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How Companies are Embedding Biodiversity into their Evolving Business Models: Measuring and Strategically Shaping their Impact on the Environment

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Abstract:

The concept of biodiversity is gaining increasing recognition within the corporate and industrial world. It is considered important not only on an environmental level but also as a key competitive factor for the survival of economic activities.

This concept is increasingly relevant today, particularly its protection, which can generate significant competitive advantages.

The objective of this study is to identify, through data and case studies, the validity of pro-biodiversity policies within business environments, with a particular focus on ESG policies and their economic, social, and environmental returns. It will also analyze the European political and legislative framework, which aims to encourage companies to adopt sustainable practices while taking into account the role of international funds and directives.

Employing visible examples of how business integration of biodiversity can convert environmental obligations into avenues for innovation and resilience is the intended outcome and to provide a valuable guide for other companies that look to balance profits against sustainability in a business model that will not only avoid risks but also create long-term value for both the economy and the environment.

The main point to emphasize, however, is that pro-biodiversity and ESG are targeting long-term value creation and operational resilience. These strategies may not yield immediate financial returns; indeed, sustainability scores do not always correlate with higher economic returns in the short term, for at least two reasons:

1. Short-term results may be affected by exogenous (and/or speculative) events;
2. A short-term strategy, reinforced by coherent incentive schemes for management, leads to a distortion in the long-term Strategy of value creation for stakeholders.

Companies increasingly pursuing biodiversity and ESG integration, not solely for regulatory compliance or short-term profit, are securing long-term competitiveness.

In particular, protecting access to critical natural resources and investing in alternative business models enables firms to prepare for future scarcity and systemic shocks.

Purpose - The purpose of this paper is to systematize the research field of biodiversity loss and its connection to corporate revenue considered in the long term.

Design/methodology/approach - The paper systematically reviews existing studies and analyses

drivers of case studies through a qualitative and quantitative approach.

Findings– The review suggests an interconnection between the application of sustainable and pro-biodiversity practices and an increase in the competition of certain companies.

Keywords - Biodiversity, Sustainability reporting, Corporate social responsibility reporting,

Sustainability, Sustainable development, Case studies, International regulatory system.

Paper type - Literature review.

CHAPTER 1: Critical aspects of biodiversity loss.

1.1 Context and relevance of biodiversity in the global economy: physical and transition risks analysis.

The concept of biodiversity has been widely discussed over the past years, everyone recognizes its fundamental importance, especially considering its ability to regulate the balance of our ecosystem, many have ventured into creating a specific definition of this subject, for example, ‘’biodiversity includes not only the world's species with their unique evolutionary histories but also genetic variability within and among populations of species and the distribution of species across local habitats, ecosystems, landscapes, and whole continents or oceans’’,[1] others cite it as follows: ‘’biodiversity is all the different kinds of life you’ll find in one area- the variety of animals, plants, fungi, and even microorganisms that make up our natural world’’.’[2]

However, the relevance of this concept is often confined to specific themes, such as the environment. Yet, one cannot overlook the fact that the importance of biodiversity extends to other crucial but frequently neglected areas—most notably, the economy, which plays a fundamental role in maintaining the balance of today’s society.

Concerning biodiversity, modern business perspectives are evolving, recognizing sustainability protection as a strategic imperative for ensuring long-term operational continuity. Increasingly, companies are integrating biodiversity and ESG strategies into their core business models, not primarily driven by immediate financial gains or regulatory compliance, but by the necessity of securing future access to critical raw materials and fostering innovation in sustainable products and services. This forward-looking approach reflects the understanding that the depletion or degradation of natural capital threatens the availability and cost of essential inputs, potentially disrupting supply chains and eroding competitive advantage.

As natural resources become scarcer and environmental regulations tighten, firms that proactively adopt biodiversity-friendly practices can better anticipate these challenges and adapt their business strategies accordingly. Although the financial benefits of such strategies may not materialize in the

[1] National Academies Press (US). (1999). *What is Biodiversity?* Perspectives on Biodiversity - NCBI Bookshelf.
[2] *What is biodiversity?*. WWF.

short term, these investments build resilience, create new market opportunities, and position companies for sustained success in a transitioning economy.

It is, therefore, essential to understand the impact of biodiversity on this balance to fully grasp its value.

Biodiversity, indeed, supports a range of goods and services that are of fundamental importance to people for health, well-being, livelihood, and survival.[3]

We value biodiversity for many reasons, some utilitarian, some intrinsic. This means we consider it both for what it provides to humans and for the value it has in its own right. Ecosystems play a key role in emitting and sequestrating greenhouse gas emissions and in supporting the adaptation to a changing climate. For example, globally, forests absorb nearly 16 billion metric tons of carbon dioxide per year and currently hold 861 gigatons of carbon in their branches, leaves, roots, and soils.[4]

Biodiversity, however, is currently being lost at unprecedented rates; according to WWF, between 0.01% and 0.1% of all species will become extinct each year, 10,000 times higher than the natural extinction rate.[5] Moreover, drivers of the loss of nature, such as deforestation, are significant sources of greenhouse gas emissions; nature-related risks are therefore closely linked to climate-related risks in several ways, and the risks must be considered together.

The loss of biodiversity is a topic that is not deeply studied, especially considering the repercussions at the economic level and how it affects financial risks. When assessing financial risks associated with climate change, the role of the loss of nature in climate feedback loops and tipping points is of significant importance.

The disruption of this balance is regarded as the primary driver of climate change's adverse impacts, including the so-called "physical risks" and "transition risks."

Physical and transition risks can interact and affect economic agents through various channels before materializing into traditional sources of financial risk (e.g., credit or market risk). For example, organizations can generate acute physical risk by removing coastal marshes, leading to potential damage costs linked to the loss of coastal infrastructure from storms. This can also generate a transition risk, specifically policy and legal risk (if that action was illegal) and reputation risk (if it is negatively perceived by consumers). If sufficient organizations in that region remove coastal marshes, then whole regions of the industry may suffer from a lack of protection from coastal storms, resulting in systemic risk.

In this section of the chapter, the concepts of physical and transition risks will be defined, exploring their characteristics and the significant impacts they can have at an industrial level.

1.1.1 PHYSICAL RISKS:

Based on the European Sustainability Reporting Standards (ESRS), Physical risks arise from the physical effects of climate change. They typically include acute physical risks, which arise from hazards, especially weather-related events such as storms, floods, fires or heatwaves, and chronic physical risks, which arise from longer-term changes in the climate, such as temperature changes,

[3] Christie, M., Fazey, I., Cooper, R., Hyde, T., Deri, A., Hughes, L., Bush, G., Brander, L., Nahman, A., De Lange, W., & Reyers, B. (2008). An evaluation of economic and non-economic techniques for assessing the importance of biodiversity to people in developing countries.
[4] Ruiz, S. (2024, April 18). *Forest carbon storage explained - Woodwell Climate*. Woodwell Climate. https://www.woodwellclimate.org/global-forest-carbon-storage-explained/
[5] *How many species are we losing?* . WWF.

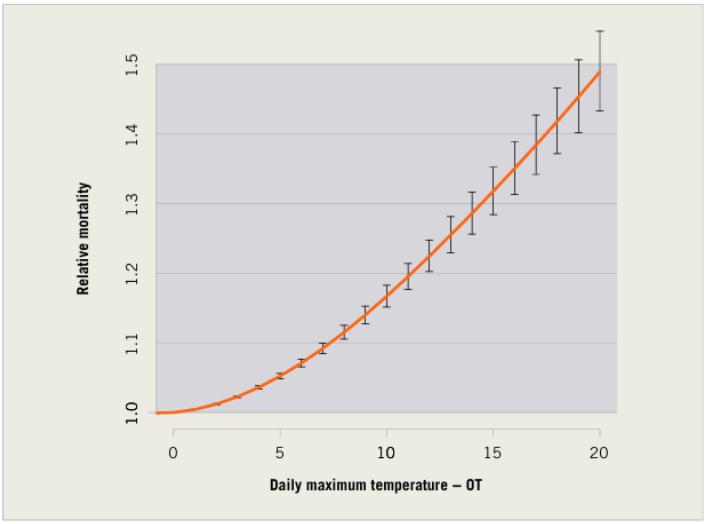
rising sea levels, reduced water availability, biodiversity loss and changes in land and soil productivity.

These risks present seven characteristics:

1) Increasing.
2) Spatial: Climate hazards manifest locally, and the direct impacts of physical climate risk need to be understood within a geographically defined area.
3) Non-stationary: The risks associated with climate change are not static and will evolve.
4) Interconnected: Physical climate risks are interconnected with other risks and can have cascading effects on various systems.
5) Sector-specific: Different sectors and industries are vulnerable to specific physical climate hazards.
6) Threshold-driven: Physical climate risks are often associated with reaching critical thresholds, both in terms of physical and biological systems. These thresholds can trigger significant impacts and changes in the affected systems.
7) Nonlinear: The increase in physical climate risk is often nonlinear, meaning the risks do not progress linearly.

Physical risks tend to affect our everyday lives heavily; for example, an increase in future heat-related mortality is seen as one of the most likely impacts of future anthropogenic climate change. An increase in health effects is projected from both increases in average seasonal temperatures and an increase in the frequency and intensity of heatwave events.[6]

Figure 1: Relationship between temperature index and relative mortality for people aged over 65 years old.



