust audit trails, making them a more powerful and reliable alternative.



1 | Survey Concept

Title: ICAEA2024: ESG Auditing Survey

Description:

The International Computer Auditing Education Association (ICAEA) is conducting a comprehensive survey titled "ICAEA2024: ESG Auditing Survey" to explore the adoption, challenges, and regulatory landscape of ESG (Environmental, Social, and Governance) auditing. This survey aims to gather insights into current ESG auditing practices, the prevalence of greenwashing, regulatory requirements, and the role of computer-assisted audit tools (CAATs) in ESG assurance.

The main survey participants include six groups: the auditing industry (registered accountants), regulatory bodies (e.g., financial supervision agencies), the business sector (internal auditors), research institutions (universities/graduate schools), software developers, and finance and auditing professionals. All participants share a strong interest in computer-assisted auditing, ESG reporting, and data analysis.

The survey focuses on ESG disclosure regulations, greenwashing risks, evolving legal frameworks, and ESG auditing challenges. It also explores professionals' willingness to engage in ESG audits and necessary enhancements in audit software.

By analyzing survey data, participants and stakeholders can access an open information platform and gain valuable insights into the current ESG auditing landscape, regulatory developments, technological advancements, and future trends in ESG assurance.

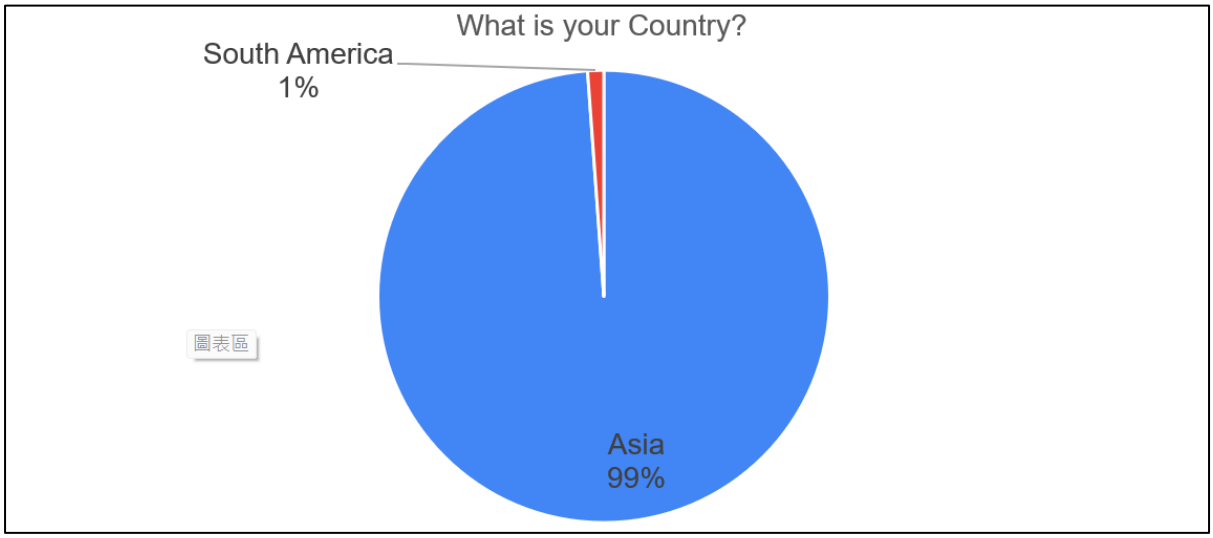
Survey Link: https://reurl.cc/GnVq1W



2| Overview of Participants

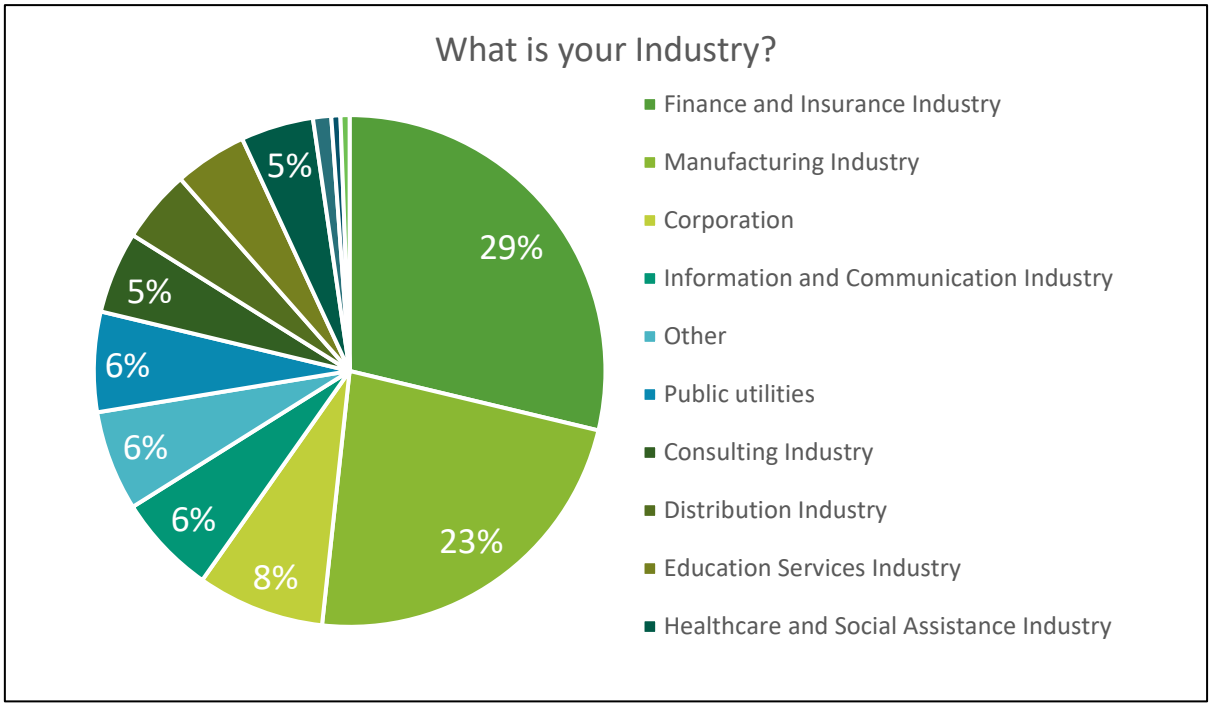
From Country Aspect

With over 99% of participants from Asia, the data reflects a significant regional focus on ESG auditing. This strong representation suggests a high level of awareness and interest in ESG reporting regulations, greenwashing risks, and auditing challenges. It also indicates a growing need for enhanced ESG auditing capabilities to ensure compliance and reliability in sustainability disclosures.



