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Climate Risk Disclosure Quality in Beverage Industry ESG Reports: A Qualitative Assessment of Coca-Cola and Pepsico's Compliance with ISSB Standards

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ABSTRACT

Corporate sustainability reporting has become increasingly standardized through frameworks like the International Sustainability Standards Board (ISSB) and Task Force on Climate-related Financial Disclosures (TCFD). This research conducts a qualitative assessment of climate risk disclosure quality in ESG reports from two major beverage companies, Coca-Cola and PepsiCo, examining their compliance with ISSB S2 (Climate-related Disclosures) standards implemented in 2024.

Using a systematic qualitative review methodology, this study analyzes disclosure quality across ISSB's four core pillars: governance, strategy, risk management, and metrics and targets. Rather than determining which company engages in greenwashing, this research evaluates whether both companies meet the specific disclosure requirements mandated by ISSB standards and identifies gaps in reporting transparency. The analysis incorporates both company-disclosed information and independent third-party assessments to verify disclosure completeness and accuracy.

Findings reveal that while both companies provide extensive documentation meeting formal ISSB requirements, significant variations exist in disclosure depth, transparency, and verifiability. PepsiCo demonstrates more comprehensive disclosure across most dimensions, particularly in Scope 3 emissions methodology and scenario analysis detail. Coca-Cola meets minimum disclosure thresholds but provides less granular information, especially regarding supply chain emissions and verification processes. Both companies show gaps between disclosed commitments and independently verified outcomes, raising questions about the effectiveness of standardized frameworks in ensuring substantive climate action beyond compliance.

Keywords: ESG disclosure quality, ISSB standards, climate reporting, beverage industry, corporate sustainability, disclosure compliance

1. INTRODUCTION

1.1 Background

Climate change represents one of the most pressing challenges facing global business operations, demanding urgent action from corporations across all sectors. In response, Environmental, Social, and Governance (ESG) reporting has evolved from voluntary corporate social responsibility statements to increasingly mandatory disclosure requirements. Major multinational companies now publish detailed sustainability reports outlining their environmental impact, climate risks, and mitigation strategies, responding to pressure from investors, regulators, and stakeholders who demand transparency regarding climate-related business risks and opportunities.

The beverage industry faces unique and substantial climate challenges that directly threaten operational viability and financial performance. Companies like Coca-Cola and PepsiCo operate complex global supply chains involving agricultural production, manufacturing, packaging, distribution, and waste management. Each stage contributes to greenhouse gas emissions and environmental degradation while simultaneously facing vulnerability to climate impacts. Water scarcity threatens production in key markets, extreme weather events disrupt agricultural supply chains, and shifting consumer preferences toward sustainable products create market risks. These factors make climate risk management not merely an ethical imperative but a fundamental business necessity for beverage sector survival and competitiveness.

1.2 The Rise of Standardized ESG Reporting

To address concerns about inconsistent and unreliable corporate sustainability claims, international bodies have developed standardized reporting frameworks designed to improve comparability and credibility. The International Sustainability Standards Board (ISSB), established in 2021 at COP26, created comprehensive guidelines requiring companies to disclose climate-related risks and opportunities in a consistent, comparable manner. These standards build on earlier frameworks like the Task Force on Climate-related Financial Disclosures (TCFD) developed in 2017 and the Global Reporting Initiative (GRI) established in 1997.

ISSB standards, specifically IFRS S1 (General Requirements for Disclosure of Sustainability-related Financial Information) and IFRS S2 (Climate-related Disclosures), became effective in 2024 in multiple jurisdictions. These standards mandate disclosure across four core pillars: governance structures overseeing climate risks, strategic responses to climate change, risk management processes integrating climate considerations, and quantitative metrics including greenhouse gas emissions. The ISSB framework specifically addresses investor needs by linking sustainability disclosures to financial materiality, requiring companies to disclose how climate risks affect their business model, strategy, and financial planning across short, medium, and long-term horizons.

Unlike voluntary frameworks, ISSB standards aim to create a global baseline for sustainability reporting that enables meaningful comparison across companies and industries. However, questions remain about whether standardized disclosure requirements translate into substantive climate action or merely create more sophisticated compliance exercises that satisfy formal requirements without driving operational transformation.

1.3 Scope 3 Emissions: A Critical Disclosure Challenge

Understanding corporate climate impact requires familiarity with greenhouse gas (GHG) emissions classification established by the GHG Protocol. Scope 1 emissions originate from sources owned or controlled by the company, such as manufacturing facilities and company vehicles. Scope 2 emissions result from purchased electricity, steam, heating, and cooling. Scope 3 emissions encompass all other indirect emissions occurring throughout the company's value chain, including purchased goods and services, transportation, waste disposal, use of sold products, and end-of-life treatment.

For beverage companies specifically, Scope 3 emissions represent seventy to ninety percent of total greenhouse gas impact, making them the most material climate consideration for the sector. However, Scope 3 also presents the greatest measurement and management challenges. Companies must rely on supplier data, industry averages, and estimation methodologies rather than direct measurement, creating substantial uncertainty and opportunity for incomplete or misleading disclosure. The complexity of tracking emissions across global agricultural supply chains, diverse packaging materials, refrigerated

distribution networks, and consumer product use makes comprehensive Scope 3 reporting technically difficult and resource-intensive.

Given that Scope 3 constitutes the overwhelming majority of beverage industry climate impact, disclosure quality for these emissions becomes the critical test of whether companies are providing stakeholders with material information necessary for informed decision-making. This research therefore pays particular attention to how Coca-Cola and PepsiCo disclose Scope 3 emissions, including methodology transparency, data quality indicators, verification status, and year-over-year comparability. The challenges companies face in Scope 3 reporting reveal broader questions about whether current disclosure frameworks adequately address the most significant climate impacts or allow companies to focus attention on more easily controlled but less material emissions categories.

1.4 Research Question and Objectives

This research asks: **Do Coca-Cola and PepsiCo's ESG reports meet ISSB S2 disclosure requirements for climate-related information, and what is the quality of their climate risk disclosures?**

Unlike comparative studies that attempt to determine which company performs better or engages in more greenwashing, this qualitative assessment examines whether both companies fulfill specific disclosure obligations mandated by ISSB standards. The research evaluates disclosure completeness, transparency, and quality rather than making judgments about relative environmental performance or corporate behavior.

Specific objective:

Assess the quality and completeness of climate-related disclosures in Coca-Cola and PepsiCo's 2023-2024 ESG reports against ISSB S2 requirements across four pillars: governance, strategy, risk management, and metrics and targets.

This focused research question enables systematic evaluation of disclosure practices without requiring conclusions about greenwashing behavior, which would necessitate analyzing multiple additional companies and extensive counter-evidence from independent sources. By concentrating on disclosure quality assessment, this research provides valuable insights into how well current reporting practices serve stakeholder information needs and whether standardized frameworks successfully promote transparency.

1.5 Significance of the Study

This research matters for several important reasons. First, it provides an early assessment of how companies respond to newly implemented ISSB standards, offering insights into whether standardization improves disclosure quality in practice. Since ISSB S2 became effective in 2024, limited research exists examining actual company reporting under these standards, making this study timely and relevant for understanding framework effectiveness.

Second, by systematically evaluating disclosure quality using specific ISSB criteria, this research develops a replicable methodology that other researchers, investors, or regulators could apply to assess climate reporting across different companies and industries. The qualitative assessment framework established here contributes to developing best practices for disclosure evaluation beyond simple compliance checking.

Third, this study illuminates the practical challenges companies face in meeting comprehensive disclosure requirements, particularly regarding Scope 3 emissions. Understanding where disclosure quality falls short helps identify areas where additional guidance, standardization, or enforcement may be necessary to improve stakeholder information quality.

For high school students and young people, understanding corporate climate disclosure quality is

particularly important. Our generation will inherit both the consequences of climate change and the responsibility for holding institutions accountable. Developing the ability to critically assess corporate climate reporting - distinguishing substantive transparency from minimal compliance - represents essential literacy for future investors, consumers, policymakers, and business leaders. This research demonstrates that such assessment is possible through systematic, evidence-based analysis even for high school students willing to engage deeply with technical material.

1.6 Paper Structure

The remainder of this paper proceeds as follows. Section 2 reviews existing literature on ESG reporting frameworks, disclosure quality assessment, and beverage industry sustainability challenges. Section 3 explains the qualitative review methodology in detail, including specific assessment criteria and data sources. Section 4 presents results of the disclosure quality assessment across all four ISSB pillars. Section 5 discusses implications of findings for stakeholders and identifies areas where disclosure practices could improve. Section 6 concludes with recommendations for enhancing climate disclosure quality in the beverage sector.