[a] Cumulative effect over 15 days
Reproduced using results from Honda et al. (2014)

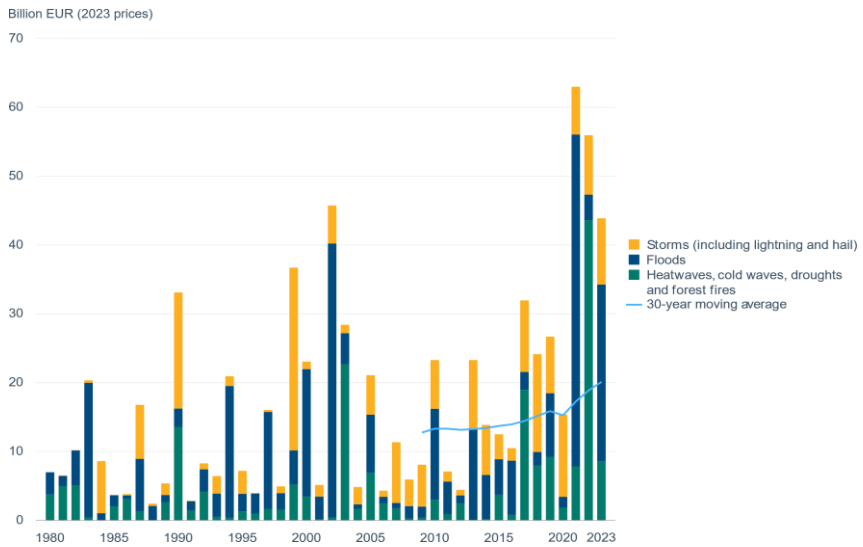
Source: World Health Organization.

[6] Field, C. B., Barros, V., Stocker, T. F., & Dahe, Q. (2012). Managing the risks of extreme events and disasters to advance climate change adaptation. In *Cambridge University Press eBooks*.

Physical risks often carry significant implications for organizations as well, such as direct damage to assets and indirect impacts from supply chain disruption. Organizations' financial performance may also be affected by water availability, sourcing, and quality; food security; and extreme temperature changes affecting organizations' premises, operations, supply chain, transport needs, and employee safety.[7]

Weather and climate-related extremes caused economic losses of assets estimated at EUR 738 billion during 1980 - 2023 in the European Union, with over EUR 162 billion (22%) between 2021 and 2023. Analyzing trends in economic losses is challenging, primarily due to large annual variability. Statistical analyses revealed that economic losses increase over time, and the last three years are all in the top five years of the highest annual economic losses. As severe weather- and climate-related extreme events are expected to intensify further, it seems unlikely that associated economic losses will be reduced by 2030.[8]

Figure 2: Annual economic losses caused by weather- and climate-related extreme events in the EU Member States



Source: https://www.eea.europa.eu/en/analysis/indicators/economic-losses-from-climate-related

[7] *Climate Risks and opportunities defined | US EPA*. (2025, March 3). US EPA. https://www.epa.gov/climateleadership/climate-risks-and-opportunities-defined

[8] *Economic losses from weather- and climate-related extremes in Europe*. (2024, October 14). European Environment Agency's Home Page. https://www.eea.europa.eu/en/analysis/indicators/economic-losses-from-climate-related

1.1.2 TRANSITION RISKS:

Transition risks are business-related risks that follow societal and economic shifts toward a low-carbon and more climate-friendly future. These risks can include policy and regulatory risks, technological risks, market risks, reputational risks, and legal risks. These risks are interconnected and often top-of-mind for investors as they attempt to navigate an increasingly aggressive low-carbon agenda that can create capital and operational consequences to their assets.[9]

Potential financial impacts from the transition to a low-carbon economy include the following:

1) Revenue loss (due to demand contraction) – reduced demand for fossil fuels as well as for products and services associated with the fossil fuel value chain or associated with value chains impacted by the success of circular economy.
2) Stranded assets – devaluation or impairment of fossil fuel reserves and related assets and industrial assets in derived industries (see automotive industry due to the ban in Europe of combustion engine vehicles from 2035).
3) Revenue growth – growth in renewable energy and the emergence of new industries and products, including carbon capture and sequestration, smart grid technologies, energy-efficient products, infrastructure adaptations, and green chemistry solutions.
4) Long-term cost reductions – operating cost reduction from investments in updated infrastructure and technologies.
5) Loss of revenue – work interruptions associated with loss of grid power, flooding, or supply chain disruption, as well as productivity loss due to chronic temperature rise.

1.2 The risk of biodiversity loss: direct and indirect costs.

-The loss of biodiversity is closely connected to climate change risks, which significantly impact ecosystems. Biodiversity plays a crucial economic role by supporting essential services that meet human needs. This section of the chapter will be dedicated to the ability of this damage to burden our community's economy, both directly and indirectly.

1.2.1 Direct costs of Biodiversity Loss:

1) **Decline in Agricultural Productivity:**
   Biodiversity loss reduces the genetic diversity of crops and natural pest control, increasing the application of artificial fertilizers and pesticides. This increases production costs and reduces output, which makes the food system vulnerable to climate change and disease.[10]

2) **Loss of Animal Species and Ecological Resources:**
   At present, ecologists estimate that less than one-tenth of 1% of naturally occurring species are directly exploited by humans. Therefore, it is argued that the significant threat to the loss

[9] *Transition Risk Report*. (2025, March 11). GRESB. https://www.gresb.com/nl-en/products/transition-risk-tool.

[10] The ecology and economics of biodiversity loss: the research agenda. (1993b). *Biological Conservation*, *63*(2), 189.

of species is not caused by direct human exploitation but by the habitat alteration and destruction that results from expanding human populations and human activities.[11]
These include global changes resulting from fossil fuel combustion and the emission of greenhouse gases and ozone-depleting substances. In all cases, alterations in primary productivity, nutrient availability, and hydrological cycles modify the living conditions of organisms, thereby affecting the composition and size of biological communities as well as the quantity and quality of the ecological services they provide. The degradation of marine ecosystems, including coral reefs and mangroves, leads to declining fish stocks. Overfishing combined with biodiversity loss has caused economic collapses in fishing communities, such as the cod fishery crisis in Canada, which resulted in massive job losses and economic downturns.

3) **Increased Risk of Natural Disasters:**
Natural ecosystems like wetlands and forests are natural flood, landslide, and hurricane barriers. When these ecosystems are destroyed, it raises disaster risks at higher levels, leading to more investments in repairing infrastructure, insurance payouts, and emergency response operations.[12]

4) **Impact on Tourism and Recreation:**
Nature tourism is a great economic driver in the majority of regions. The destruction of natural environments, such as coral reefs and rainforests, reduces the income from tourism, affecting local enterprises and employment. Thailand has suffered from losses in ecotourism revenues due to coral bleaching and habitat loss.[13]

5) **Increased Health Costs:**
The reduction in biodiversity leads to greater disease transmission, as seen in the spread of zoonotic diseases like COVID-19. The destruction of ecosystems increases human-wildlife interactions, facilitating the emergence of new pathogens and raising healthcare expenditures globally.[14]

1.2.2 Indirect Costs of Biodiversity Loss:

1. **Decreased Ecosystem Resilience:**
Biodiversity supports ecosystem stability. Its loss reduces resilience to environmental shocks, such as droughts and heatwaves, increasing vulnerability to climate change and leading to economic disruptions in agriculture and energy production.

[11] Ibid.
[12] Hanley, N., & Perrings, C. (2019). The economic value of biodiversity. *Annual Review of Resource Economics*, *11*(1), 355–375.
[13] Christie, M., Fazey, I., Cooper, R., Hyde, T., Deri, A., Hughes, L., Bush, G., Brander, L., Nahman, A., De Lange, W., & Reyers, B. (2008b). An evaluation of economic and non-economic techniques for assessing the importance of biodiversity to people in developing countries.
[14] Hanley, N., & Perrings, C. (2019). The economic value of biodiversity. *Annual Review of Resource Economics*, *11*(1), 355–375.

A widely damaged ecosystem, for example, is that of the Amazon forest, home to 10% of all species on Earth[15], now considered not only an environmental but also a social problem.

Human disturbance and deforestation of the Amazon rainforest result in the degradation of animal species, indigenous people, water cycles, and an increase in CO2 emissions.[16]

2. **Reduced Economic Security for Indigenous and Rural Communities:**
   Many rural and indigenous populations depend on biodiversity for their livelihoods. The depletion of forests, fisheries, and wild plant species forces communities to migrate or shift economic activities, often leading to poverty and social instability.

   Freshwater fish, for example, are an important species under threat; one-third of freshwater fish species are threatened with extinction, while there has been a 76 percent decline in migratory freshwater fish since 1970. Marine species, as part of the ocean's carbon pump, have an indispensable role in mitigating climate change; an ocean teeming with life facilitates carbon sequestration, with scientists estimating that fish contribute 16 percent of the total ocean carbon flux.[17]

3. **Erosion of Future Economic Opportunities:**
   Biodiversity is a key source of genetic material for medicine, agriculture, and biotechnology. The loss of species reduces the potential for future discoveries, limiting pharmaceutical developments and innovations in sustainability.