From industry aspect

Participants in this survey span various industries, demonstrating that ESG affects all sectors. Notably, the finance and insurance, and manufacturing sectors are key contributors. The manufacturing industry's strong representation indicates a focus on ESG compliance and sustainability reporting, driven by regulatory pressures and supply chain transparency. Likewise, the finance and insurance sector's involvement reflects the growing importance of ESG in risk assessment and investment decisions. This broad participation highlights the collective recognition of ESG auditing's role in promoting corporate accountability and sustainability.



From primary function aspect

Based on the survey responses, the majority of participants are primarily engaged in auditing, particularly internal auditing. We also see significant representation from functions related to finance and auditing, such as business operations, compliance, legal, internal controls, risk management, and accounting & finance. Other areas, such as cybersecurity audit, consultancy, and education & training, are also well-represented, providing a broad range of perspectives. Participants from education and training, in particular, offer unique insights into the evolving landscape of ESG auditing, enriching the survey with diverse, professional viewpoints across multiple sectors.





3| Legal Oversight of ESG Reporting and Greenwashing

Findings：

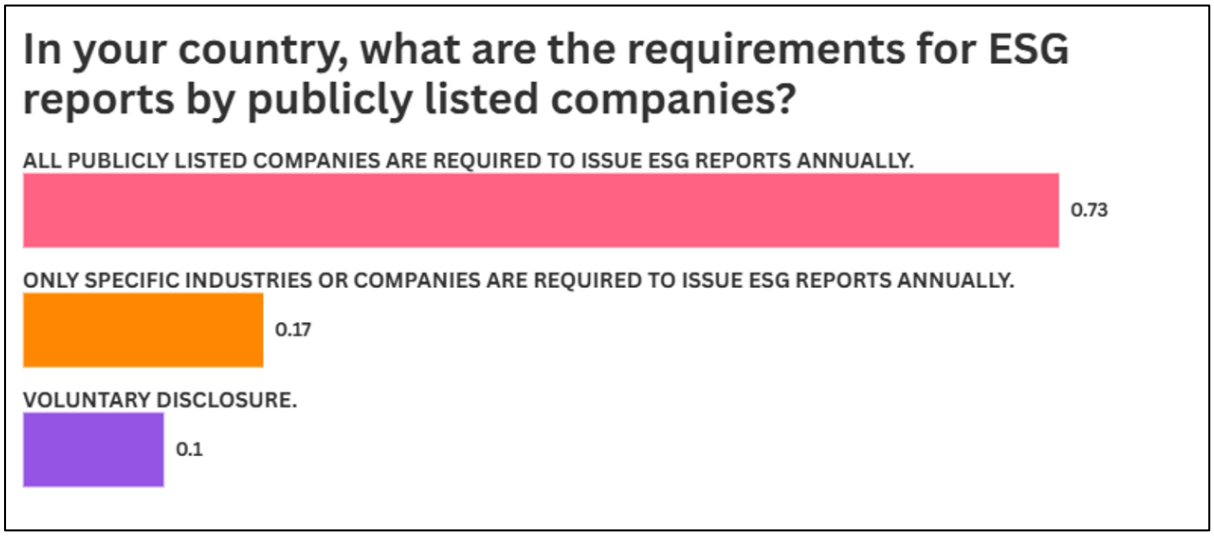
1. Mandatory ESG reporting is expanding, and transparency is crucial.
2. Greenwashing is widespread, making effective ESG audits essential.
3. Regulation is still in its early stages, making proactive esg audits crucial for businesses to prepare for future changes.
4. 84% of respondents anticipate stricter greenwashing regulations soon.

Mandatory ESG reporting is expanding, and transparency is crucial.

According to the survey, 73% of respondents believe that publicly listed companies in their respective countries are required to issue ESG reports, indicating that many regions have announced or adopted clear regulations aimed at ensuring corporate transparency in ESG matters. These mandates promote the disclosure of detailed ESG performance, which is essential for stakeholders, including investors and regulators, to assess companies' sustainable development efforts. This trend highlights the growing recognition of the importance of environmental, social, and governance factors in evaluating long-term corporate success and risk management.

However, 17% of respondents noted that only specific industries or companies are required to report ESG, suggesting that some countries have industry-based differentiation. For example, sectors like finance, energy, or high-pollution industries may face stricter requirements. This targeted approach reflects an effort to tailor regulations to the specific impacts of different industries, ensuring that companies with higher environmental or social risks are held to more rigorous standards.

Additionally, 10% of respondents indicated that ESG reporting is voluntary. Voluntary reporting can result in inconsistent quality and transparency. Companies that fail to provide relevant information or publish inaccurate data losing access to capital (Gupta & Kalia, 2022), and auditors will play a key role in ensuring transparency and credibility in ESG reporting.