2. LITERATURE REVIEW

2.1 Evolution of ESG Reporting Frameworks

ESG reporting has evolved from voluntary corporate social responsibility statements to increasingly mandatory, standardized disclosures driven by investor demand for decision-useful sustainability information. Several frameworks now guide corporate sustainability reporting, each with different emphases and intended audiences.

The Task Force on Climate-related Financial Disclosures, launched in 2017, provides a framework for companies to disclose climate-related financial risks using four pillars: governance, strategy, risk management, and metrics and targets. By 2023, over four thousand organizations globally had adopted TCFD recommendations, making it the most widely implemented climate disclosure framework. TCFD emphasizes financial materiality, requiring companies to disclose how climate risks affect their business model and financial planning across different time horizons.

The Global Reporting Initiative, established in 1997, offers the most widely used sustainability reporting standards covering economic, environmental, and social impacts. GRI focuses on impact materiality and stakeholder engagement, requiring companies to report on how their operations affect the environment and society broadly, not just financially material risks to the company itself. This dual materiality perspective provides different information than financially focused frameworks like TCFD.

The International Sustainability Standards Board, created in 2021 at COP26, aims to consolidate various reporting frameworks into a global baseline for sustainability disclosure. ISSB S1 establishes general requirements for sustainability-related financial information, while ISSB S2 specifically addresses climate-related disclosures building on TCFD's structure. The standards became effective in 2024 for jurisdictions adopting them, creating the first truly global sustainability reporting baseline. ISSB standards specifically target investor information needs, linking sustainability disclosures to financial materiality and requiring integration with financial reporting rather than separate sustainability reports.

The progression from voluntary GRI reporting to mandatory ISSB standards reflects growing recognition that sustainability information is financially material and essential for capital allocation decisions. However, questions remain about whether standardized disclosure requirements ensure transparency or merely create more sophisticated compliance exercises. This research contributes to answering those

questions by examining actual disclosure quality under the new ISSB framework.

2.2 Disclosure Quality Assessment

Academic literature distinguishes between disclosure quantity (amount of information provided) and disclosure quality (usefulness and reliability of that information). High-quality disclosure exhibits several characteristics including specificity with measurable claims rather than vague statements, verifiability through independent confirmation, materiality by addressing significant impacts, consistency enabling year-over-year comparison using stable methodologies, and completeness covering all required elements comprehensively.

Research on ESG disclosure quality reveals persistent challenges despite framework standardization. Studies find that companies often provide extensive documentation meeting formal requirements while offering limited substantive information useful for decision-making. Common quality issues include selective disclosure emphasizing positive information while minimizing negative impacts, vague language using undefined terms like "sustainable" or "responsible" without specific meaning, lack of verification for most sustainability claims especially supply chain information, inconsistent methodologies preventing meaningful year-over-year comparison, and incomplete coverage omitting difficult-to-measure but material impacts.

For climate disclosure specifically, Scope 3 emissions represent the most significant quality challenge. Research by Chen and Chang (2023) comparing ESG report claims with actual emission trajectories for ten major food and beverage companies found that while eight companies claimed emission reductions, six actually increased absolute emissions when accounting for business growth and using consistent measurement methodologies. This disconnect between disclosed commitments and verifiable outcomes suggests that disclosure quantity does not ensure disclosure quality or accountability.

A 2022 study by Szabo and Webster analyzed plastic reduction commitments by major beverage companies, finding that while ninety percent announced recycled content targets, only twenty-three percent provided verifiable progress data with specific metrics enabling assessment of whether targets were being met. The study identified aspirational goal-setting without implementation roadmaps or progress tracking as a common pattern undermining disclosure usefulness.

These studies establish that even with standardized frameworks, disclosure quality varies substantially across companies and that formal compliance with disclosure requirements does not guarantee provision of decision-useful information to stakeholders. This research builds on this literature by systematically assessing disclosure quality for two major companies under the newly implemented ISSB framework, examining whether the latest standards address previous quality shortcomings.

2.3 Beverage Industry Sustainability Challenges

The beverage industry faces distinct environmental challenges that shape both operational risks and disclosure requirements. Water intensity represents a fundamental challenge, as beverage production requires substantial water resources beyond the water contained in products. Coca-Cola uses approximately 1.98 liters of water to produce one liter of beverage according to 2023 data, while PepsiCo reports 1.7 liters per liter of product. Water scarcity in key production regions including India, the Middle East, and parts of Africa poses operational and reputational risks requiring disclosure of water stewardship strategies and facility-level risk assessments.

Packaging and plastic pollution constitute the most visible environmental challenge for beverage companies. Single-use plastic bottles represent a major concern given that only nine percent of plastic globally gets recycled despite decades of industry recycling promotion. Coca-Cola produces

approximately three million tons of plastic packaging annually. Break Free From Plastic's annual brand audits consistently rank Coca-Cola as the world's largest plastic polluter and PepsiCo as second, finding their branded plastic waste in the majority of countries surveyed. This creates both regulatory risk as governments implement extended producer responsibility laws and plastic bans, and reputational risk as environmental organizations and consumers demand packaging alternatives.

Agricultural supply chains generate substantial emissions and environmental impacts requiring comprehensive Scope 3 disclosure. Both companies source agricultural commodities including sugar, corn, fruits, and coffee from regions vulnerable to climate change impacts. Deforestation to expand agricultural production, water depletion for irrigation, and pesticide use in supply chains contribute significantly to environmental footprint. However, tracking and verifying supply chain impacts across thousands of suppliers in dozens of countries presents enormous disclosure challenges, making agricultural Scope 3 emissions the most uncertain and potentially incomplete element of beverage company climate reporting.

Distribution carbon footprint from global networks involving refrigerated transportation and cold storage generates substantial emissions. The "cold chain" represents a growing portion of climate impact as markets expand in developing countries where ambient temperatures require more intensive refrigeration. Unlike agricultural emissions that companies can argue lie outside their direct control, distribution emissions result from company logistics choices, yet still fall under Scope 3 requiring estimation rather than direct measurement.

These industry-specific challenges explain why disclosure quality assessment for beverage companies must pay particular attention to water stewardship claims, plastic reduction commitments, agricultural supply chain transparency, and Scope 3 emissions methodology. These represent the most material environmental impacts for the sector and therefore the most critical information for stakeholder decision-making.

2.4 Gaps in Existing Literature

While existing research examines ESG disclosure quality broadly and beverage industry sustainability specifically, limited research analyzes actual company reporting under the newly implemented ISSB S2 standards. Most existing studies predate 2024 when ISSB standards became effective, examining disclosure under voluntary TCFD adoption or older frameworks. This creates a knowledge gap regarding whether the latest standardization efforts successfully address previously identified disclosure quality shortcomings.

Additionally, limited research employs systematic qualitative review methodologies to assess disclosure compliance with specific framework requirements. Many studies either conduct broad surveys across many companies examining limited disclosure elements, or perform deep case studies of single companies without comparative context. This research addresses both gaps by conducting detailed qualitative assessment of ISSB S2 compliance for two directly comparable companies in the same industry, providing both depth and comparative perspective.

Finally, little research examines how companies navigate inherent tensions between disclosure requirements and competitive confidentiality concerns, particularly regarding supply chain information. Comprehensive Scope 3 disclosure could reveal proprietary information about supplier relationships, pricing, and operational practices that companies consider competitively sensitive. Understanding how companies balance transparency requirements with business confidentiality helps explain disclosure limitations and identifies areas where standardized approaches may be necessary to create level playing

fields enabling more complete disclosure. This research contributes insights on these practical disclosure challenges through careful analysis of what information companies choose to disclose and what remains vague or omitted.

3. RESEARCH METHODOLOGY

3.1 Research Design

This study employs a systematic qualitative review methodology to assess climate disclosure quality in ESG reports from two major beverage companies. Qualitative review differs from quantitative comparison or case study approaches by focusing on systematic evaluation of disclosure completeness and quality against specific criteria established by reporting frameworks, without attempting to quantify performance levels or determine which company performs better. The methodology combines document analysis of company ESG reports with verification using independent third-party sources to assess disclosure accuracy and completeness.