4. **Market and Supply Chain Disruptions:**
   Biodiversity contributes to supply chain stability in industries such as agriculture, forestry, and fishing. The collapse of ecosystems disrupts raw material availability, increasing costs for businesses and consumers.

5. **Long-Term Macroeconomic Effects:**
   The cumulative impact of biodiversity loss affects national economies by reducing GDP, lowering labor productivity (due to health impacts), and increasing government spending on environmental restoration and disaster recovery.

1.3 Sectoral vulnerabilities to biodiversity loss

The Finance for Biodiversity (FfB) Foundation undertook a pilot investigation into the possible repercussions of operating business sectors on biodiversity. The study was designed in cooperation with four biodiversity footprint assessment tools and analyzed a cohort of 250 high-impact companies drawn from the MSCI World Index.

The objective is to develop a basis for investors to initiate a conversation with companies that reasonably should assume responsibility for their biodiversity footprint. The pilot results suggest that few companies account for much of the total biodiversity footprint. Within all of the sectors analyzed,

[15] "Brazil and the Amazon Forest," Greenpeace, accessed October 28, 2019, https://www.greenpeace.org/usa/issues/brazil-and-the-amazon-forest/.
[16] Wegrowski, B. (2024, September 11). *Deforestation in the Amazon Rainforest - Ballard Brief*. Ballard Brief.
[17] *Plenty of Fish?* (2022). United Nations Climate Change.

the Food, Beverage, and Tobacco sectors had the most potential consequences for biodiversity, closely followed by the Materials sector.

The Food Products sector had the most damaging consequences for biodiversity. This demonstrates the extensive environmental footprint associated with global food production. The pilot assessed impacts through a multi-tool collaborative approach to different biodiversity footprinting tools to allow the assessment to measure potential instead of actual impacts, as the limited corporate disclosure of company data concerning emissions, land, and resource use continues to be restrictive.

The finance sector was excluded from the study as there are no established assessment tools, while certain industries, including agriculture or marine ecosystems, may not have been adequately represented. The pilot serves to identify which industries investors should prioritize concerning engagement in biodiversity conservation, despite these limits. The results of this pilot will contribute to the efforts of the Nature Action 100 (NA100) initiative to assess the performance of corporations concerning their biodiversity footprint. The Finance for Biodiversity Foundation will work to develop the methodology further in future pilots, improve the data quality, and look to expand into more developing market-identified companies and the measurement of unlisted firms.

Top 10 High-Impact Industries

1. Food Products – 18% of the total impact
2. Oil, Gas & Consumable Fuels – 13%
3. Chemicals – 8%
4. Consumer Staples Distribution & Retail – 7%
5. Metals & Mining – 5%
6. Pharmaceuticals – 4%
7. Health Care Providers & Services – 4%
8. Automobiles – 3%
9. Electric Utilities – 3%
10. Trading Companies & Distributors – 3%[18]

As we can see, food production is the sector most affected by biodiversity loss and one of the most fundamental for our societies.

Increased temperatures and altered precipitation patterns change growing conditions and alter growing conditions, extending seasons in some cases but also increasing water needs in others. Air pollution reduces crop resiliency. Threats to yields include wildfires, larger pest populations, and shifting pollination patterns.

Livestock under heat stress will be less productive, reducing the production of meat, milk, and eggs. Severe weather will increase soil erosion, decrease soil nutrients, and heavy precipitation will increase runoff, contributing to pollution of water sources and increasing hypoxia that harms fish populations and coastal economies. Coastal farmland will face sea-level rise and storm erosion, as well as seepage

[18] Finance for Bidiversity. (2023, November 22). *Briefing paper: Top 10 biodiversity-impact ranking of company industries - Finance for Biodiversity Foundation*. Finance for Biodiversity Foundation.

from saltwater intrusions. The overall health of agricultural laborers will decline due to continued heat exposure, use of pesticides, and disease-carrying pests. Social barriers and lack of access to adequate health care compound the threats to agricultural workers, which reduces workforce productivity and food security.

The agricultural sector continues to be a substantial economic engine, with the U.S. accounting for over $1.53 trillion toward gross domestic product. Given the climate challenges, the agricultural sector is at risk of disruption both in domestic food supply and food export capacity. The food-insecure population continues to rise, particularly within vulnerable populations, including Indigenous groups. Unless society adapts, climate change will have a substantial impact on food production and economic sustainability.[19]

1.4 The obligations and costs of the alignment with international directives:

The nature of the costs arising from biodiversity loss and climate change can also be influenced by the international obligations adopted by European entities to address these issues. Companies are no longer assessed solely based on their financial performance but also on the social and environmental impact they create.

Over the years, the European Union has been at the forefront of the fight against climate change, imposing significant economic burdens on businesses and requiring them to comply with new international directives. The creation of documentation regarding the activities undertaken by companies to demonstrate their commitment to environmental or social protection is still an evolving function. It is currently based on reporting procedures aimed at enhancing transparency between companies and customers, who are often unaware of crucial information and the actual impact of the company.

The European Commission defined sustainable reporting as a type of process that aims at disclosing sustainability information ‘’by combining long-term profitability with social justice and environmental protection’’.[20]

To operationalize this objective, corporations should consider their economic, environmental, and social impacts on society in general and on stakeholders in particular.[21]

The scale of the company is one of the primary factors affecting the cost of sustainability reporting services. The larger the company, the more information needs to be gathered and organized into the report, which naturally requires more time and labor from service providers.[22]

[19] *Climate change impacts on agriculture and food supply | US EPA*. (2025, February 6). US EPA.

[20] Dienes, D., Sassen, R. and Fischer, J. (2016), "What are the drivers of sustainability reporting? A systematic review", *Sustainability Accounting, Management and Policy Journal*, Vol. 7 No. 2, pp. 154-189.
[21] Dyllick, T., & Hockerts, K. (2002). Beyond the business case for corporate sustainability. *Business Strategy and the Environment*, *11*(2), 130–141.
[22] Reporthink. (2024, December 24). Exploring the cost of Sustainability Report Services: What you need to know. *Reporthink.AI*. https://reporthink.ai/exploring-the-cost-of-sustainability-report-services-what-you-need-to-know/

Moreover, larger companies have stronger incentives to issue voluntary reports because of their exposure to greater pressure to publish sustainability information to meet the informational needs of the stakeholders and the capital market.[23]

In contrast, smaller companies or SMEs tend to have simpler data to analyze, making the cost of a sustainability report more affordable.

Considering more limited companies, tho, pieces of information are usually withheld, possibly because of their greater sensitivity to competition, which would explain their lower reporting rate.[24]

Another important aspect is a company's ability to engage external auditors to establish these procedures. The involvement of external auditors is generally associated with a positive impact on sustainability reporting.

The cost of sustainability report services in Indonesia, to give an example, typically starts at IDR 100 million (approximately 6 thousand euros), reflecting the complexity and importance of these reports as a strategic communication tool for companies.[25]

Some studies have found that the costs of sustainability reporting can vary widely depending on factors such as the size of the company, industry, the scope of the report, the reporting framework used, and the level of assurance required (e.g., by external auditors) (Christensen et al., 2021), the level of integration of sustainability into a company's overall strategy, the use of digital reporting tools, and the quality of data collection and analysis. [26]

KPMG in 2013 found that the average cost of creating a sustainability report was €193,000 with an additional €37,000 in verification costs (KPMG, 2013).

Figure 3: Costs of creating and verification of sustainability reports.

Size of the company by number of employees	Cost of creating the report (€)		The cost of getting the report verified (€)	
	Reasonable estimate	High estimate	Reasonable estimate	High estimate
500 to 999	17 000	33 300	7 200	11 000
1000 to 4999	30 300	61 600	11 000	18 000
5000 +	197 000	357 000	30 000	100 000
Evaluation from CAC 40 (top companies in France)			60 000	200 000

Source: KPMG, 2013.

We can observe that an increased integration of sustainability into business accountability signals a trend toward greater transparency and compliance with regulations. As sustainability reporting evolves, companies must respond to the increasing financial and operational demands of complying with international guidelines. Larger corporations are better equipped to manage these expectations,

[23] Dyllick, T., & Hockerts, K. (2002). Beyond the business case for corporate sustainability. *Business Strategy and the Environment*, *11*(2), 130–141.
[24] Ibid.
[25] Reporthink. (2024, December 24). Exploring the cost of Sustainability Report Services: What you need to know. *Reporthink.AI*. https://reporthink.ai/exploring-the-cost-of-sustainability-report-services-what-you-need-to-know/
[26] Sustainable Performance in Business Organisations and Institutions: Measurement, Reporting and Management (pp.56-72), Kristina Rudzioniene and Sarunas Brazdzius.

while smaller corporations are hard-pressed to balance the ability to uphold compliance costs and competitive sustainability. The use of external auditors also places an added emphasis on the credibility of reporting to substantiate the broader economic and strategic implications of sustainability undertakings. Lastly, the cost of compliance in financial value emphasizes the need for scalable solutions for regulatory compliance and economic viability across different industries.

The subject of international directive obligations will be discussed in greater depth in the following chapters, where they will be explained in more detail in their nature and structure, without dwelling on the subject of the costs involved, and considering how the latter are able to influence not only micro-economically but also macro-economically.