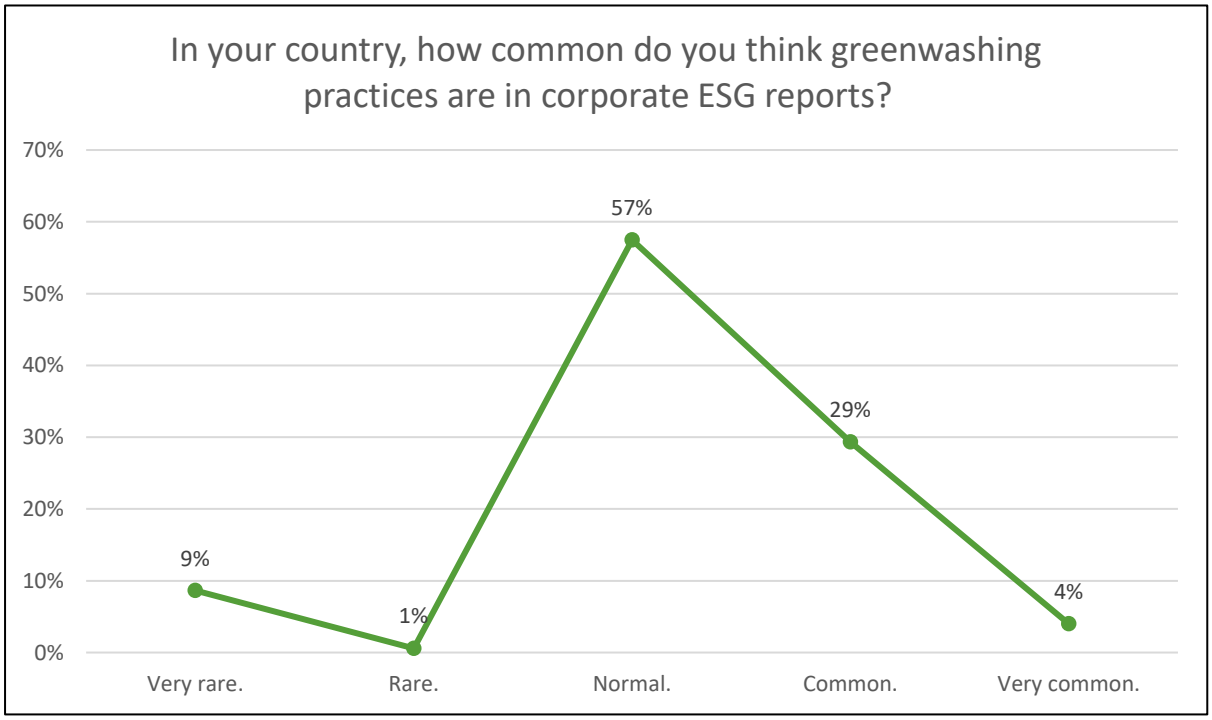


Greenwashing is widespread, making effective ESG audits essential.

Greenwashing—misleading claims about a company's environmental or social efforts—remains a prevalent issue in ESG reporting. The survey shows that 91% of respondents perceive greenwashing as either "normal," "common," or "very common" in their respective countries, reflecting a significant concern about the accuracy of ESG claims. Only a small portion (9%) felt that greenwashing is "rare" or "very rare," emphasizing the need for robust audit mechanisms to detect and prevent such practices.

Effective ESG audits and mechanisms to detect greenwashing are essential for maintaining corporate accountability and transparency, ultimately promoting a more sustainable business environment. As the gap between corporate environmental claims and actual practices continues to widen, enhancing ESG audits is crucial to ensuring that companies' sustainability claims are backed by verifiable actions. By integrating robust detection mechanisms, such as auditing frameworks and internal controls aligned with ESG frameworks, companies can foster trust with stakeholders and mitigate the risk of greenwashing. Furthermore, accounting firms must expand their focus to include greenwashing detection, providing assurance services that validate the authenticity of ESG disclosures (Huang et al., 2024).

Misleading communications, inaccuracies in disclosures, and material omissions can severely harm a company's reputation, erode trust with customers and investors, and expose it to legal and regulatory risks. Auditors must play a critical role in ensuring that ESG reports are transparent, accurate, and compliant with regulations. Strengthening ESG audits through data-driven methods and improved oversight is essential for reducing the risk of greenwashing and building greater confidence in sustainability reporting.



Regulation is still in its early stages, making proactive ESG audits crucial for businesses to prepare for future changes.

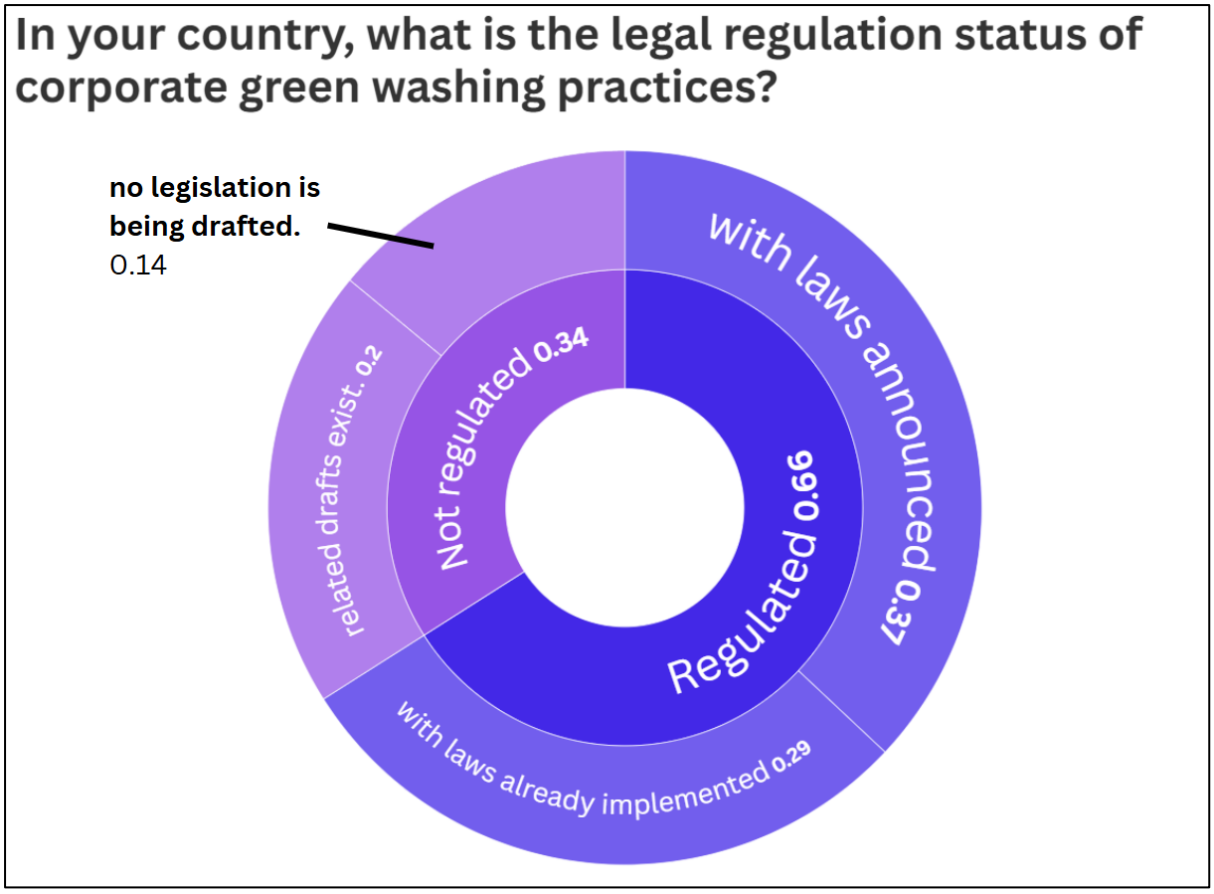
The survey results show that there is growing awareness and legal action surrounding corporate greenwashing and its regulation. 29% of respondents believe that corporate greenwashing is already regulated by laws, while 37% say that laws have been announced but are still pending implementation. These findings point to the increasing recognition of the need for regulation to combat misleading environmental claims made by businesses. This trend reflects the broader global shift toward more robust environmental governance and greater consumer demand for corporate accountability.