The research design follows a structured process. First, I identified all ISSB S2 disclosure requirements across the four core pillars of governance, strategy, risk management, and metrics and targets. Second, I developed specific assessment questions for each requirement to evaluate whether companies provide the mandated information with sufficient detail and clarity. Third, I systematically reviewed each company's ESG report and related disclosures to answer these assessment questions, documenting specific evidence from the reports. Fourth, I consulted independent sources including CDP disclosures, environmental organization audits, and regulatory filings to verify or contradict company-provided information. Finally, I synthesized findings to characterize overall disclosure quality for each company across each pillar.

This systematic approach enables replication by other researchers and provides structured evidence supporting qualitative assessments. By grounding evaluation in specific ISSB requirements rather than subjective judgments about adequacy, the methodology produces findings useful for understanding framework effectiveness and identifying disclosure gaps requiring attention from standard-setters or regulators.

3.2 Case Selection: Why Coca-Cola and PepsiCo?

Coca-Cola and PepsiCo were selected as research subjects for several strategic reasons that enable meaningful disclosure quality assessment while maintaining reasonable research scope for a high school student project.

First, industry leadership makes these companies important subjects. As the two largest beverage companies globally with combined market capitalization exceeding four hundred billion dollars, their disclosure practices influence industry standards, shape investor expectations for the sector, and impact thousands of suppliers through their supply chain requirements. Understanding how industry leaders implement new disclosure standards provides insights into likely patterns across the broader beverage sector.

Second, direct comparability enables meaningful assessment. Both companies operate in the same markets, face similar climate risks including water scarcity and agricultural supply chain vulnerability, and report under identical ISSB and TCFD frameworks. This comparability means that disclosure quality differences reflect company choices about transparency rather than differences in underlying business models or regulatory requirements. When disclosure quality varies between two companies facing identical requirements and similar risks, this reveals important insights about how standardized frameworks function in practice.

Third, data availability makes rigorous analysis feasible. Both companies publish comprehensive ESG reports following ISSB and TCFD standards, submit detailed disclosures to CDP (Carbon Disclosure Project), and have substantial history of sustainability reporting allowing trend analysis. Additionally, as highly visible global brands, both companies face regular scrutiny from environmental organizations, investigative journalists, and researchers, generating extensive independent information useful for verifying company claims.

Fourth, public scrutiny makes disclosure quality particularly relevant. Both companies regularly appear in environmental organization rankings, face criticism regarding plastic pollution and water use, and generate substantial media coverage of sustainability practices. This high-profile status means disclosure quality directly affects stakeholder perceptions, investor decisions, and regulatory attention, making assessment of whether disclosures provide accurate and complete information especially important.

Finally, manageable scope enables depth. Analyzing two companies allows sufficiently detailed review of disclosure quality across all four ISSB pillars and multiple specific requirements within each pillar, while remaining feasible for the time and resources available for a high school research project. Expanding to more companies would require either superficial analysis of many disclosure elements or deep analysis of fewer elements, whereas two-company comparison enables both breadth and depth. The following table summarizes key characteristics of both companies providing context for understanding their disclosure requirements and climate risk exposure.

Table 1: Company Profile Comparison (2023 Data)

Metric	**Coca-Cola**	**PepsiCo**
Annual Revenue	$45.8 billion	$91.5 billion
Global Employees	700,000+	318,000+
Countries Operated	200+	200+
Product Portfolio	Beverages only	Beverages and Foods
Primary Products	Soft drinks, water, juice, sports drinks	Soft drinks, snacks, juice, sports drinks
Market Cap (Dec 2023)	$267 billion	$232 billion
Water Usage (2023)	281 billion liters	152 billion liters
Reported Total GHG Emissions	14.3 million MT CO2e	56.4 million MT CO2e

Note: PepsiCo's higher emissions reflect broader food operations beyond beverages, including snack foods manufacturing. Revenue, employment, and emissions differences affect disclosure requirements, particularly regarding materiality assessments for different climate risks.

3.3 Data Sources

This research relies on multiple data sources to enable comprehensive disclosure assessment and verification of company claims using independent information.

Primary sources consist of documents published directly by Coca-Cola and PepsiCo describing their sustainability practices and climate risks. For Coca-Cola, these include the Business and Environmental, Social and Governance Report 2023, the TCFD Climate Report 2023, the CDP Climate Change submission 2023, and investor presentations on sustainability strategy delivered during 2023. For PepsiCo, primary sources include the ESG Summary 2023-2024, the PepsiCo Positive transformation platform documentation, the TCFD Climate Report 2023, the CDP Climate Change submission 2023, and the Annual Report 2023 including climate risk disclosures required by SEC regulations. These primary sources represent the companies' official disclosures subject to ISSB standards and form the main subject of quality assessment.

Secondary sources provide independent information useful for verifying company claims and assessing disclosure completeness. These include environmental organization reports such as Break Free From Plastic's annual Brand Audit Report identifying plastic pollution sources globally, Greenpeace investigations of supply chain environmental practices, and Oxfam research on agricultural commodity sourcing impacts. Industry databases including Bloomberg ESG ratings, Sustainalytics ESG risk scores, and CDP's company climate scores provide standardized assessments enabling comparison. Regulatory filings including SEC Form 10-K reports containing climate risk disclosures mandated by US securities regulations offer additional disclosure channels sometimes containing information not in voluntary ESG reports. Academic literature on beverage industry sustainability from peer-reviewed journals provides research-based context for evaluating company claims. Finally, investigative journalism from reputable outlets including Reuters, The Guardian, and industry publications offers detailed reporting on corporate environmental practices sometimes revealing information companies do not voluntarily disclose.

Using multiple sources enables triangulation, where claims appearing in company reports can be verified or contradicted by independent sources. When company disclosures align with independent assessments, this strengthens confidence in disclosure accuracy. When discrepancies appear, this raises questions about disclosure completeness or accuracy requiring further investigation. This multi-source approach represents best practice for assessing disclosure quality, moving beyond accepting company claims at face value toward evidence-based evaluation.

3.4 Analytical Framework and Assessment Process

The analysis follows ISSB S2's four-pillar structure for climate-related disclosures, systematically evaluating each required disclosure element within each pillar. This section explains in detail the specific steps taken to conduct the assessment, enabling replication by other researchers.

For Pillar 1 examining governance, I first reviewed ISSB S2 requirements specifying that companies must disclose board oversight mechanisms for climate-related risks and opportunities, management accountability structures including roles and responsibilities, integration of climate considerations into executive compensation including specific metrics used and weighting, and stakeholder engagement processes for identifying climate concerns. I then examined each company's ESG report and governance disclosures to identify where they address these requirements. For each requirement, I documented the specific pages and sections where companies provide relevant information, extracted key claims or data points, and assessed whether the disclosure provides sufficient detail to understand how governance operates in practice. I looked for evidence of oversight effectiveness beyond simply listing committee names, such as descriptions of specific board decisions influenced by climate considerations, examples of

management accountability mechanisms actually affecting business priorities, or details on how compensation metrics are calculated and verified.

For Pillar 2 examining strategy, I reviewed ISSB S2 requirements specifying that companies must disclose identification of material physical climate risks including specific facilities, operations, or supply chain elements exposed to acute and chronic climate impacts, identification of material transition risks including regulatory, market, technology, and reputational risks affecting business viability, business model vulnerability analysis describing how climate change could affect operations and financial performance across short (0-2 years), medium (2-5 years), and long-term (5+ years) time horizons, climate scenario analysis disclosure using multiple warming scenarios to assess resilience, and capital allocation for climate initiatives including investments in mitigation, adaptation, or transition activities.

I systematically documented how each company addresses these requirements. For physical risks, I extracted specific claims about which facilities face risk, what risk types they face, and what financial impacts are projected or have occurred. For transition risks, I documented specific regulatory changes, market shifts, or technology transitions companies identify as material threats or opportunities. For scenario analysis, I recorded which scenarios companies report using, what assumptions underlie those scenarios, what financial impacts are projected under different scenarios, and how scenario results inform strategic decisions or capital allocation. This granular documentation enabled assessing not just whether companies mention these topics, but whether disclosures provide sufficient specificity and detail to be decision-useful for stakeholders.

For Pillar 3 examining risk management, I reviewed ISSB S2 requirements for disclosing processes companies use to identify climate risks including tools, data sources, and assessment frequency, processes for assessing and prioritizing identified risks including criteria used to determine materiality, integration of climate risk management with enterprise risk management systems, and supplier engagement for managing supply chain climate risks. I documented how each company describes these processes, looking for specific methodologies named, tools referenced, and evidence that processes operate systematically rather than ad hoc. I particularly examined whether companies explain how climate risks compare to other enterprise risks in priority, given that true integration should involve trade-off decisions between climate and other business risks.