CHAPTER 2: The value of Biodiversity in business turnarounds.

2.1 The concept of ecological turnarounds: Common practices implementation.

Turnaround is conventionally defined as a recovery in performance after a period of organizational failure.[27]

The value of climate change is increasingly recognized within this concept, especially in light of the strong impact it can have on the corporate environment.

The early strategic management literature was dominated by the industrial organization (IO) view, which holds that the industry sector in which a firm operates, as opposed to the resources a firm controls, is the primary determinant of firm profitability.[28]

The resource-based view (RBV), as opposed to the IO perspective, places more emphasis on a firm's resources, suggesting that by identifying the resources that are of strategic importance and employing them effectively, firms can achieve a competitive advantage over their industry rivals.[29]

Both the IO perspective and the RBV were developed through the 1980s with little regard for the competitive implications of incorporating environmental and other sustainable business practices into company strategy.

Nowadays, however, many companies must be able to incorporate the theme of environmental protection and biodiversity into their organizational policy, given, above all, increasing pressure from legislation, customer awareness, and financial players.

Corporate sustainability is a broadly used term that refers to the implementation of practices aimed at fostering sustainable development within businesses. These practices impact a company's economic, social, and environmental performance, both in the short and long term.

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[27] Environmental Change, Human Resources and Organizational Turnaround, George A. Boyne and Kenneth J. Meier, 2009.

[28] Fowler, S. J., & Hope, C. (2006). Incorporating sustainable business practices into company strategy. *Business Strategy and the Environment*, *16*(1), 26–38.

[29] Barney, J. B. (1986). Organizational culture: Can it be a source of sustained competitive advantage? *Academy of Management Review*, *11*(3), 656–665.

Companies that are in the process of integrating sustainable practices within their organizations need to choose and involve those stakeholders that are aligned with the contribution to the economic, environmental, and social conditions on a regional and/or macroeconomic scale.[30]

Two of the most common methodologies in business turnaround processes come from the guidelines of the Taskforce on Nature-related Financial Disclosures (TNFD) and the Natural Capital and Ecosystem Services methods.

TNFD provides a framework for businesses to identify, assess, manage, and disclose nature-related risks and opportunities. These recommendations align with global sustainability standards and regulatory frameworks like the Kunming-Montreal Global Biodiversity Framework (GBF) and IFRS Sustainability Disclosure Standards. Organizations should integrate the four pillars:

- Governance – Board oversight of nature-related risks.
- Strategy – Impact of biodiversity on business models.
- Risk & Impact Assessment – Processes for identifying and mitigating risks.
- Metrics & Targets – Measurement and performance tracking.

The development of these four pillars allows us to understand nature-related financial risks, other than prioritizing key areas in the supply chain and operations, as well as actively considering the participation of its stakeholders in monitoring the progress achieved.[31]

Natural Capital Accounting is another useful tool to measure the changes in the stock and condition of natural capital (ecosystems) at a variety of scales and to integrate the flow and value of ecosystem services into accounting and reporting systems in a standard way.[32]

Natural Capital Accounting (NCA) is an umbrella term covering efforts to use an accounting framework to provide a systematic way to measure and report on stocks and flows of natural capital. Its underlying premise is that since the environment is important to society and the economy, it should be recognized as an asset that must be maintained and managed, and its contributions (services) be better integrated into commonly used frameworks.[33]

Integrating this concept within corporate reality can help to achieve a more strategic maintenance of competitive raw materials throughout a company. Moreover, this tool helps monetize natural assets, assigning economic value to ecosystem services such as water purification, carbon sequestration, and biodiversity. By integrating these values within a company accounting system, NCA manages to translate environmental benefits into economic terms, making them more easily comparable with traditional assets like human capital or infrastructure.

2.2 The economic validity of biodiversity-proven solutions:

Ecosystem services from pollination to climate regulation help maintain human economic activities by assuring biodiversity. Using solutions grounded in biodiversity as part of business and industry

[30] Székely, N., & Brocke, J. V. (2017). What can we learn from corporate sustainability reporting? Deriving propositions for research and practice from over 9,500 corporate sustainability reports published between 1999 and 2015 using topic modeling techniques.
[31] Getting started with adoption of the TNFD recommendations, TNFD, 2024.
[32] *Natural capital accounting*. (2025, March 7).
[33] *Natural Capital and Ecosystem Services FAQ | System of Environmental Economic Accounting*. (n.d.). https://seea.un.org/content/natural-capital-and-ecosystem-services-faq

strategies may help boost resilience, reduce costs, and provide new market opportunities. Nature-driven methods not only provide environmental sustainability but also long-term economic development; hence, it has been shown that protecting biodiversity is both ethical and financially worthwhile.

In this section, we will explore some of the most implemented corporate sustainability practices, focusing on their potential to generate competitive advantages. Solutions such as regenerative agriculture, circular economy models, green bonds, and sustainable investments are just a few of the strategies that will be presented and thoroughly analyzed.

2.2.1 REGENERATIVE AGRICOLTURE:

The primary sector is the most affected by climate change and the loss of biodiversity. Techniques that were previously considered optimal are now obsolete to cope with increasing consumption due to equally high demand; new techniques are needed, especially those that consider not purely economic and quantitative needs but ecological and qualitative ones.

Soil has been described as ‘’the earth’s living, breathing, fragile skin’’, able to sustain our societies by offering everything we need.

Given the increasingly common processes of biodiversity loss, soil quality has been increasingly exploited and degraded.

Excessive soil consumption is a consequence of biodiversity loss, making soil regeneration increasingly complicated. This loss is also due to the use of machines or increasingly aggressive chemical factors.

Unfortunately, we are eroding our topsoil at an alarming rate of an inch per decade, wrote Montgomery (2012), mostly as a consequence of poor agricultural practices. This imbalance has created a crisis for a simple reason: there is no substitute for dirt. Oil and natural gas can be replaced by other energy sources, preferably renewable ones, but nothing else can do what dirt does. [34]

Once land has become degraded, it is more vulnerable to the effects of climate change, particularly rising temperatures and droughts of greater severity.[35]

Healthy soils have a 6–8 percent fraction of carbon in them, typically. If undisturbed or restored to health, soils continue to hold their carbon and can “soak up” even more from the atmosphere, which is very good news for fighting global warming. Soil is one of the great carbon pools on the planet, along with the atmosphere, oceans, and vegetation.[36]

The importance of the carbon content of soils is also their improved capacity to hold water. It is estimated that a 1 percent increase in organic matter can add as much as 16,000 gallons of water storage capacity per acre (about 144,000 liters per hectare)

Gabe Brown, one of the most well-known advocates for regenerative agriculture in the USA, is an important author and educator.

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[34] Rhodes CJ. The Imperative for Regenerative Agriculture. Science Progress. 2017;100(1):80-129. doi:10.3184/003685017X14876775256165

[35] Ibid.

[36] White, C. (2020). Why regenerative Agriculture? *American Journal of Economics and Sociology*.

Many consider his five principles as the cornerstones of regenerative agriculture, after he managed to successfully grow a 5000-acre ranch with crop yields 20-25 percent higher than the average yields in his county, using fully sustainable practices.[37]

Here are Brown's ''five principles'' for creating topsoil:

1) **Limit disturbance**: The principle of limiting the use of mechanical, chemical, and physical external elements that can disturb the soil. Tillage damages the soil structure, tearing apart natural living organisms within the soil, and can create natural fertility.
2) **Armor**: Providing a natural ''coat'' is essential to protect the soil from unwanted wind and water erosion while, at the same time, providing food and habitat for macro and microorganisms.
3) **Diversity**: This concept is essential to sustain a regenerative type of agriculture. Different types of vegetables have different characteristics, each of which plays an important role in maintaining the soil's health.
4) **Living roots**: Those are capable of feeding soil biology by providing carbon, its basic component.
5) **Integrate Animals**: Pollinators, predator insects, earthworms, and all of the microbiology that drive ecosystem function.[38]

One of the key co-benefits of increasing topsoil through regenerative agriculture is the production of healthy, nutrient-dense food along with the potential for sustainable intensification, a promising prospect for a world striving to feed billions amid climate change and resource scarcity.

2.2.2 CIRCULAR ECONOMY:

Circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended.[39]

It is proposed as a solution for decoupling economic growth from negative environmental consequences, based on the ability to minimize resource consumption while providing superior services.

Among the different ways of applying the circular economy, we can identify several strategies, ranging from eco-design to the zero-waste model. In particular, these practices include the design of products that require less use of materials, corporate training geared to sustainability, and the ability to reintegrate their recycled products into the production cycle.

Below is a table of the most effective applications of the CE model:

[37] *Gabe Brown – Center for Regenerative Agriculture and Resilient Systems*. Chico State.
[38] Kruesi, G., & Kruesi, G. (2025, March 6). 5 Principles of soil health. *Chelsea Green Publishing*.
[39] *Circular economy: definition, importance and benefits | Topics | European Parliament*. (2023).