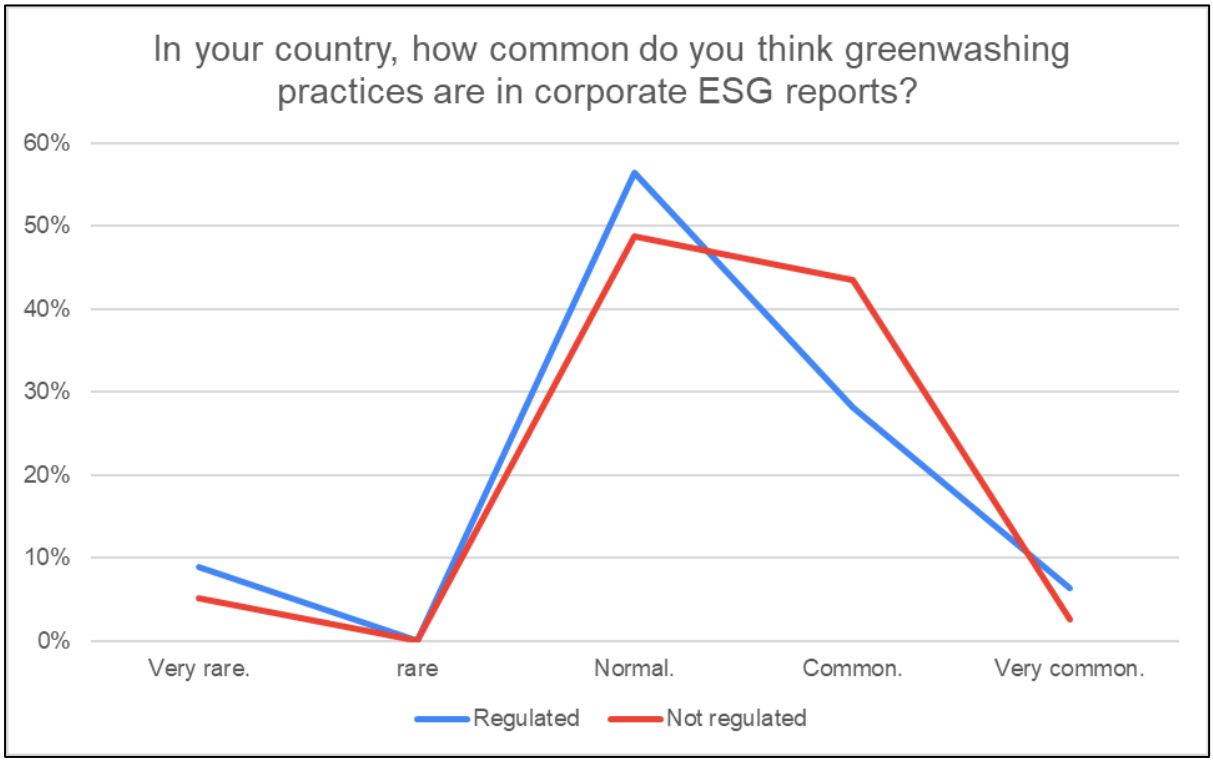
In countries where ESG-related regulations are already implemented, businesses must conduct thorough ESG audits to ensure their practices align with legal requirements. These audits provide the transparency needed to demonstrate that companies are not engaging in greenwashing and are complying with relevant laws. Furthermore, ESG audits are critical in showcasing a company's genuine commitment to sustainability and ethical business practices, helping to foster trust among consumers and investors alike. By adhering to these regulations, companies also avoid the legal risks and potential penalties associated with non-compliance.

In jurisdictions where no specific ESG regulations exist (34% of respondents), businesses can still benefit from conducting ESG audits to stay ahead of potential future regulations. Although these audits are not legally required in such areas, they can help improve a company's reputation, meet investor expectations, and prepare for future regulatory tightening. As legal frameworks evolve, companies that proactively conduct ESG audits will be better positioned to adapt to upcoming changes. Moreover, these audits can provide valuable insights into areas where businesses can improve their environmental impact, ultimately contributing to long-term sustainability goals.

The survey also revealed a difference in the perception of greenwashing between regulated and unregulated countries. In regulated countries, 56% of respondents view greenwashing as "normal," with 28% considering it "common." In contrast, in unregulated countries, 44% of respondents consider greenwashing "common," and 49% view it as "normal" . This suggests that, although regulations help mitigate the extent of greenwashing, it still persists. Therefore, regardless of the regulatory environment, companies should conduct ESG audits to ensure compliance, enhance their reputation, and maintain transparency. Proactive ESG measures not only help reduce the risk of greenwashing but also empower businesses to demonstrate their genuine commitment to responsible practices.

As public and governmental awareness of greenwashing continues to rise, businesses that fail to align their practices with sustainable and ethical standards risk not only damaging their reputation but also alienating a growing base of conscientious consumers. Thus, companies across both regulated and unregulated markets should prioritize ESG audits as a key part of their long-term strategic planning to ensure they remain competitive and transparent in an increasingly sustainability-conscious world.


In your country, what is the legal regulation status of corporate green washing practices?
no legislation is being drafted.
0.14
related drafts exist. 0.2
Not regulated 0.34
Regulated 0.66
with laws announced 0.37
with laws already implemented 0.29