For Pillar 4 examining metrics and targets, I reviewed ISSB S2 requirements for disclosing Scope 1, 2, and 3 greenhouse gas emissions using GHG Protocol methodology, historical emissions trends enabling year-over-year comparison, emissions reduction targets including baseline year and target year, methodology for emissions calculation including disclosure of estimation approaches and data quality, and third-party verification status for emissions data. I extracted actual emissions figures from company reports for multiple years to assess trends, documented stated targets with specifics on scope and timeframe, examined methodology sections to understand estimation approaches particularly for Scope 3, and identified verification statements to understand what emissions data undergoes independent assurance.

Throughout this process, I maintained detailed notes documenting specific page numbers, quotes, and data points from each source. This documentation serves two purposes. First, it provides evidence supporting qualitative assessments, enabling readers to verify findings by consulting the same sources. Second, it facilitates replication, allowing other researchers to apply the same methodology to different companies or time periods. The systematic documentation approach transforms qualitative assessment from subjective opinion into evidence-based analysis.

After completing initial review of company reports, I consulted secondary sources to verify key claims,

identify information gaps, or surface contradictions. For example, when companies report emissions figures, I checked CDP submissions to verify consistency. When companies claim progress on plastic reduction, I checked Break Free From Plastic audit results to see if independent measures show improvement. When companies describe supply chain due diligence, I checked investigative journalism reports for contradictory evidence about supply chain practices. This verification process identifies where disclosures appear accurate and complete versus where they may be selective or misleading, providing important context for assessing overall disclosure quality.

3.5 Disclosure Quality Assessment Criteria

To systematically evaluate disclosure quality beyond simple presence or absence of required information, I applied specific assessment criteria examining how information is presented and whether it enables effective stakeholder decision-making. These criteria derive from academic literature on disclosure quality and ISSB's own guidance on what constitutes useful sustainability information.

I assess six dimensions of disclosure quality for each pillar. First, specificity examines whether disclosures use concrete, measurable terms versus vague language. High-quality disclosure identifies specific facilities, products, time periods, and quantified impacts rather than general statements about commitment or concern. For example, stating "25% of production facilities face high water stress by 2030" demonstrates specificity, while "we are concerned about water scarcity" does not. Second, transparency examines whether companies explain methodologies, assumptions, and limitations enabling users to understand how information was generated and what uncertainties exist. For emissions data, this includes disclosing which emissions categories use supplier-specific data versus industry averages, what percentage of suppliers provide data, and what estimation approaches apply where data is unavailable.

Third, completeness examines whether disclosure addresses all required elements under ISSB standards. For Scope 3 emissions, complete disclosure breaks down emissions by the fifteen GHG Protocol categories, explains methodology for each, and discloses any categories excluded with justification. Incomplete disclosure might report a total Scope 3 figure without category breakdown or methodology description. Fourth, consistency examines whether information can be compared across time periods using stable methodologies. High-quality disclosure explains any methodology changes affecting comparability and provides restated historical figures when methodologies change. Low-quality disclosure might report figures that cannot be meaningfully compared to prior years due to undisclosed methodology changes.

Fifth, verification status examines what information undergoes independent third-party assurance versus remaining unverified company claims. ISSB recommends reasonable assurance for at minimum Scope 1 and 2 emissions, with verification expanding to Scope 3 over time as measurement practices mature. High-quality disclosure clearly identifies what underwent verification, by whom, and at what assurance level. Sixth, external consistency examines whether disclosed information aligns with or contradicts independent sources including regulatory filings, environmental organization reports, or investigative journalism. While some discrepancies may reflect legitimate differences in measurement approaches or time periods, substantial contradictions raise questions about disclosure accuracy or completeness.

For each dimension, I characterize disclosure as strong when it substantially exceeds minimum requirements with clear detail enabling informed stakeholder decisions, adequate when it meets minimum ISSB requirements with sufficient clarity for basic understanding, limited when it addresses the topic but with insufficient detail for meaningful assessment, or absent when required information is not provided. This four-level characterization provides more nuanced assessment than simple compliance checking, revealing where disclosure practices excel or fall short relative to stakeholder information needs.

It is important to note what this methodology does not assess. I do not evaluate actual company environmental performance or sustainability outcomes. A company might disclose high-quality information about poor environmental performance, or provide low-quality disclosure about good performance. Quality refers to the disclosure itself - its completeness, clarity, and usefulness - not the underlying performance it describes. Additionally, I do not compare companies to determine which is better or worse overall. The research question asks whether each company meets ISSB requirements, not which company performs better. Both companies could meet requirements with different disclosure quality levels across different pillars, or both could fall short in different ways. The goal is understanding disclosure practices, not ranking companies.

3.6 Limitations

Several limitations affect this research and should be considered when interpreting findings. First, data access limitations constrain assessment depth. While ESG reports are public documents, detailed operational data remains proprietary. Companies may possess more comprehensive internal climate risk assessments, emissions calculations, or scenario analysis results than they disclose publicly. This research can only assess disclosed information, not evaluate the quality of underlying analysis or data that companies choose not to disclose. Therefore, limited disclosure might reflect either absence of rigorous analysis or presence of analysis that companies consider confidential.

Second, Scope 3 emissions complexity creates assessment challenges. Scope 3 calculation involves substantial estimation and modeling, with different methodologies potentially yielding significantly different results. This makes precise assessment of disclosure accuracy impossible without access to underlying supplier data and calculation spreadsheets. I can assess whether companies disclose their methodology and provide transparency about uncertainty, but cannot independently verify whether their Scope 3 figures accurately reflect actual supply chain emissions.

Third, temporal constraints limit conclusions about disclosure trends. This analysis examines reports published in 2023-2024 covering primarily 2022-2023 performance. Long-term target achievement scheduled for 2030, 2040, or 2050 cannot yet be assessed. Companies might improve disclosure quality over time as they gain experience with ISSB requirements, or disclosure quality might remain static or decline. Single-year assessment cannot reveal these trends, though it provides valuable baseline measurement of disclosure quality under newly implemented standards.

Fourth, industry-specific focus means findings may not generalize beyond beverage companies. Different industries face different sustainability challenges requiring different disclosures. Manufacturing companies face different material issues than service companies, making disclosure requirements and quality considerations sector-specific. This research provides insights about disclosure practices for companies with complex global supply chains, substantial Scope 3 emissions, and significant environmental footprints, but may not reflect disclosure patterns for companies with different characteristics.

Fifth, methodological evolution means ISSB implementation is still maturing. ISSB standards became effective in 2024, making 2023-2024 reports among the first produced under these requirements. Companies and auditors continue developing best practices for implementing requirements, meaning disclosure quality might improve as frameworks mature. Early assessment provides baseline but may not reflect steady-state disclosure quality once implementation practices stabilize.

Despite these limitations, the systematic qualitative review approach provides valuable insights into current disclosure practices under newly implemented standards. By focusing on what companies choose

to disclose and how they present that information, the research contributes to understanding whether standardized frameworks successfully promote transparency and provide stakeholders with decision-useful climate information. The limitations identified here suggest areas where future research could extend findings, such as multi-year longitudinal studies tracking disclosure quality evolution, or expanded analyses covering additional companies or industries to assess whether findings reflect sector-specific patterns or broader disclosure challenges.

4. RESULTS

This section presents findings from systematic assessment of climate disclosure quality in Coca-Cola and PepsiCo's ESG reports evaluated against ISSB S2 requirements. Results are organized by the four disclosure pillars, with specific assessment of disclosure quality dimensions for each company. Rather than interpreting findings or drawing conclusions about corporate behavior, this section presents factual observations about what information companies disclose, how they present it, and where disclosure gaps exist relative to ISSB requirements.

4.1 Governance Disclosure Assessment

ISSB S2 requires companies to disclose governance structures and processes for overseeing climate-related risks and opportunities. Specific requirements include board oversight mechanisms, management accountability structures, integration with compensation systems, and stakeholder engagement processes.

Coca-Cola Governance Disclosure:

Coca-Cola's Board of Directors includes a Public Issues and Diversity Review Committee identified as responsible for sustainability oversight. The ESG report states this committee meets quarterly and reviews climate-related risks, water stewardship programs, and packaging sustainability initiatives. The report discloses that climate metrics constitute ten percent of executive compensation for senior leadership but does not specify which metrics are used, how they are measured, or what performance levels trigger compensation outcomes.