Green Purchasing: • Provide design specifications for suppliers that include environmental requirements for purchased items; • Selecting suppliers using environmental criteria; • Suppliers with ISO 1400 certification[40] • Cooperate with suppliers to reduce packaging; • Cooperating with other firms to establish eco-industrial chains; • Require the use of eco-packaging for collaborators;	**Eco-Design:** • Design of products for reduced consumption of material/energy; • Design of products for reuse, recycling, recovery of material, and parts; • Design of products to avoid or reduce the use of hazardous products; • Design of processes for minimization of waste; • Policy for producing products where components used can be remanufactured; • Sustainable raw material sources; • Product design that is easy to recycle or disassemble;
Sustainable Manufacturing Practices: • Reduce hazardous and non-hazardous waste; • Reduce the use of water in the manufacturing process; • Reduce the use of energy; • Keep waste to a minimum; • Recycle water, waste, or materials; • Environmentally friendly technologies for manufacturing processes and waste disposal; • Research and Development; • Safe and healthy work for employees; • Acquisition of patents and licenses;	**Internal Environmental Management:** • Including environmental factors in the internal performance evaluation system; • Environmental auditing programs; • Eco-labelling of products; • Special training for employees; • Pollution prevention programs; • Generate environmental reports for internal reports; • Commitment at the manager level;
Green Manufacturing: • Include the sustainable manufacturing features;	**Green Human Resource Management:** • Training to promote the CE as a value; • CE employee performance evaluation criteria; • Incentives for ideas by employees on the CE; • Offering workshops, forums, or joint sessions to improve the behavior of staff; • Teamwork implementation to consolidate CE values;

[40] *ISO - ISO 14000 family — Environmental management*. (2023, January 19). ISO. https://www.iso.org/standards/popular/iso-14000-family.

Zero Waste: • Zero waste production processes articulated with product design for reuse; • Motivating and training consumers in sustainable practices; • Engage suppliers with zero-waste extraction and processes; • Recycle and recover resources from the end-of-life product;	**Investment Recovery:** • Policy to sell excess inventory/materials; • Policy for selling defective products or components; • Policy for selling waste and scrap; • Policy to collect and recycle expired products; • Policy to establish a recycling system; • Remanufacturing products; • Taking back products from consumers after the end of their functional life; • Reusing water or energy across the value chain;
Recycling and Manufacturing: • Ability to retain the complete form of goods by remanufacturing; • Ability to split the product into its constituent parts by recycling; • Melt or reprocess into new forms a product/part: • Reducing waste through recycling;	**Reverse Logistics:** • Return of defective products; • Return for maintenance; • Repair and overhaul of products; • Return of excess products; • Company integration with the supply chain; • Cascade orientation principle integrated into the product recovery program;

[41]

2.2.3 GREEN BONDS:

Green Bonds are the most modern financial frontier; considered as classic bonds whose performance is linked to ecological and environmental protection results.

Green bonds are closely linked to the concept of ESGs, investments with environmental, social, and economic development objectives. ESGs are incorporated into corporate management, business decisions, and investors' portfolio choices.

ESG investing is a framework by which firms can maximize financial returns and minimize risk while aligning socially responsible business practices based on non-financial quantitative data related to a set of criteria, such as:

- Environmental Metrics:

  - Measuring greenhouse gas emissions;

  - Monitoring carbon footprint;

  - Tracking energy efficiency and programs in place to improve it;

- Social Metrics:

[41] Source: Rafael Mora-Contreras, Luz Elba Torres-Guevara, Andrés Mejia-Villa, Marta Ormazabal, Vanessa Prieto-Sandoval, Unraveling the effect of circular economy practices on companies' sustainability performance: Evidence from a literature review, Sustainable Production and Consumption, Volume 35, 2023, Pages 95-115.

- Tackle the gender gap;
- Metrics on diversity, equity, and inclusion;
- Offering equal opportunities to employees;

- Governance Metrics:
  - Sustainable purpose and values;
  - Auditing of ESG practices;
  - Cybersecurity practices;
  - Measurement of health and safety within a company;

- Supply Chain Metrics:
  - How sustainable are your suppliers?

Studies reveal that green bonds have a positive impact on the stock price of the company, capable of generating more profitability and operational efficiency than other firms.[42] Furthermore, the green bonds are weakly correlated with other forms of financial instruments, so they provide diversification benefits and growth.[43]

There is currently no global standard to officially certify a bond as 'green', but some guidelines developed by the International Capital Market Association (ICMA) have been defined to make the identification process clearer.[44]

The four core components of the Green Bond Principles (GBP) are as follows:

- Use of Proceeds: The funds raised must be exclusively allocated to eligible Green Projects, which generate environmental benefits
- Process for Project Evaluation and Selection: The process should outline how the project fits within the eligible categories, including how environmental risks are identified and managed.
- Management of Proceeds: The procedure must be tracked transparently, ideally in a sub-account portfolio, with transparency on the use and allocation of funds;
- Reporting: Issuers must report annually on the project details and expected outcomes, while using qualitative and quantitative indicators.[45]

2.3 Case studies: How companies have redefined their business models through nature-based solutions.

[42] Bhutta, U. S., Tariq, A., Farrukh, M., Raza, A., & Iqbal, M. K. (2021). Green bonds for sustainable development: Review of literature on development and impact of green bonds. *Technological Forecasting and Social Change*, *175*.
[43] Ibid.
[44] Borsa Italiana. (n.d.). *Cosa sono i Green Bond - Borsa Italiana*. https://www.borsaitaliana.it/notizie/sotto-la-lente/green-bond-definizione.htm
[45] The Green Bond Principles, Voluntary Process Guidelines for Issuing Green Bonds. (2021), ICMA.

This section of the thesis is dedicated to analyzing various case studies to illustrate the real applications and tangible consequences of recent approaches and solutions for protecting and enhancing biodiversity. These real-life illustrations aim to highlight the effectiveness and limitations of conservation efforts made regarding biodiversity over the past few years.

2.3.1 Danone:

Danone is a French multinational company in the food industry, well known for its commitment to a more sustainable future by improving unhealthy dietary habits among its consumers.

Danone believes it has a role to play in society. Thus, it was logical to further its journey as a sustainable business by adopting the French "Société à Mission" status and aiming for the full B Corp certification[46], both of which contribute to anchoring environmental and social performance in its business model.

The progress reported by the company aims at achieving a series of goals across different operational areas. The following tables present the most relevant objectives along with their associated KPIs.

- PRESERVE & REGENERATE NATURE:

GOAL	**KPIs**	**2023 result**
Curb GHG emissions in line with 1.5 C°.	CO2 reduction by 2030 in line with 1.5 C°.	-7.5% vs 2020.
	Net Zero by 2050.	-7.5% vs 2020.
	30% reduction in methane emissions from fresh milk by 2030.	-13.3% vs 2020.
	30% improvement in energy efficiency by 2050.	-1.3% vs 2020.
Pioneer and scale regenerative agriculture.	30% of key ingredients sourced from farms that have begun a transition to regenerative agriculture by 2025	38%
	Zero deforestation & conversion of key commodities by 2025.	84% (2022)
Preserve and restore watersheds where Danone operates and drives water footprint reduction across the value chain.	The 4R approach will be deployed in all products by 2030.	94.8%
	Watershed preservation in highly water-stressed areas by 2030.	53%
Drive the transition to a circular and low-carbon packaging system.	100% reusable, recyclable, or compostable by 2030	84%
	Halve the use of virgin fossil-based packaging by 2040, with a 30% reduction by 2030.	-3% vs 2020
	Lead the development of effective collection systems to	58%

[46] Corp Certification is a designation that a business is meeting high standards of verified performance, accountability, and transparency on factors from employee benefits and charitable giving to supply chain practices and input materials.

	recover as much plastic as Danone uses by 2040.	
Cut waste across the value chain.	Halve all food waste not fit for human, animal consumption, or biomaterial processing by 2030 vs 2020	-19.8% VS 2020.

- PROGRESS & LEAD HEALTH THROUGH FOOD:

GOAL	KPIs	2023 result
Offer tastier and healthier food and drinks.	85% vol dairy, plant-based, water, and aqua drinks rated ≥ 3.5 stars by Health Star Rating by 2025.	89.2%
	> 95% vol Kids dairy and plant-based ≤ 10g total sugars/100g by 2025.	62.2%
	> 95% vol toddlers' milk (1-3yo) ≤ 1.25g added sugars /100kcal by 2025.	99.3%
Promote healthier choices.	> 95% vol sold of dairy, plant-based, and aquadrinks products with on-pack/online interpretative nutritional information by 2025.	40.5%
Provide positive nutrition & hydration for a healthier life.	≥ 85% vol Kids dairy fortified with relevant vitamins & minerals by 2025	83.2%
	5 projects to address iron deficiency in children by 2025	2
	20M people with access to safe drinking water by 2025	12.7 M
Invest in nutrition and hydration science and research	150 scientific publications in peer-reviewed journals and/ or presentations at scientific conferences (from baseline of 2021) by 2025	108 full papers accepted for publication.