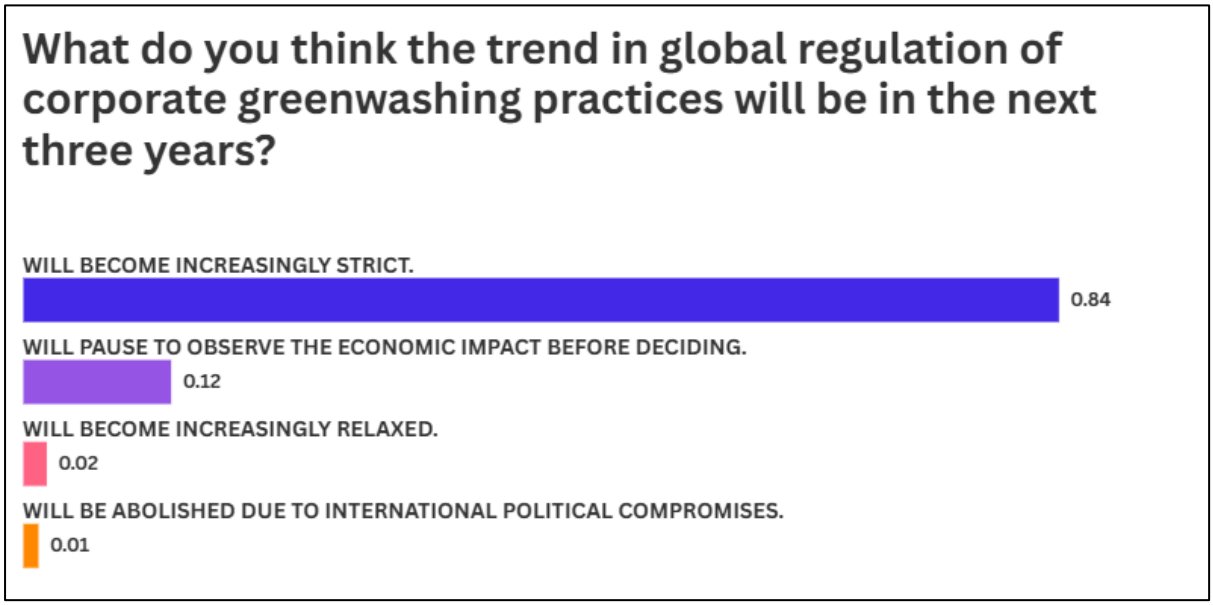

In your country, how common do you think greenwashing practices are in corporate ESG reports?
60%
50%
40%
30%
20%
10%
0%
Very rare.
rare
Normal.
Common.
Very common.
Regulated
Not regulated

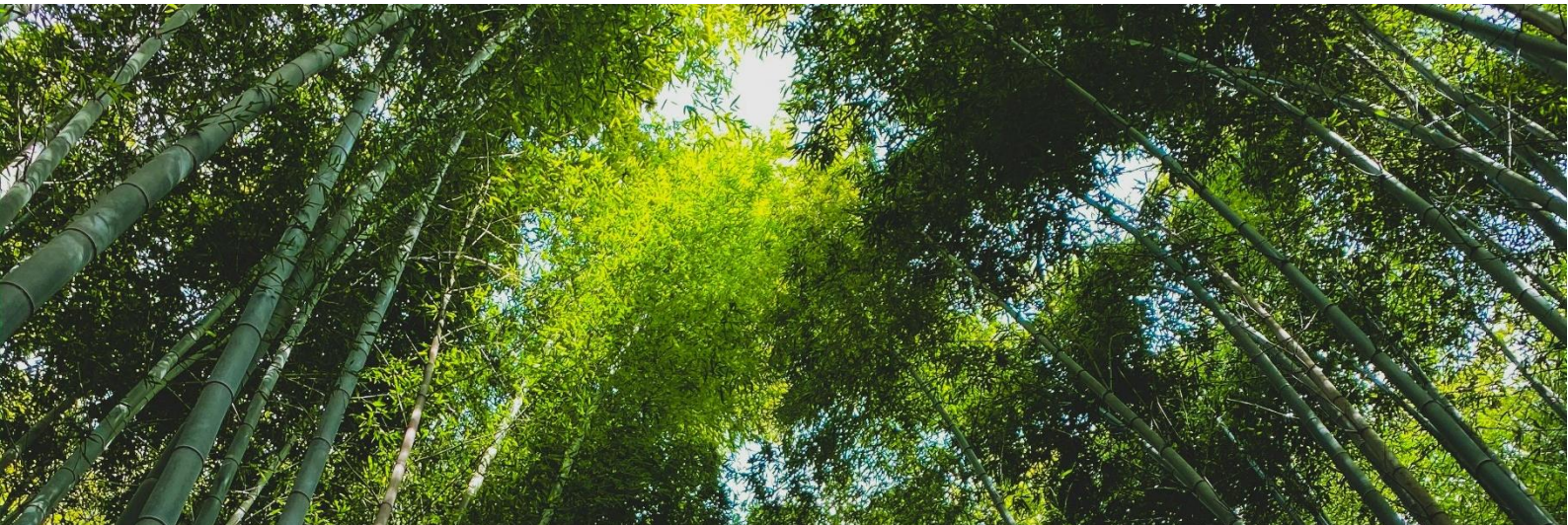
Stricter greenwashing regulations are anticipated in the next 3 years.

According to a recent survey, 84% of respondents expect regulations addressing corporate greenwashing to become stricter over the next three years. This expectation reflects growing global concerns about environmental sustainability and an increasing demand for transparency in corporate social responsibility. As a result, most anticipate that legal frameworks will evolve to better address greenwashing, ensuring greater corporate accountability for environmental claims.

However, a smaller portion of respondents (12%) suggested that regulatory changes might slow down temporarily to assess the economic impact before moving forward with further action. This viewpoint seems to hold some merit, as demonstrated by the European Commission's recent adoption of new proposals in February 2025. These proposals aim to simplify sustainability rules, boost EU investments, enhance competitiveness, and unlock additional investment capacity. The proposals would remove around 80% of companies from the scope of CSRD and postpone by two years (until 2028) the reporting requirements for companies currently in the scope of CSRD and which are required to report as of 2026 or 2027 (European Commission, 2025).

The situation in the EU suggests that while the short-term pace of regulatory change may vary, the long-term consensus is clear: regulations will become more robust to combat corporate greenwashing, underscoring the growing need to hold businesses accountable for their environmental claims.