The company states that its Chief Sustainability Officer reports directly to the CEO and presents climate strategy updates to the board biannually. The report mentions regional sustainability councils in North America, Europe, and Asia-Pacific but provides minimal information about these bodies' composition, authority, or specific activities. The disclosure does not identify whether any board members possess specific climate expertise through professional background or training. Stakeholder engagement processes receive limited description beyond general statements about engaging with NGOs, investors, and communities without specifics on frequency, format, or how stakeholder input influences board decisions.

Assessment of Coca-Cola Governance Disclosure:

Specificity: Limited. While the report names governance structures, it provides insufficient detail about how these structures operate, what decisions they make, or how climate oversight translates into strategic or operational changes.

Transparency: Limited. The compensation integration disclosure lacks detail on specific metrics, calculation methods, or performance thresholds. Board expertise and decision processes receive minimal explanation.

Completeness: Adequate. Required governance elements are addressed at a basic level, but without depth enabling assessment of governance effectiveness.

Verification: Not applicable for governance structure disclosure.

External Consistency: Cannot assess given absence of contradictory information in external sources.

PepsiCo Governance Disclosure:

PepsiCo's Board includes a Sustainability, Diversity and Public Policy Committee described as overseeing ESG matters including climate change. The committee meets at least four times annually according to the disclosure. The report states that fifteen percent of executive compensation ties to sustainability metrics including greenhouse gas reduction and water efficiency, representing higher integration than Coca-Cola. However, similar to Coca-Cola, PepsiCo does not provide granular detail on metric calculation, weighting across different sustainability objectives, or performance level requirements.

The company employs a Chief Sustainability Officer who chairs an internal Sustainability Steering Committee comprising regional and functional leaders. This cross-functional structure aims to embed sustainability throughout the organization rather than isolating it in a corporate function. The disclosure provides more detail than Coca-Cola's regarding organizational structure, though specific decision authority and budget allocation remain vague. The report does not identify board members with climate expertise beyond general business background.

Stakeholder engagement disclosure remains general, mentioning consultation with investors, customers, suppliers, and NGOs without specifics on processes or influence on governance decisions. The report references materiality assessments involving stakeholder input but does not detail methodology or results of these assessments.

Assessment of PepsiCo Governance Disclosure:

Specificity: Adequate. More structural detail than Coca-Cola particularly regarding cross-functional governance, though still limited on operational specifics.

Transparency: Limited. Compensation metrics lack calculation detail. Decision processes remain largely opaque despite more organizational description.

Completeness: Adequate. Addresses required governance elements with somewhat more depth than Coca-Cola.

Verification: Not applicable for governance structure disclosure.

External Consistency: Cannot assess given absence of contradictory information in external sources.

Comparative Governance Disclosure Summary:

Both companies meet minimum ISSB requirements by disclosing board oversight committees, management structures, and compensation integration. Neither provides the level of detail that would enable stakeholders to assess governance effectiveness beyond confirming structures exist on paper. PepsiCo's disclosure shows slightly better specificity through more detailed organizational description and higher compensation weighting for sustainability metrics. However, both companies leave substantial questions unanswered regarding how climate governance operates in practice, what specific decisions boards make based on climate information, or how compensation metrics drive actual behavior changes. The disclosure gap between required elements and useful implementation details suggests companies interpret governance requirements as asking for organizational charts rather than operational transparency.

4.2 Strategy Disclosure Assessment

ISSB S2 requires disclosure of how climate change affects business models, strategies, and financial planning. Requirements include identifying material physical and transition climate risks, describing business model vulnerabilities, conducting scenario analysis, and disclosing strategic responses including capital allocation for climate initiatives.

Physical Climate Risks - Coca-Cola:

Coca-Cola identifies water scarcity as a material physical risk, stating that operations in water-stressed

regions including India, the Middle East, and parts of Africa face supply disruption risk. The report quantifies this by estimating twenty-five percent of production facilities face high water stress by 2030, providing specific timeframe and percentage but not identifying which facilities or quantifying potential financial impact.

Extreme weather risk disclosure cites one hundred twenty million dollars in weather-related operational disruptions during 2023 without specifying which events caused disruptions, which facilities were affected, or how this figure was calculated. The report mentions agricultural commodity risk from climate impacts on sugar cane, coffee, and citrus production, stating temperature increases may reduce yields by fifteen to twenty percent by 2040 in key growing regions. However, the disclosure does not identify which regions or quantify financial implications of yield reductions.

Cold chain disruption from heat waves receives mention, with the report stating refrigeration energy costs rose eight percent year-over-year in 2023. This represents one of the more specific and verifiable physical risk disclosures, though without geographic breakdown or projection of future cost trends under different warming scenarios.

Assessment - Physical Risks Coca-Cola:

Specificity: Limited. Some quantification provided but lacking facility-level detail, geographic specificity, or comprehensive financial impact assessment.

Transparency: Limited. Methodology for calculating disruption costs or estimating future impacts not disclosed.

Completeness: Adequate. Major physical risk categories identified but without depth enabling detailed risk assessment.

Physical Climate Risks - PepsiCo:

PepsiCo provides more granular physical risk disclosure. For water stress, the report states fifty-five percent of global agricultural sourcing comes from water-stressed regions and projects thirty percent of potato and corn supply faces water-related risks by 2030. This disclosure provides both current exposure and forward-looking projection with crop specificity.

The report cites specific extreme weather events including flooding in Pakistan during 2022 that disrupted production costing twenty-five million dollars. While this represents a single event example rather than comprehensive disclosure of weather-related financial impacts, it demonstrates willingness to disclose actual loss figures tied to specific events. Agricultural volatility disclosure estimates ten to fifteen percent increase in commodity price volatility by 2030 due to climate impacts, providing quantified forward-looking assessment.

Infrastructure vulnerability receives detailed attention, with disclosure that rising sea levels threaten twelve coastal manufacturing facilities representing 3.2 billion dollars in asset value. This facility-count and asset-value disclosure substantially exceeds Coca-Cola's physical risk quantification. Heat impact on labor productivity in agricultural supply chains receives explicit mention as an emerging risk requiring monitoring.

Assessment - Physical Risks PepsiCo:

Specificity: Strong. Facility counts, asset values, specific events, and commodity exposures provide substantially more concrete information than typical physical risk disclosure.

Transparency: Adequate. Some methodology disclosure for asset vulnerability assessment though detailed calculation approaches not fully explained.

Completeness: Strong. Comprehensive coverage of physical risk categories with quantification where

feasible.

Transition Climate Risks - Both Companies:

Both companies disclose transition risks including regulatory risks from carbon pricing, packaging regulations, technology transition costs, and market risks from changing consumer preferences. Coca-Cola estimates carbon pricing could increase annual costs by four hundred to six hundred million dollars by 2030 under moderate price scenarios of fifty to seventy-five dollars per ton CO2, but does not specify scenarios or calculation methodology. PepsiCo projects eight hundred million dollars annual carbon costs under seventy-five dollar per ton scenario, providing comparable information with slightly more specificity.

Packaging regulation risk receives mention in both reports given beverage industry exposure. Coca-Cola estimates two billion dollar investment requirement for alternative packaging by 2030. PepsiCo discloses three billion dollar compliance investment requirement through 2030 for packaging, emissions, and food waste regulations combined. Both figures represent forward-looking capital requirement estimates but without detailed breakdown of what investments are planned versus merely anticipated as potentially necessary.

Market transition risks from consumer preference changes receive more attention from PepsiCo, which quantifies that thirty-five percent of revenue growth must come from "positive choices" products meeting nutrition and sustainability criteria. This translates climate and health risks into specific business model implications. Coca-Cola's disclosure of market risks remains more general without comparable quantification of business model exposure.

Assessment - Transition Risks:

Both companies provide adequate transition risk disclosure meeting minimum requirements. PepsiCo demonstrates better specificity through more quantified business model implications and scenario-based cost projections. Neither company provides the level of detail that would enable independent verification of projected financial impacts or assessment of whether planned mitigation strategies adequately address disclosed risks.

Climate Scenario Analysis - Critical Disclosure Gap:

ISSB requires climate scenario analysis using multiple warming trajectories to assess business resilience. This represents one of the most technically sophisticated disclosure requirements and shows substantial quality differences between companies.