- THRIVING PEOPLE & COMMUNITIES:

GOAL	KPIs	2023 result
Make Danone a force for good by fostering a unique, diverse & inclusive culture and empowering Danoners for positive impact.	All employees covered by the BCorp certification by 2025.	68%
	All employees covered by Dan'Care by 2030.	98%
	Achieve gender balance in management globally by 2030	43%
	Drive equity and close the gender pay gap by 2025.	2.1 pts

	Maintain the inclusion index.	+2 pts.
Equip and empower communities (i.e. internal, external) with skills and capabilities of the future to thrive in a fast-changing economy.	Make future skilling programs available to all Danoners by 2025.	On track with the program designed in 2023
	Extend future skilling programs to key partners by 2030	
Champion a renewed social contract by fostering a prosperous & inclusive ecosystem, upholding human rights and pursuing social progress.	100% of employees trained on Danone Human Rights policy by 2025.	On track with the e-learning designed in 2023.
	Danone Sustainable Sourcing Policy deployed to all suppliers by 2030.	On track with the policy launched in 2024 and deployed in stages to all suppliers by 2030.

As seen, Danone has attained some notable outcomes within a period of about three years, which have resulted in such major achievements as being named the world leader in fresh dairy and plant-based foods and beverages, the second in packaged waters and early life nutrition, and the fourth in adult medical nutrition.

It is also possible to analyze such data from a financial point of view.

During the same period in which these new practices were implemented, Danone experienced a significant shift in stock value, reaching approximately €70 per share (as of 29/03/2025) compared to an average of €55 in 2020, with an increase of about 27.10% since 2020.[47]

All data has been sourced from the company's 2023 Sustainability Report.[48]

Figure 4: Danone stock value.

Source: https://finance.yahoo.com/

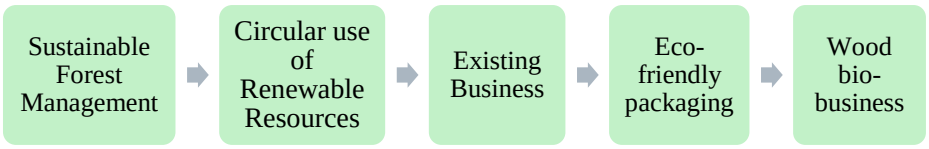
[47] Investing.com, 2025.
[48] Danone Annual Integrated Report, 2024.

2.3.2 Oji Group:

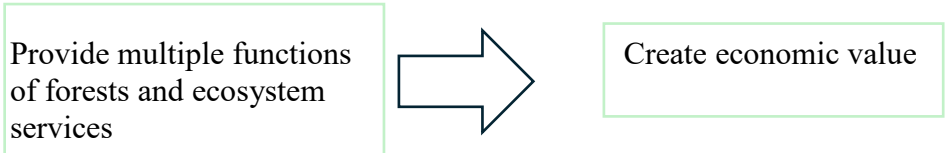
The Oji Group, which was founded more than 150 years ago as a pillar of the Japanese paper and paper industry, has managed to evolve over time into a global reality. One of the largest and strongest financial players in the global industry, Oji continues to adapt to changing times, exploring new opportunities to contribute to society and expand beyond traditional sectors.

Within the corporate strategy, critical inputs are considered on which to focus in order to define a business model that is competitive but at the same time attentive to its environmental and social impact.

The following table attempts to summarize the value creation process of the Oji group, considering the fundamental inputs and outcomes.

<table>
<tr><th>Input</th><th>Business Model/ Output</th><th>Outcome</th></tr>
<tr><td>Human capital:
- Number of employees (38.322)
- Number of overseas employees (57.5%)</td><td rowspan="4"> 
</td><td rowspan="2">Economic value:

-Operating profit;
-ROE;
-Free cash flows;
-Dividend per share.</td></tr>
<tr><td>Intellectual capital:
- R&D expenses (¥10.4 billion)</td></tr>
<tr><td>Natural capital:
- Oji Forests (635,000 ha)
- Rate of forest certification acquisition (98%)</td><td rowspan="2">Social value:

-Human rights education training;
-Male employees' childcare leave;
-Rate of sustainability survey on all main suppliers' implementation.</td></tr>
<tr><td>Manufactured capital:
- Overseas manufacturing sites (110 sites in 23 countries)</td></tr>
<tr><td>Financial capital:
- Shareholders’ equity (¥818.3 billion)
- Interest-bearing debt (¥736.7 billion)</td><td> 
</td><td>Environmental value:

-Reduction of GHG emissions;</td></tr>
</table>

Social and Relationship capital: - Suppliers and Sustainability Number of companies surveyed (955)		-Expansion of forest carbon stocks; -Percentage of renewable energy use; -Recovered paper utilization ratio; -Reduction of water intake intensity.

All these activities helped the Oji Group close the 2023 fiscal year with a net profit of ¥1,696.3 billion. A range of positive and negative fluctuations in stock value can be observed, which enabled the company to stabilize at a strong and competitive price overall.

As of March 29, 2025, the value of each Oji Group share is ¥639, up from ¥597 on March 27, 2022, representing a 7.03% growth. This establishes Oji Group as the leading company in domestic paper and paperboard production volume, and the second-largest paper producer overall in Japan.[49]

All subsequent data are reported in the sustainability report published by the company in 2023. [50]

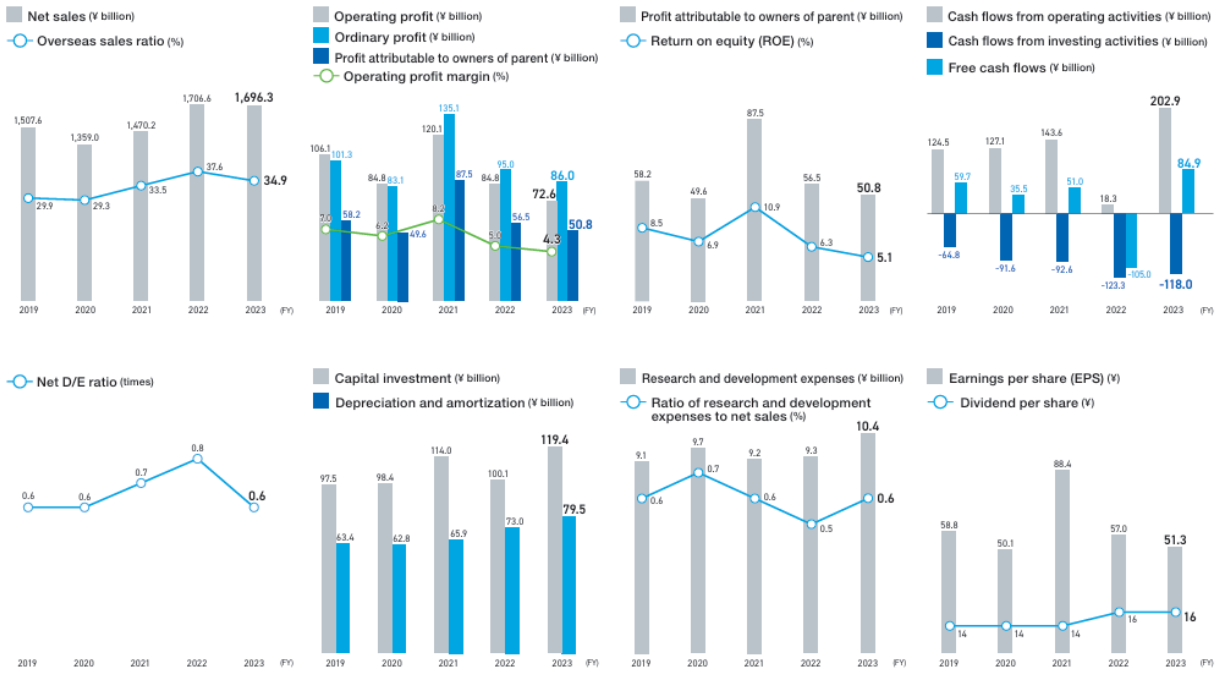
Figure 5: Oji Group Stock Value chart.

Source: https://www.marketwatch.com/investing/stock/3861?countrycode=jp

[49] Marketwatch.com, 2025.

[50] Oji Group Sustainability report, 2024.

Figure 6: Overview of financial operations by Oji Group:



Source: Oji Group Sustainability Report of 2023.

2.3.3 Saipem:

The Saipem Group, born in Italy in 1957, is one of the world's pioneers in the design and implementation of major projects in the energy and infrastructure sectors, staying on track for a sustainable future.

Over the years, Saipem has generally maintained or improved its position in the main ESG ratings and indices, reaching a leading position in most of them. This reflects the continuous improvement of Saipem's sustainability performance, together with the publication of a four-year Sustainability Plan and related ESG targets, supported by transparent and reliable disclosure of sustainability information.