Findings：

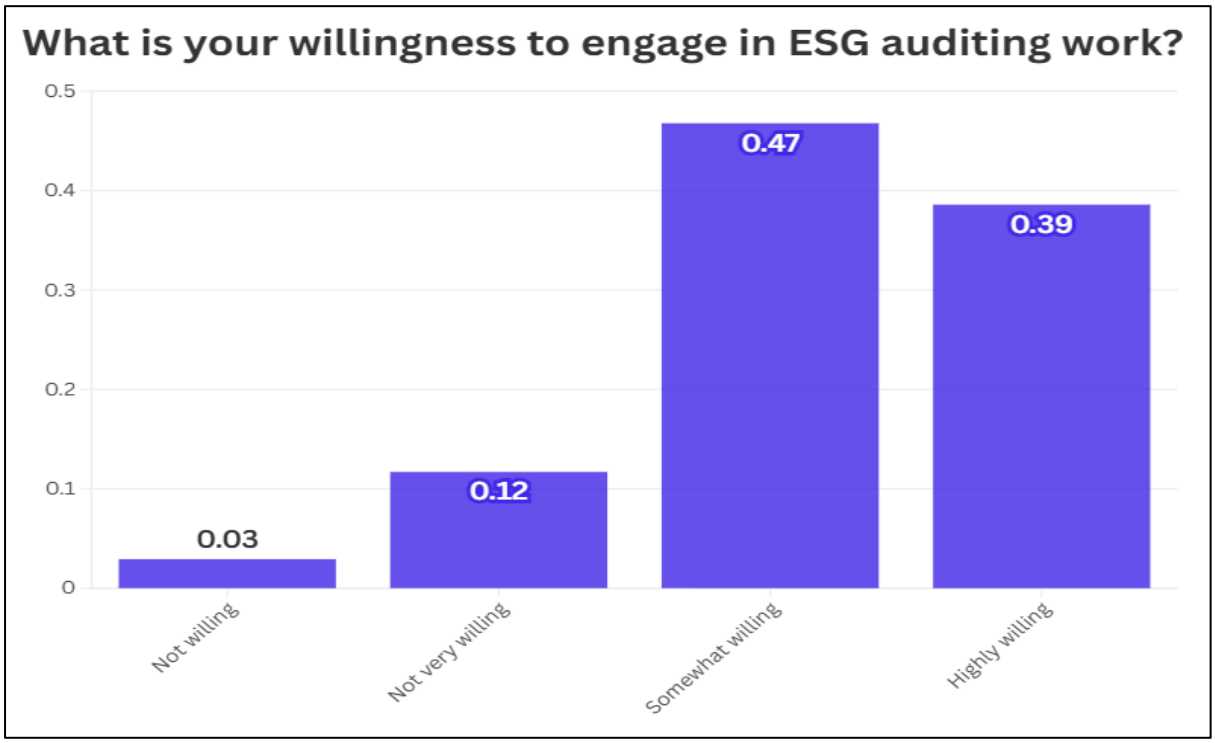
1. ESG auditing is increasingly recognized as a crucial skill for the future.
2. Data, technology, and talent are the main challenges for ESG auditing.
3. The focus remains on functionalities related to Data Analysis, Text Mining, and Machine Learning.
4. Excel is still the most used CAATs.

ESG auditing is increasingly recognized as a crucial skill for the future.

Auditors' willingness to engage in ESG auditing reflects a range of perspectives. 15% of respondents expressed low willingness, with a small minority (3%) believing that ESG auditing is not part of the auditing profession, and 12% feeling that their current workload is already overwhelming. These auditors are hesitant to take on additional responsibilities, as they feel the scope of their work is already too broad to include ESG auditing.

In contrast, 85% of respondents recognize the potential value of ESG auditing and acknowledge its growing importance. Among them, 39% see ESG auditing as a necessary skill for the future of the profession. Despite concerns over the added burden, the majority view ESG auditing as an essential area of expertise that will shape the industry in the coming years.

The Institute of Internal Auditors (IIA, 2021) stresses that internal auditors should adopt both Assurance and Advisory roles, ensuring the relevance, accuracy, and timeliness of ESG reporting metrics. Additionally, auditors should work to establish a robust ESG control environment to enhance organizational accountability and transparency. While some auditors remain hesitant or feel overwhelmed by the added responsibilities, most acknowledge the significance of ESG auditing and its potential to become a core part of the profession's future.



Data, technical complexity, and expertise are the main challenges in using computer-assisted audit techniques (CAATs) for ESG audits.

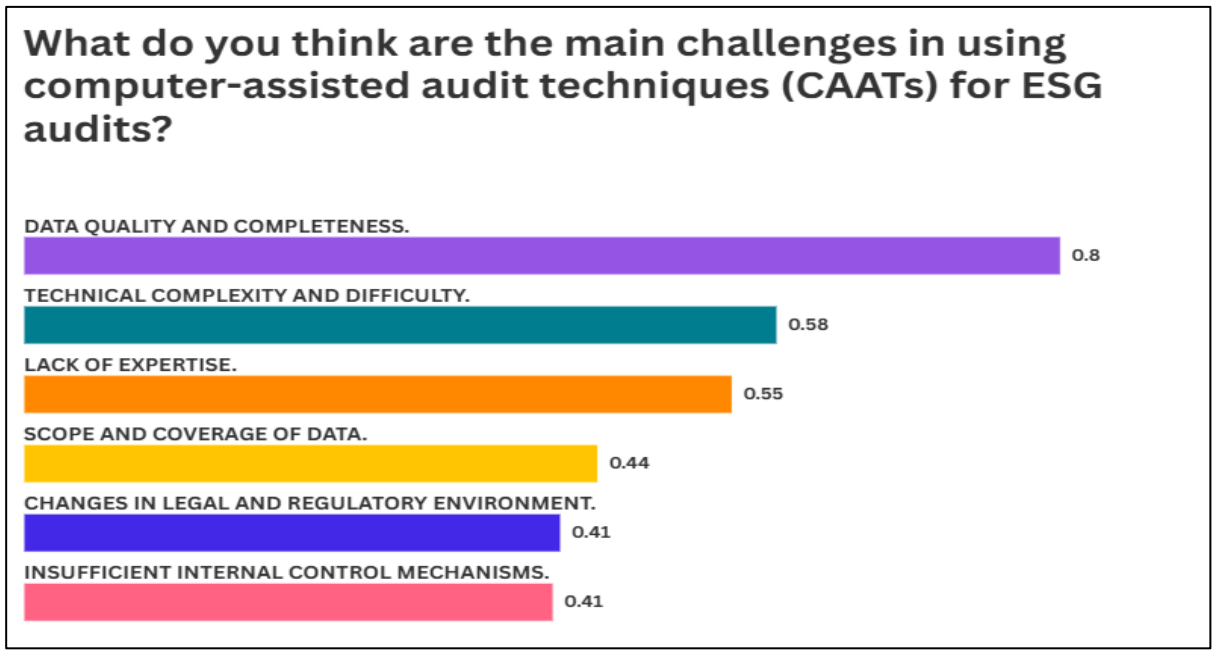
CAATs in ESG assurance face several significant challenges, with data quality and completeness (80%) being the most pressing. ESG data may be fragmented and sourced from multiple channels, which affects its consistency and relevance (Applebaum et al., 2024). Auditors must verify the authenticity and origin of the data, but without sufficient expertise in ESG (55%), they may struggle to properly define the audit scope. This can lead to over-coverage and information overload, ultimately diminishing the audit's effectiveness.