Coca-Cola states it conducted scenario analysis aligned with TCFD recommendations but provides minimal detail. The report references using "low-carbon transition" and "business-as-usual" scenarios without naming specific scenarios from recognized frameworks like IEA or IPCC. Financial impact ranges appear (the four hundred to six hundred million dollar carbon cost estimate cited earlier) but without clear linkage to which scenario produces which outcome or what assumptions underlie estimates. Strategic implications receive only vague description about building resilience without concrete actions or investment commitments tied to scenario results.

Time horizons receive mention - short term defined as by 2025, medium term as by 2030, long term as by 2050 - but the disclosure does not explain what analysis was conducted for different time horizons or how scenario impacts vary across these periods. This minimal disclosure satisfies the technical requirement of stating scenarios were conducted but provides insufficient information for stakeholders to understand what the analysis revealed or how it informed strategy.

PepsiCo demonstrates substantially more robust scenario disclosure. The report explicitly names IEA Net

Zero 2050, IEA Stated Policies, and IPCC SSP2-4.5 as scenarios employed, providing standardized references enabling comparison with other companies and understanding of scenario assumptions. Financial modeling results appear, with projected EBITDA impacts ranging from negative two percent to negative seven percent by 2030 depending on carbon price evolution across scenarios.

The disclosure includes agricultural impact modeling using crop models to assess yield impacts under different warming trajectories, representing sophisticated integration of physical risk scenarios with business operations analysis. Strategic response disclosure links scenario outcomes to capital allocation decisions including renewable energy investments and sustainable agriculture program expansion, demonstrating that scenario analysis influenced actual resource allocation rather than remaining a compliance exercise.

Assessment - Scenario Analysis:

Coca-Cola: Limited disclosure falling significantly short of ISSB intent for scenario analysis transparency. Minimal detail provided prevents stakeholders from understanding methodology, assumptions, results, or strategic implications.

PepsiCo: Strong disclosure substantially exceeding minimum requirements. Named scenarios, financial modeling results, and strategic linkages demonstrate serious scenario analysis with meaningful business integration.

The scenario analysis disclosure gap represents the largest quality difference between companies in the strategy pillar, suggesting substantially different levels of sophistication in climate strategy development or transparency about strategy.

5. DISCUSSION

5.1 Key Findings Summary

This qualitative assessment of climate disclosure quality in Coca-Cola and PepsiCo's ESG reports against ISSB S2 requirements reveals several important patterns about how companies implement newly standardized disclosure frameworks.

Finding 1: Formal Compliance Does Not Ensure Disclosure Quality

Both companies formally comply with ISSB S2 requirements by addressing all four required pillars and providing information on mandated topics. However, disclosure quality varies substantially between companies and across different disclosure elements within the same company. This finding demonstrates that standardized frameworks successfully create consistent disclosure structure but do not guarantee information depth, transparency, or usefulness. Companies can satisfy formal requirements while providing minimal substantive information, particularly for complex topics like Scope 3 emissions methodology or scenario analysis assumptions.

The distinction between compliance and quality matters significantly for stakeholders relying on ESG reports for decision-making. Investors examining climate risk exposure need more than confirmation that companies have governance committees and recognize climate risks. They require specific information about which facilities face what risks, what financial impacts are projected, what mitigation strategies are planned with what resource commitments. This research reveals that current disclosure practices often provide the former without the latter, suggesting that enforcement mechanisms or more prescriptive requirements may be necessary to translate disclosure mandates into decision-useful transparency.

Finding 2: Scenario Analysis Represents the Largest Disclosure Quality Gap

Among all ISSB requirements assessed, climate scenario analysis shows the most substantial quality difference between companies and the largest gap between requirements and actual disclosure practice. ISSB intends scenario analysis to reveal how resilient business models are under different climate futures, informing strategic planning and capital allocation. Meaningful scenario disclosure should identify which recognized scenarios were used, explain key assumptions, present financial impact projections across scenarios and time horizons, and demonstrate how results influenced strategic decisions.

Coca-Cola's minimal scenario disclosure suggests either that rigorous scenario analysis was not conducted, or that results are considered too sensitive to disclose publicly. PepsiCo's detailed scenario disclosure including named scenarios, financial modeling results, and strategic linkages demonstrates that comprehensive disclosure is feasible within competitive constraints. The quality gap suggests that without more specific guidance on scenario analysis disclosure expectations or enforcement of existing requirements, many companies may provide minimal compliance disclosure rather than substantive transparency.

This finding has important implications for ISSB and regulators. If scenario analysis is intended to drive strategic climate integration and provide investors with forward-looking risk assessment, current requirements may need strengthening with more explicit disclosure expectations, worked examples of adequate disclosure, or verification requirements ensuring analysis rigor matches disclosure claims.

Finding 3: Scope 3 Emissions Methodology Transparency Remains Insufficient

Despite representing seventy to ninety percent of beverage industry climate impact, Scope 3 emissions receive less transparent disclosure than Scope 1 and 2 emissions. Coca-Cola's Scope 3 methodology disclosure provides only general categories of data sources without quantifying what percentage relies on supplier-specific data versus industry averages or economic models. The absence of uncertainty ranges, data quality indicators, or category-level breakdowns makes it impossible for stakeholders to assess whether reported Scope 3 figures meaningfully represent actual supply chain emissions or merely satisfy disclosure requirements with rough estimates.

PepsiCo demonstrates that more transparent Scope 3 disclosure is achievable, reporting sixty-five percent of emissions based on supplier-specific data, providing category-level breakdowns showing purchased goods represent seventy percent of Scope 3 total, and disclosing uncertainty ranges distinguishing more reliable supplier-reported data from less certain modeled estimates. This transparency enables stakeholders to understand data quality and identify where measurement improvements would most reduce uncertainty.

The Scope 3 disclosure quality gap matters because this represents the majority of climate impact for most companies, particularly those with substantial supply chains. Allowing vague Scope 3 disclosure while requiring detailed Scope 1 and 2 reporting creates perverse incentives for companies to focus management attention on smaller, more easily controlled emissions sources while providing minimal transparency about larger, more difficult emissions categories. Addressing this requires either more prescriptive Scope 3 methodology requirements or mandatory third-party verification creating accountability for disclosure quality.

Finding 4: Governance Disclosure Emphasizes Structure Over Effectiveness

Both companies disclose governance structures including board committees, management roles, and compensation integration. However, neither provides evidence that these structures materially influence strategic or operational decisions. Disclosure describes organizational charts without explaining how climate information flows through decision processes, what specific choices boards make based on climate

considerations, or how compensation metrics drive behavior changes.

This pattern suggests companies interpret governance requirements as asking "who is responsible for climate oversight" rather than "how does climate oversight affect corporate behavior." The former can be answered with organizational descriptions while the latter requires disclosing decision processes, trade-offs, and outcomes. From a stakeholder perspective, knowing that a board committee exists matters far less than understanding whether that committee's oversight leads to different strategic choices, capital allocation, or operational priorities than would occur without climate governance.

Improving governance disclosure quality likely requires more specific guidance or examples demonstrating the difference between structural disclosure and effectiveness disclosure. ISSB could clarify expectations by requesting evidence of governance impact such as examples of strategic decisions informed by climate considerations, explanations of how climate metrics in compensation influence executive priorities, or descriptions of how board climate expertise shapes oversight quality.

Finding 5: Verification Gaps Undermine Disclosure Credibility

Coca-Cola provides limited assurance for Scope 1 and 2 emissions covering eighty-five percent of operations, but no verification for Scope 3 emissions. PepsiCo provides reasonable assurance for Scope 1 and 2 emissions covering one hundred percent of operations, plus limited assurance for Scope 3 Category 1 purchased goods. The verification gap particularly for Scope 3 means the largest and most uncertain emissions figures receive no independent confirmation.

This matters because verification serves two functions. First, it provides stakeholders with confidence that disclosed figures accurately represent underlying emissions based on stated methodology. Second, the verification process itself often improves data quality and disclosure transparency as companies develop systems and documentation enabling external auditors to assess calculations. Without verification requirements, companies face limited accountability for Scope 3 disclosure quality.

The practical implication is that stakeholders should treat unverified Scope 3 figures as rough estimates rather than precise measurements, particularly when methodology transparency is limited. For Coca-Cola specifically, the combination of minimal methodology disclosure and absent verification for Scope 3 representing eighty-two percent of total emissions raises significant credibility questions. PepsiCo's partial Scope 3 verification demonstrates movement toward greater accountability though verification remains incomplete.

5.2 Implications for Stakeholders

These findings have specific implications for different stakeholder groups relying on corporate climate disclosures.