Among the most important objectives of the company's ESG policies, we can highlight three main strands:

- CLIMATE CHANGE MITIGATION AND ENVIRONMENTAL PROTECTION:

Objectives 2023-2026	**Results 2023**	**Target Year**
GHG emissions avoided through energy management initiatives.	47 kt CO2 emissions avoided	2023-2025
GHG emissions are compensated due to the offsetting strategy of the company	Acquired 100 kt CO2 eq, of which 70 kt from REDD+ projects in carbon credits	2023-2025

Introduction of an internal carbon price shadow in the investment selection process	Analysis is still in progress	2025
Systematize the mapping of operational sites in biodiversity-sensitive areas	Mapping Saipem operational sites in sensitive areas according to IUCN categories for biodiversity and the UNESCO World Heritage List of Protected Areas for Biodiversity with Geographic Information System (GIS)	2024
Mapping the operational sites of major suppliers in biodiversity-sensitive areas	Definition of a list of significant suppliers and ongoing analysis through external partners	2023
Continue spill mapping and risk analysis with 2 new Oil Spill Mapping and Risk Assessments in the ABSER Business Line	2 new Oil Spill and Risk Assessments made	2025
Continue the efforts to reduce waste and increase the types of recyclable waste sent for recycling	Maintain 100% of recycled waste at most applicable sites	2023
Carbon Neutrality for Scope 2: Enable purchase of 100% renewable energy, preferably certified, in all offices, where applicable (including I-REC certificates), and compensation for residual emissions	An agreement for the provision of credit clearing with 3 companies and made the purchase (see objective above)	2023

- CENTRALITY OF PEOPLE:

Objectives 2023-2026	**Results 2023**	**Target Year**
Maintain a TRIFR and an HLFR not higher than the average of the last 5 years each year until 2026. For 2023, the average of the last 5 years of the TRIFR is 0,43 and stands at 0,98 per HLFR	In 2023, the TRIFR* stood at 0.32 and the HLFR* at 0.74	2023-2026
Maintain a TRIFR and an HLFR for subcontractors not higher than the average of the last 5 years for each year until 2026. For 2023, the average for the last 5 years of the	The TRIFR reached 0.23 and 0.44 for the HLFR.	2023-2026

TRIFR is 0,32 and stands at 0,57 for HLFR1		
Involve management in the LiHS*	750 managers participated in the LiHS workshops.	2023
Implement innovative initiatives to further strengthen safety performance, such as the Fire Prevention Campaign in 2023	Implementation of a fire prevention campaign and development of a new human factor campaign	2025
Implementing the ‘’Digital Permit to Work’’ for 100% of Saipem workers.	In 2023, 32% of Saipem workers have implemented the Digital Permit to Work. The process is ongoing	2026
Improving the efficiency and use of telecardiology services	In 2023, the utilization rate stood at 75% of sites identified	2023-2026
Extending the use of telemedicine services	In 2023 these services started for all the identified sites.	2023-206
Initiate employee health initiatives on mental health, cardiovascular risk prevention, and proper nutrition	In 2023, telepsychology and teledermatology services were launched at all identified sites	2023-2026
Creating a Smart Clinic for the Fano and Arbatax locations	This activity is ongoing	2026
Implement a methodology to identify countries where sustainability initiatives in the health field can be implemented	A methodology is being created for projects in India and Indonesia.	2026
Maintaining ISO 30415-Human resource management diversity and inclusion*	The certification has been kept	2023

*TRIFR: Total recordable injury frequency rate (TRIFR) is a metric used to gauge an organization’s safety performance. It reflects the number of fatalities, lost time injuries, substitute work, and injuries requiring treatment by a medical professional per million hours worked.[51]

*HLFR: High Level Frequency Rate Event was introduced in 2021 by Saipem to measure all accidents with high potential harm to people.

*LiHS: Leadership in Health & Safety (LiHS) aims to implement the methodology of leadership in health and safety in the organization.[52]

*ISO 30415: Establishes guidelines for typical HR management processes that can be oriented towards valuing diversity: workforce planning, remuneration, recruitment, induction, learning and development, etc.

[51] https://www.safeopedia.com/definition/3353/total-recordable-injury-frequency-rate-trifr
[52] https://www.fondlhs.org/metodo-lihs/

- VALUE CREATION:

Objectives 2023-2026	Results 2023	Target Year
Extend the number of suppliers registered in Open-es and strengthen the information and data available on the platform	An agreement with around 800 suppliers was made	2023-2026
Extend the number of suppliers registered on Carbon Tracker* and strengthen the information and data available on the platform	In June 2023, a meeting was held with around 250 new suppliers; 30 one-to-one meetings were also held with strategic suppliers	2023-2026
Raise awareness about human rights and labor among the main contractors	70% of suppliers participated in the training.	2023
Perform (desktop) audits on Saipem suppliers regarding the topic of human rights and labour	Audit on 10 main suppliers.	2023
Strengthening expertise on sustainability issues within the Supply Chain function through specific training	39 resources have completed the training process	2024
Conduct new market surveys to identify possible Environmental requirements applicable to procurement processes	Two new market surveys have been carried out on cluster of equipment for our drilling and construction fleet, and a survey on procurement services	2023-2026
Strengthening the supplier qualification process regarding ESG issues as part of the corporate qualification system update	In the process of completion following decision to join, upon invitation, to use the Open-es platform for the ESG part of supplier qualification	2023
Continue the training activity in the area of Anti-Corruption and Compliance 231* for personnel at risk, covering 100% of the countries covered by the training plan	The training was carried out in 18 countries	2023
Implement a job rotation program for new graduates to ensure experience in the Control and Compliance functions	Implementation of the program has started, involving 16 new hires	2025
Keep the "Detection and Response" process in place	Certification confirmed in February 2023	2023

compliance with ISO/IEC 27001* through certification confirmation		
Continue public health initiatives, such as malaria prevention and health promotion, and awareness	Numerous initiatives for the territory to promote health have been organized, including those on malaria prevention	2023
Develop a methodology for effective identification of initiatives on the ground	A methodology has been developed that will be applied to the initiatives planned for 2025	2023-2026
Implementation of a biodiversity protection initiative	Realized in Venice (‘’Seabin initiative’’)	2023

*Carbon Tracker: It is an independent financial think tank that carries out in-depth analysis on the impact of the energy transition on capital markets and the potential investment in high-cost, carbon-intensive fossil fuels.[53]

*Anti-Corruption and Compliance 231: This document helps companies prevent corruption and other illegal activities. It's based on the Italian Legislative Decree 231/2001.

*ISO/IEC 27001: The standard provides companies of any size and from all sectors of activity with guidance for establishing, implementing, maintaining, and continually improving an information security management system.[54]

In 2023, Saipem posted revenues of €11.87 billion, representing a highly impressive financial recovery and one of the company's strongest years recorded in the last ten years.

The results of 2023 could not have been more different from Saipem’s revenue in the difficult years of 2020 (€7.34 billion) and 2021 (€6.52 billion); during a challenging time of global interruptions and volatility of the larger sector. This recovery was not 100% dependent on market forces, but also characterized a new direction taken by Saipem to financially incentivize itself by becoming a more sustainable and socially responsible business. By introducing environmental, social, and governance (ESG) principles into corporate governance, operational activities, and supply chain management, Saipem is gaining its investors' trust, improving operational efficiency, and taking advantage of green financing trends. [55]

In addition, the company is aligned with the EU Taxonomy, where 6.6% of total revenues now come from climate-aligned revenue activity, illustrating the tangible benefits of Saipem’s transition to environmental strategy on its investments. In summary, Saipem is using innovation, resiliency, and an ESG-driven strategy not only to improve their reputation but to establish themselves as an innovative and forward-thinking leader in energy infrastructure.[56]

[53] https://carbontracker.org/
[54] https://www.iso.org/standard/27001
[55] *Quarterly financials and reports | Saipem*.
[56] Saipem Sustainability Report, 2023.

In 2024, Saipem closes the year with revenues at 14.5 billion euros and an adjusted EBITDA of 1.3 billion euros, up 23% and 44% respectively compared to the previous year. Net profit rises to 306 million euros, an increase of 70% over 2023. The number of orders acquired also rose to EUR 18.8 billion, with the order book reaching an all-time high of EUR 34 billion.[57]

2.3.4 Obolon:

Obolon Joint Stock Company is a Ukrainian producer of beverage products such as beer, low alcohol drinks, soda, and non-alcoholic drinks, based in Kyiv and founded in 1980.

The Management Systems of Obolon present several important certifications that demonstrate their social responsibility aims, such as:

- Quality Management System (DSTU ISO 9001:2001) is now firmly established as the globally implemented standard for assuring the ability to satisfy quality requirements and to enhance customer satisfaction in supplier-customer relationships.
- Food Safety Management System (DSTU ISO 22 000:2007) is the preventive system for providing of safety of food products for consumers (permanent analysis of dangerous factors and verification of critical control points at all stages of production).
- Environmental Management System (DSTU ISO 14001:2006) provides the development and implementation of the ecological policy of the company and manages its ecological aspects.
- Occupational Health and Safety Assessment System (DSTU-P OHSAS 18 001:2006) enables the organization to manage risks in the area of safety and hygiene of labour and also to improve qualitative characteristics in this area.

In 2020, PJSC Obolon reported a relatively modest net profit of UAH 77 million, followed by a net loss of UAH 112 million in 2021.

In 2022, the company rebounded dramatically, recording a net profit of UAH 1.2 billion, and in 2023, it reached UAH 1.8 billion. This remarkable recovery in financial performance during the period of 2022-2023 significantly improved Obolon's overall financial condition.

As of December 31, 2021, the company had bank loans at UAH 1.6 billion, which dropped to UAH 880 million at the end of 2022 and UAH 225 million as of December 31, 2023.