Another key challenge is the technical complexity of CAATs (58%). Many auditors lack the specialized technical skills needed to fully leverage advanced tools, especially those involving AI and machine learning. This lack of expertise can lead to inefficiencies and hinder auditors' ability to understand the "black box" nature of these tools, which in turn impacts the transparency and reliability of the audit process.

The scope and coverage of ESG data (44%) also pose difficulties. ESG information spans a broad range of areas, often with inconsistent reporting standards across organizations. This makes it challenging for auditors to determine whether the data is comprehensive and relevant, potentially leading to inefficiencies and diluted audit focus.

Weak internal control mechanisms (41%) present another challenge. Inadequate internal controls can result in inaccurate or inconsistent data, undermining the reliability of CAATs and the audit process. Strong internal controls are crucial to maintaining data integrity and ensuring compliance with relevant standards.

Finally, frequent changes in the legal and regulatory (41%) landscape introduce uncertainty. Auditors must continually adapt to evolving regulations, which adds complexity to ESG audits. This is especially challenging when different jurisdictions have varying standards and requirements.



The focus on new audit commands to assist in ESG auditing remains centered on Data Analysis, Text Mining, and Machine Learning.

Data Analysis Commands (73%): These are essential in ESG auditing for processing structured and unstructured data, such as sustainability reports, carbon footprint data, and compliance records. They help auditors identify trends and discrepancies in ESG performance.

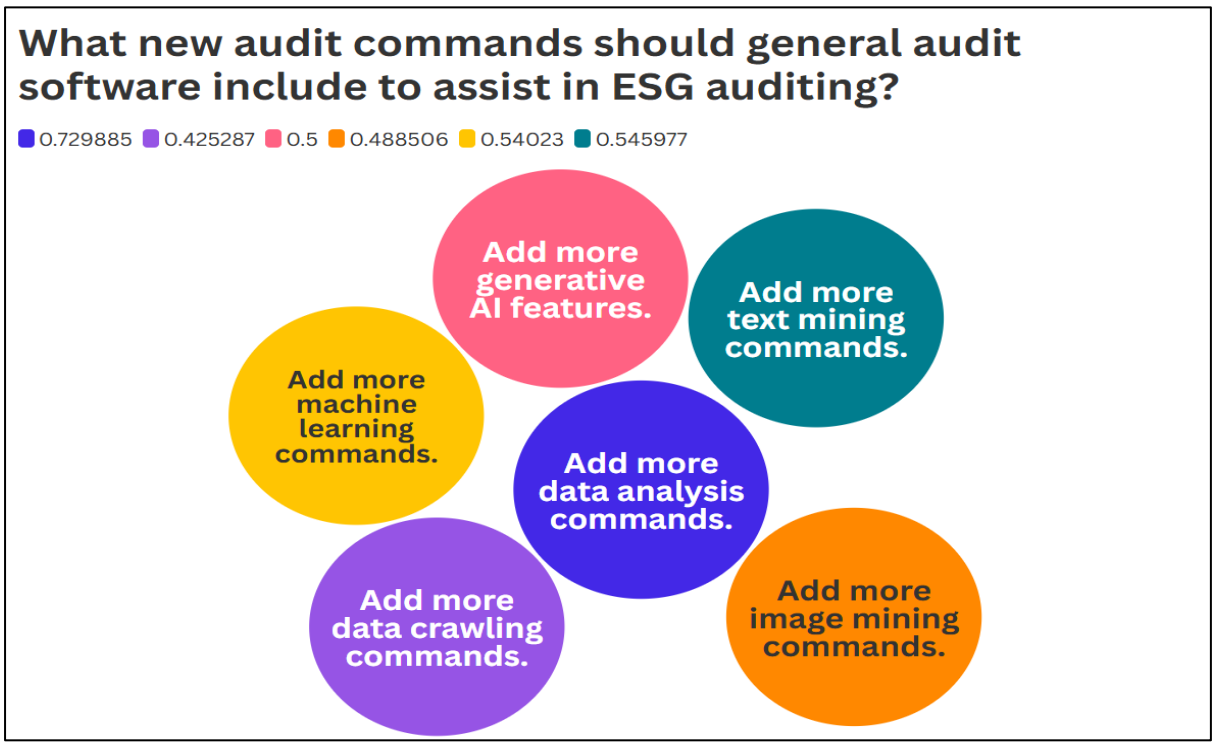
Text Mining Commands (55%): Crucial for analyzing company reports, identifying discrepancies, and ensuring compliance with regulations like the Corporate Sustainability Reporting Directive (CSRD). It also helps prevent greenwashing and ensures accurate reporting (KPMG, 2023).

Machine Learning Commands (54%): Applied in ESG audits to identify patterns, predict risks, and detect anomalies in financial and sustainability reports, enhancing overall audit accuracy.

Generative AI features (50%): Enhances ESG audits by automating research, identifying standard requirements, and improving data validation. It also helps in stakeholder management, meeting transcription, and reporting, ensuring efficiency and transparency (Sivaraman Subramaniam, 2023).

Image Mining Commands (49%): Useful for verifying ESG compliance, such as detecting environmental violations via satellite imagery or social media content, thereby improving audit accuracy.

Data Crawling Commands (43%): Used to collect external data on ESG-related risks from sources like media, social media, and company reports. This dynamic process helps in proactive risk identification and provides a more comprehensive understanding of a company's ESG performance (Li et al., 2024).