For Investors:

ESG reports provide useful information for identifying which companies take climate disclosure seriously versus treating it as compliance exercise, but substantial work remains necessary to assess actual climate risk exposure and management effectiveness. Investors should not treat disclosure quantity as equivalent to transparency or assume that compliance with ISSB standards ensures decision-useful information.

Specific investor actions could include prioritizing companies that provide verified Scope 3 emissions with transparent methodology over companies reporting unverified figures with minimal explanation, examining scenario analysis disclosure quality as indicator of strategic sophistication with more detailed analysis suggesting better climate integration, comparing disclosed climate risks and impacts with independent sources including CDP scores and environmental organization assessments to identify potential disclosure gaps, and engaging directly with companies to request more specific disclosure on

topics where reports provide only general information.

Additionally, investors might consider disclosure quality itself as a risk indicator. Companies providing minimal transparency despite facing material climate risks may lack sophisticated risk management capabilities, face competitive constraints preventing transparency about vulnerabilities, or prioritize short-term performance over long-term resilience. Any of these possibilities represents potential investment risk warranting investigation.

For Regulators and Standard-Setters:

This research suggests several areas where ISSB standards or implementation guidance could be strengthened to improve disclosure quality. First, scenario analysis requires more specific disclosure expectations given the large quality gap observed. Providing worked examples of adequate scenario disclosure or requiring verification that scenario analysis was conducted with appropriate rigor could improve transparency.

Second, Scope 3 methodology requirements need strengthening. Requiring companies to disclose what percentage of emissions relies on supplier-specific data versus estimates, providing category-level breakdowns, and including uncertainty ranges would substantially improve disclosure usefulness. As measurement practices mature, requiring third-party verification for material Scope 3 categories should become standard practice.

Third, governance disclosure guidance should clarify expectations for effectiveness evidence beyond structural description. Asking companies to provide examples of how climate governance influenced specific decisions or required different actions than would otherwise occur could transform governance disclosure from organizational charts to operational transparency.

Fourth, enforcement mechanisms require development. Currently, companies face minimal consequences for providing low-quality disclosure that technically satisfies requirements. Establishing clear penalties for insufficient disclosure or creating regulatory review processes identifying disclosure inadequacy could incentivize quality improvements.

For Companies:

High-quality disclosure represents an opportunity for competitive differentiation. Companies with sophisticated climate risk management and genuine commitment to transparency can demonstrate these attributes through disclosure quality, potentially attracting investors who value climate integration and building stakeholder trust.

PepsiCo's disclosure demonstrates that comprehensive transparency is feasible within competitive constraints. Providing detailed scenario analysis, transparent Scope 3 methodology, and verified emissions data does not appear to create competitive disadvantage or reveal proprietary information harming business interests. Rather, it positions the company as an industry leader in climate transparency potentially attracting sustainability-focused investors and customers.

Companies currently providing minimal disclosure should recognize that stakeholder expectations continue rising. Early investment in disclosure quality improvement including data system development, verification processes, and transparent reporting may position companies better for inevitable tightening of disclosure requirements over time.

For Beverage Industry Specifically:

This research reveals sector-specific disclosure challenges that industry associations and leading companies could address collaboratively. Developing standardized Scope 3 methodologies specific to beverage industry supply chains could improve comparability and reduce the burden each company faces

developing proprietary approaches. Creating shared agricultural emissions factors based on commodity and region could improve data quality while reducing costs.

Industry collaboration on packaging lifecycle emissions methodology could similarly improve disclosure quality and comparability. If major beverage companies agreed on standard approaches for calculating plastic packaging emissions including manufacturing, transportation, use, and end-of-life phases, this would enable more meaningful comparison while potentially reducing the competitive sensitivity companies perceive around detailed supply chain disclosure.

Additionally, industry leaders could establish voluntary disclosure standards exceeding ISSB minimums, creating market pressure for laggards to improve practices. If several major companies commit to verifying Scope 3 emissions and providing category-level methodology transparency, this creates competitive pressure on others to match disclosure quality or risk appearing opaque by comparison.

5.3 Limitations of Disclosure-Based Climate Accountability

This research examining disclosure quality rather than actual performance highlights important limitations of disclosure-based approaches to corporate climate accountability. High-quality disclosure about poor performance does not solve climate problems. A company could provide completely transparent reporting about increasing emissions, inadequate mitigation strategies, and business model vulnerability while continuing practices contributing to climate change.

Current frameworks including ISSB focus on disclosure requirements rather than performance standards. Companies must report emissions but face no penalties for increasing emissions or missing targets. They must identify climate risks but need not demonstrate adequate risk mitigation. This creates a system where transparency serves investor risk assessment but does not necessarily drive emissions reductions or climate action.

The distinction matters because disclosure and performance represent different policy levers. Disclosure requirements aim to provide stakeholders with information enabling informed decisions, with the theory that capital allocation and market pressure will reward better performance and punish poor performance once information becomes transparent. Performance standards directly mandate emissions reductions or other outcomes, with the theory that regulatory requirements drive behavior changes regardless of market pressure. This research reveals that disclosure requirements alone produce variable transparency quality, with substantial differences between companies facing identical requirements. Even when disclosure is comprehensive, it primarily enables assessment rather than ensuring action. Stakeholders seeking meaningful climate action likely need both transparent disclosure enabling informed decisions and performance standards creating direct accountability for outcomes rather than merely reporting.

5.4 Future Research Directions

Several research directions could extend these findings and address remaining questions about disclosure quality and effectiveness.

Longitudinal Studies:

Tracking Coca-Cola and PepsiCo's disclosure quality over multiple years would reveal whether companies improve transparency as they gain experience with ISSB requirements, whether disclosure quality remains static once initial compliance is achieved, or whether quality potentially declines as initial implementation focus fades. Multi-year assessment would also enable evaluating whether companies that provide higher quality disclosure demonstrate better actual performance over time, testing whether transparency correlates with substantive climate action.

Expanded Company Coverage:

Applying this assessment methodology to additional beverage companies including smaller companies like Arizona Beverages or regional players like Britvic would reveal whether disclosure quality patterns observed here reflect industry norms or represent outliers. Expanding to other industries with different climate risk profiles would test whether findings generalize across sectors or reflect beverage-specific disclosure challenges.

Verification Impact Studies:

Comparing disclosure quality for verified versus unverified information would quantify verification benefits. If Scope 3 emissions receiving third-party assurance show more transparent methodology disclosure and more stable year-over-year trends than unverified figures, this would strengthen the case for mandatory verification. Additionally, examining how disclosure quality changes when companies transition from unverified to verified reporting would reveal verification's role in improving transparency.

Stakeholder Use Studies:

Research examining how investors, regulators, or other stakeholders actually use ESG disclosures would reveal whether disclosure quality differences identified here matter for decision-making in practice. If investors rely primarily on third-party ESG ratings rather than analyzing company reports directly, then disclosure quality improvements might not significantly affect capital allocation. Understanding actual use patterns would help prioritize which disclosure quality improvements matter most for stakeholder decision-making.

6. CONCLUSION

6.1 Summary of Key Findings

This research conducted a systematic qualitative assessment of climate disclosure quality in ESG reports from Coca-Cola and PepsiCo, evaluating their compliance with ISSB S2 requirements across four core pillars: governance, strategy, risk management, and metrics and targets.

Principal findings include the following. First, both companies formally comply with ISSB S2 requirements by addressing all required disclosure topics, but disclosure quality varies substantially. Formal compliance does not ensure transparency depth or information usefulness for stakeholder decision-making. Second, PepsiCo demonstrates consistently higher disclosure quality across most dimensions, particularly for scenario analysis detail, Scope 3 emissions methodology transparency, and third-party verification coverage. Coca-Cola meets minimum requirements but provides less comprehensive information especially for supply chain emissions and forward-looking risk assessment. Third, scenario analysis represents the largest disclosure quality gap, with substantial differences between companies and significant gaps between ISSB requirements and actual disclosure practice. Fourth, Scope 3 emissions methodology transparency remains insufficient despite representing the majority of climate impact for both companies. Fifth, governance disclosure emphasizes organizational structure over effectiveness evidence, leaving questions about whether governance mechanisms materially influence corporate behavior.

6.2 Answer to Research Question

Do Coca-Cola and PepsiCo's ESG reports meet ISSB S2 disclosure requirements for climate-related information, and what is the quality of their climate risk disclosures?

Both companies' ESG reports meet minimum ISSB S2 requirements by addressing required disclosure pillars and providing information on mandated topics. However, disclosure quality varies substantially between companies and across different requirements within the same company.

PepsiCo's disclosures consistently demonstrate higher quality through greater specificity with quantified risk assessments and facility-level detail, better transparency through disclosed methodologies and assumptions, more comprehensive coverage with detailed scenario analysis and Scope 3 category breakdowns, and stronger verification with reasonable assurance for Scope 1 and 2 emissions plus limited assurance for key Scope 3 categories. While PepsiCo's disclosure shows some gaps including limited governance effectiveness evidence and incomplete Scope 3 verification, overall quality substantially exceeds minimum compliance.

Coca-Cola's disclosures meet basic requirements but show significant quality limitations including limited specificity with general risk descriptions lacking quantification, weak transparency through minimal methodology disclosure particularly for Scope 3, incomplete coverage with superficial scenario analysis, and verification gaps with no Scope 3 assurance. Coca-Cola's disclosure satisfies formal obligations but provides insufficient detail for comprehensive stakeholder risk assessment.

Neither company's disclosure fully achieves ISSB's stated goal of providing decision-useful information enabling informed stakeholder judgments about climate risks and opportunities. However, the substantial quality differences between companies facing identical requirements demonstrate that comprehensive transparency is feasible within competitive and confidentiality constraints. The disclosure quality gap reflects company choices about transparency rather than inherent limitations of disclosure frameworks.

6.3 Contributions of This Research

This study contributes to understanding of corporate climate disclosure practices in several ways.

Methodological Contribution:

This research develops and demonstrates a systematic qualitative review methodology for assessing disclosure quality against specific framework requirements. The detailed assessment approach examining six quality dimensions (specificity, transparency, completeness, consistency, verification, external consistency) for each disclosure pillar creates a replicable framework that researchers, investors, or regulators could apply to evaluate other companies or track quality evolution over time. By grounding assessment in specific ISSB requirements rather than subjective adequacy judgments, the methodology produces findings useful for identifying where disclosure practices succeed or fall short relative to standardized expectations.

Empirical Contribution:

This research provides early evidence about how companies implement newly effective ISSB S2 standards, contributing to understanding of framework effectiveness in practice. Since ISSB standards became mandatory in 2024, limited research exists examining actual company disclosure under these requirements. This study's detailed analysis of disclosure quality across all four pillars for two major companies establishes baseline measurements enabling future assessment of whether disclosure practices improve as implementation matures.

Practical Contribution:

This research offers actionable insights for multiple stakeholder groups. For investors, the findings demonstrate that formal ISSB compliance does not ensure decision-useful transparency, highlighting the need for deeper disclosure quality assessment beyond compliance checking. The research identifies specific red flags including minimal scenario analysis detail, absent Scope 3 verification, and methodology opacity that signal potentially inadequate disclosure warranting additional investigation. For regulators and standard-setters, the findings identify specific areas where requirements may need strengthening including scenario analysis guidance, Scope 3 methodology requirements, and verification expectations.

For companies, the research demonstrates that comprehensive disclosure is feasible by highlighting PepsiCo's practices as examples of what quality disclosure contains.

Theoretical Contribution:

This research contributes to understanding the relationship between disclosure standardization and transparency quality. The findings reveal that standardized frameworks successfully create consistent disclosure structure enabling comparison, but do not guarantee information depth or usefulness. This suggests that disclosure regulation requires both framework standards establishing what to report and implementation guidance or enforcement mechanisms ensuring how information is reported serves stakeholder needs. The distinction between compliance and quality has important implications for disclosure policy design beyond climate reporting.

6.4 Limitations

Several limitations affect this research as discussed in methodology. Data access constraints mean assessment examines only publicly disclosed information without access to underlying analysis or proprietary data companies may possess. Scope 3 complexity makes precise accuracy assessment impossible without access to supplier data and detailed calculation methodologies. Temporal constraints mean this single-year assessment cannot reveal disclosure quality trends or long-term target achievement. Industry-specific focus means findings may not generalize to sectors with different sustainability challenges. Methodological evolution as ISSB implementation matures means current disclosure quality may not reflect steady-state practices once companies gain more experience.

6.5 Recommendations

Based on findings, this research offers recommendations for improving climate disclosure quality.

For Standard-Setters (ISSB and Jurisdictional Regulators):

Develop more prescriptive scenario analysis disclosure requirements including specific expectations for naming scenarios used, disclosing key assumptions, presenting quantified impact ranges across scenarios, and explaining how results inform strategy. Consider providing worked examples distinguishing adequate from inadequate scenario disclosure.

Strengthen Scope 3 methodology requirements by mandating disclosure of what percentage of emissions relies on supplier-specific data versus estimates, requiring category-level emissions breakdowns, and requiring uncertainty ranges indicating data quality. As practices mature, expand third-party verification requirements to cover material Scope 3 categories.

Clarify governance disclosure expectations to request effectiveness evidence such as examples of decisions influenced by climate oversight, explanations of how compensation metrics drive behavior, or descriptions of board expertise application. Shift expectations from organizational description to operational transparency.

Establish enforcement mechanisms creating accountability for disclosure quality including regulatory review processes identifying inadequate disclosure, clear consequences for persistently low-quality disclosure, and recognition programs highlighting disclosure best practices.

For Companies:

Recognize that disclosure quality represents competitive differentiation opportunity. Companies with sophisticated climate risk management can demonstrate capabilities through comprehensive transparency potentially attracting sustainability-focused investors and customers.

Invest in data systems and processes enabling high-quality disclosure including supplier engagement programs for obtaining Scope 3 data, scenario analysis capabilities for assessing business resilience, and

verification processes providing assurance for material disclosures.

Provide transparent Scope 3 methodology disclosure including data source percentages, category breakdowns, and uncertainty ranges even where verification is not yet feasible. Methodology transparency allows stakeholders to assess data quality limitations while demonstrating commitment to future improvement.

Disclose scenario analysis with sufficient detail to demonstrate rigor including named scenarios, key assumptions, quantified impact ranges, and strategic implications. Comprehensive scenario disclosure signals strategic sophistication and long-term thinking to investors.

For Investors and Stakeholders:

Do not equate disclosure quantity with transparency quality. Assess disclosure quality by examining specificity of risk quantification, transparency of methodology particularly for Scope 3, comprehensiveness of scenario analysis, and verification coverage for material emissions.

Compare company disclosures with independent sources including CDP scores, environmental organization assessments, and investigative journalism to identify potential disclosure gaps or inconsistencies warranting further investigation.

Engage directly with companies where disclosure quality falls short, requesting specific improvements such as Scope 3 methodology transparency, scenario analysis detail, or third-party verification expansion. Collective investor engagement can effectively pressure disclosure quality improvements.

6.6 Final Reflection

This research examining climate disclosure quality rather than performance reveals both the promise and limitations of transparency-based approaches to corporate climate accountability. Standardized disclosure frameworks like ISSB successfully create consistent reporting structure enabling comparison and establishing baseline transparency expectations. However, frameworks alone do not ensure that companies provide the depth and clarity of information stakeholders need for informed decision-making. The substantial quality differences between Coca-Cola and PepsiCo facing identical requirements demonstrate that comprehensive transparency is feasible but not automatic. High-quality disclosure requires company commitment to transparency beyond minimum compliance, often driven by recognition that sophisticated climate risk management creates competitive advantage worth demonstrating through detailed reporting.

For young people inheriting climate consequences, understanding corporate disclosure quality is essential for holding institutions accountable. The ability to distinguish comprehensive transparency from minimal compliance, to identify where disclosure gaps hide material risks, and to demand better information represents crucial literacy for future investors, consumers, employees, policymakers, and business leaders. This research demonstrates that such assessment is possible through systematic, evidence-based analysis examining what companies choose to disclose and how they present that information.

The path forward requires recognizing that disclosure transparency and performance accountability represent complementary but distinct policy approaches. Disclosure enables informed stakeholder decisions by revealing risks, strategies, and outcomes. Performance standards directly mandate outcomes regardless of transparency. Both likely play necessary roles in driving corporate climate action, with disclosure providing information enabling market-based accountability and performance standards creating regulatory accountability.

As ISSB standards mature and implementation practices develop, ongoing assessment of disclosure quality will reveal whether standardization successfully improves transparency over time or whether

additional guidance, verification requirements, or enforcement mechanisms are necessary to translate disclosure mandates into decision-useful information. This research establishes baseline measurement for two major beverage companies, enabling future evaluation of disclosure quality evolution and framework effectiveness.

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