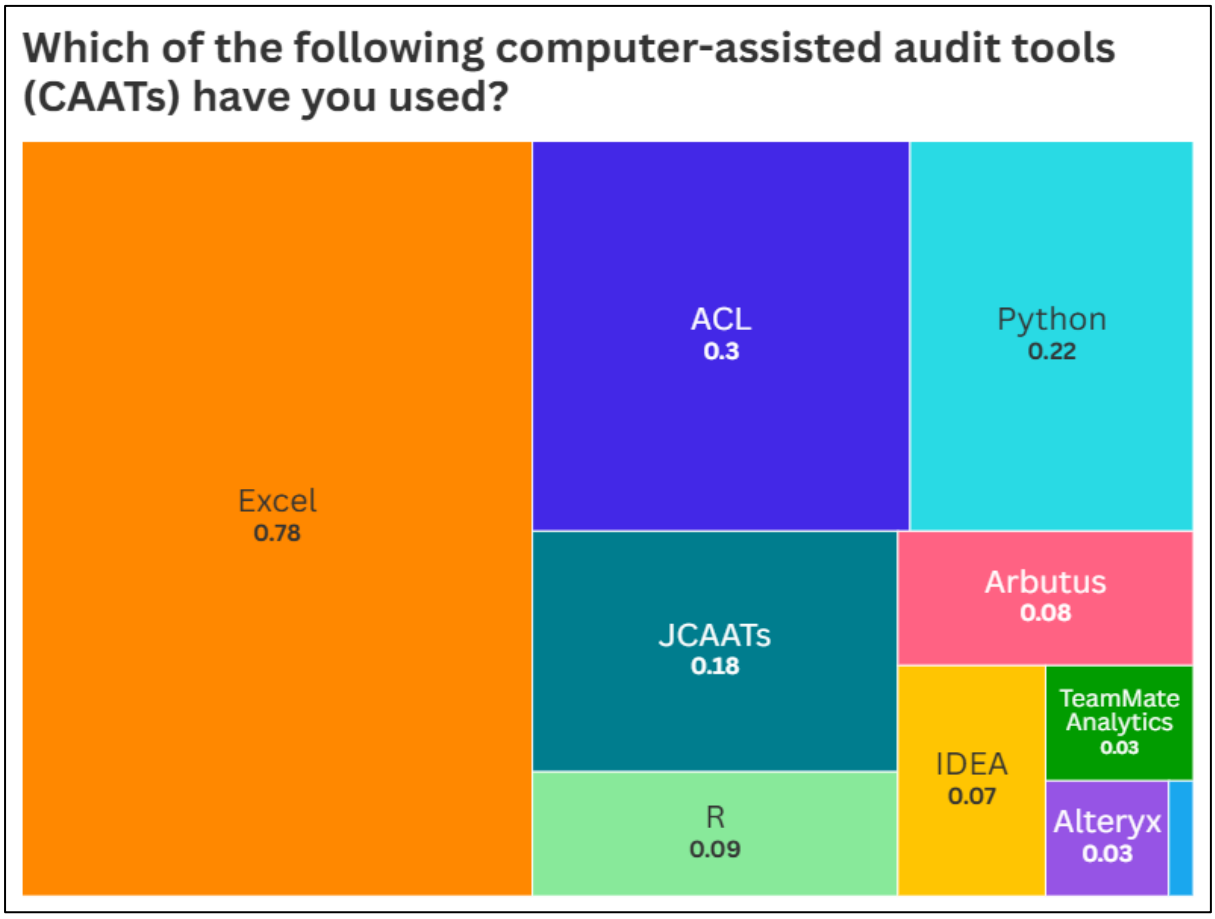
Beyond Spreadsheets: The Shift Toward Smarter Audit Tools.

Excel remains the most commonly used audit tool (78%) due to its familiarity and no licensing cost. However, nearly half (48%) rely on Excel alone, despite its key limitations—lack of audit trail, poor scalability, and high error risk—making it inadequate for modern auditing.

As audit practices become more data-driven, there is a growing shift toward specialized tools. CAATs like ACL (30%), JCAATs (18%), Arbutus (8%), IDEA (7%), Alteryx (3%) and TeamMate Analytics (3%) are gaining traction for their built-in audit functions and ease of use, especially for non-programmers.

In parallel, programming tools like Python (22%) and R (9%) are being adopted for advanced analytics, automation, and machine learning. The combination of "Python + JCAATs- Python Based Audit Software" is emerging as a powerful solution—integrating audit-specific workflows with deep analytical capabilities.

This trend reflects a broader movement: auditors are moving beyond basic spreadsheets and embracing more professional, scalable, and intelligent audit tools to meet today's evolving challenges.



6 | Conclusion

As the landscape of auditing undergoes significant transformation driven by the rise of AI, digital transformation, and the growing prominence of ESG (Environmental, Social, and Governance) factors, the demands on auditors continue to evolve. The expansion of mandatory ESG reporting and the increasing concern over greenwashing underscore the urgency of adopting robust ESG audits to ensure transparency, accountability, and compliance. Businesses are facing greater regulatory scrutiny, and the anticipated tightening of greenwashing regulations highlights the need for proactive ESG audits to mitigate risks and prepare for future changes.

However, the integration of advanced technologies like machine learning, text mining, and data analysis in ESG audits presents both opportunities and challenges. Issues such as data quality, technical complexity, and the lack of specialized expertise remain significant hurdles. Despite these challenges, the recognition of ESG auditing as a critical skill for the future underscores its growing importance in shaping corporate responsibility and sustainability efforts.

In response to these shifts, the International Computerized Audit Education Association (ICAEA) has been actively promoting the development of technical and critical thinking skills among auditors over the past decade. With the introduction of the International Certificate ESG Auditor program, ICAEA is preparing professionals to navigate the complexities of ESG audits, equipping them with the knowledge to evaluate sustainability and social responsibility practices effectively. This certification emphasizes the need to combine theoretical knowledge with practical, real-world case studies, ensuring auditors are prepared not only with the knowledge but also with the technical skills necessary for success in this evolving field.

Looking ahead, ICAEA will continue to focus on enhancing the capabilities of auditors, ensuring they are equipped to meet the increasing demands of the profession while also contributing to the global effort toward greater corporate sustainability and responsibility.



7| Methodology

ICAEA conducted a survey of 174 respondents from 16 countries to understand the opinions on applications of AI in Auditing. The respondents come from various industries and positions to demonstrate diverse and independent perspectives.

This survey used a closed-ended online questionnaire and a convenient non-random sampling method. The sample was taken from ICAEA members or relevant personnel, and the deadline for response was February 19, 2025. The survey aims to explore audit technology from eleven questions to understand the respondents' views on ‘ESG disclosure regulations, greenwashing risks, evolving legal frameworks, and ESG auditing challenges.’

Through the survey and analysis, readers can access public information to gain a deeper understanding of the status, challenges, and future direction of ESG auditing development.

8| Notes

This survey is conducted online and most of the respondents are members and related personnel of ICAEA, with a total of 174 participants. The sampling method is non-random, so the representativeness of the sample needs to be considered.

In some of the charts, the total percentage may not add up to 100%, which includes rounding of percentages, multiple choices, and answer options that have not been displayed yet due to their relevance (such as "Not Sure").

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Image：

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