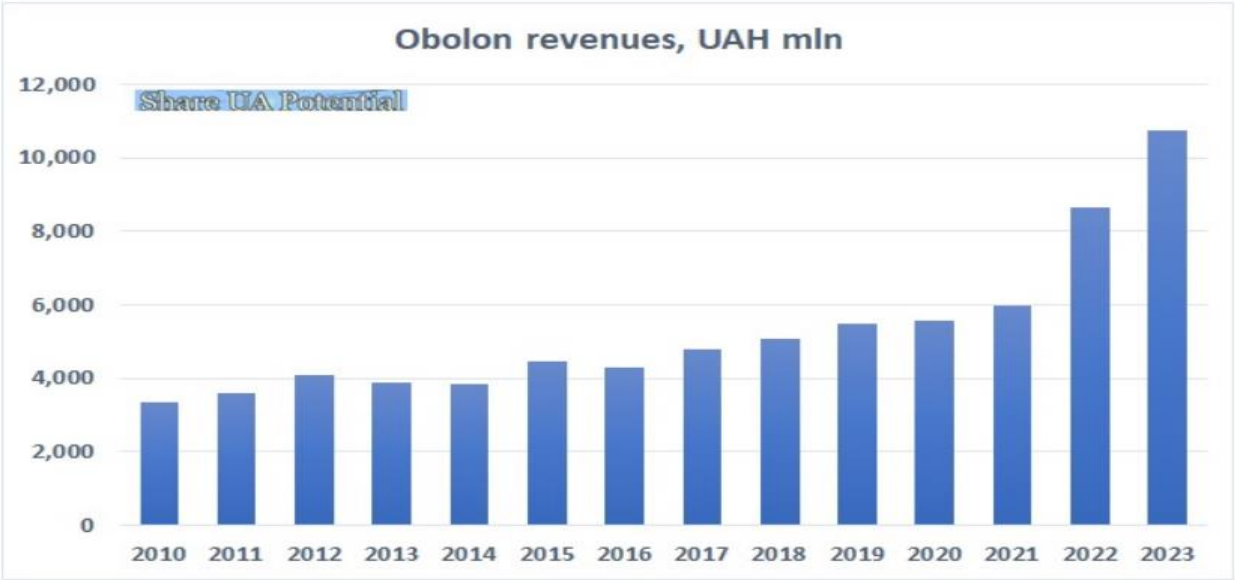
Simultaneously to pay down its loans, Obolon demonstrated remarkable growth in its cash position, increasing from UAH 139 million at the end of 2022 to UAH 475 million at the end of 2023. Presently, Obolon's operations are mainly financed by its internal resources.

By the end of December 31, 2023, the company's equity capital equaled UAH 5.2 billion and is the principal source of financing, taxed for a total of UAH 7 billion in assets. While the company's financial situation was relatively weak as of the end of 2021, the circumstances have changed completely.[58]

[57] Finanza, M. M. (n.d.). Saipem aumenta il dividendo grazie ai conti record del 2024. Ecco cosa si aspetta quest'anno. *MF Milano Finanza*.
[58] *Obolon - the financial situation has significantly improved*. (n.d.). http://shareuapotential.com/News/Newsline/obolon-fin-results-2023-12.html

The company's ability to seize market opportunities was made possible by its resilient structure and responsible management. The company's environmental efforts, local sourcing strategies, and support for Ukrainian farmers further reinforced its position as a socially conscious and economically sound enterprise.[59]

Figure 7: Obolon revenues by year.



Source: http://shareuapotential.com/News/Newsline/obolon-fin-results-2023-12.html

2.3.5 Patagonia:

Patagonia is self-proclaimed as ''a business to save the Planet.'' It is one of the most famous clothing businesses, known mainly for its commitment to a totally sustainable business model.

We can, in fact, analyze what is the corporate policy of a brand that has become so famous by rereading the company's last available Annual Benefit Corporation Report.

	FY23	FY24
Percentage of products made in a Fair-Trade Certified factory	87%	88%
Dollars Patagonia has paid in Fair Trade premiums to date since 2014, which goes directly to the factory workers	$26,184,897	$32,262,384
Patagonia products repaired in 113 locations worldwide, including their repair centers, repair partners, and retail stores; 110 employees work on the Repairs team in Reno, Nevada	153,506	145,446

[59] Official Obolon's website

Number of factory apparel workers who have earned a Fair-Trade premium for their labor and received improved benefits from Patagonia's participation in the Fair Trade USA program	86,696	82,815
Metric tons of Bureo's NetPlus and HDPE material Patagonia has used since starting its program to help remove discarded fishing nets from the ocean	1,419	2,000
Percent of Patagonia employees who are full- or part-time and who are bonus eligible	100%	100%
Percentage of the cost of medical premiums for U.S. employees covered by Patagonia	100%	100%
Children enrolled in Patagonia's on-site childcare in 17 classrooms at three locations. Patagonia employs 66 teachers, including 17 full-time bilingual teachers	183	199
Percentage of Patagonia's workforce comprised of people who identify as female, with 47.7% of managers in FY23 and 47.3% in FY24 who identify as female (in North America, Japan and Europe).	53.7%	53.1%
Farms converted and converting to Regenerative Organic Certified with the support of Patagonia Provisions	3	4
Years in a row Patagonia earned a top three spot as one of America's most trusted brands	3	4
Continents where Patagonia has invested in on- or off-site renewable energy projects (North America, Japan, Australia, Chile, Europe - Italy)	5	5
Tons of mussels sold (which improve water quality and	106	124

aquatic ecosystems as they grow)		
Percentage of electricity use for owned and operated globally that was renewable.	61%	98%
Dollars and dollar value of other forms of assistance given since 1985 to support environmental work through 1% for the Planet.	$212,000,000	$226,000,000
Dollars Patagonia matched in donations to non-profits through the company's Employee Match Program	$250,000	$200,000
Number of organizations funded through Patagonia's grants program in a fiscal year	799	848
Employees globally who are actively involved in grantmaking and deciding which environmental organizations Patagonia supports	844	814
Actions initiated by Patagonia's community on behalf of grassroots organizations	750,000+	920,000+
Hours that Patagonia employees (1,299 in FY23 and 1,653 in FY24) participated in volunteering through Patagonia's Activism Hours Program, for which employees are encouraged to use paid time off to engage in activism and support non-profit	12,589	22,074
Hours of skill-based volunteering donated (valued at over $2.1M in FY23 and $2.2M in FY24) through Patagonia Action Works	11,229	11,794
Community events held at Patagonia North America retail stores	650	707

Certified B Corps are helping companies today shift away from the traditional profit-driven focus, unlocking the potential to not only contribute to society but help reshape the way consumers view the value and impact of their spending decisions.

Estimating Patagonia's actual revenue value can be challenging due to its unique ownership structure and economic policies, such as its commitment to donating 1% of sales to environmental causes. As of January 2025, the company's annual revenue reached approximately $1.5 billion, maintaining around $1 billion in annual revenue over the previous three years.

2.3.6. BNP Paribas:

BNP Paribas is a global banking group that offers financial services, including lending, investing, saving, and protection. It's a leader in Europe and has a presence in many countries.[60]

As stated on their official website, they believe in their responsibility as the European Union's largest bank to redirect its financing towards green projects, with the aim of achieving a carbon-neutral economy by 2050.[61]

The mayor indicators in terms of ESG topics could be summarized as follows:

THEMATIC	INDICATOR	2023 RESULTS	2043 RESULTS	2025 OBJECTIVES
ECONOMIC	Amount of sustainable loans (in billions)	117	133	150
	Amount of sustainable bonds	67	106	200
	Amount of assets under management in open-ended funds distributed in Europe under Article 8 & 9 according to the SFDR*	254	285	300
SOCIAL	Share of women among the SMP population	37%	39%	40%
	Number of solidarity hours performed by employees over two rolling years	1,268,515	1,338,394	1,000,000
	Share of employees who completed at least four training courses during the year	98%	99%	90%

[60] BNP Paribas. (2024, November 7). *BNP Paribas in Italia - Chi siamo*. Italia. https://www.bnpparibas.it/it/chi-siamo/
[61] Pointet, A. (n.d.). *Fostering a just transition | BNP Paribas Group*. BNP Paribas.

CIVIC	Number of beneficiaries of products and services supporting financial inclusion (in millions)	3.9	5.0	6.0
ENVIRONMENTAL	The amount of support enabling our clients to transition to a low-carbon economy (in billions)	104	179	200
	Amount of financing to companies contributing to protecting terrestrial and marine biodiversity	4.3	5.4	4.0
	Greenhouse gas emissions	1.56	1.48	1.85

In the last 5 years, BNP Paribas has undergone a massive stock value increase, reaching a value of 68.67€ (as of 14/04/2025) and reaching an increase of 146.96%.

Figure 8: BNP Paribas Stock Value.

Source: www.yahoofinance.com

2.4 Correlation between ESG Score and ROE with RStudio:

I have developed a set of codes for defining a linear correlation using the R software to investigate a possible correlation between sustainable policies and company economic returns. The companies considered are the same as in the previous paragraph, except for Patagonia and Obolon, which are not listed on the stock exchange

The elements considered were both financial and environmental related, respectively: ROE, share value, market cap, volatility, CO2 emission, ESG score, and percentage of renewable energy use, as follows:

	Year	**CO2 emissions**	**% of Use of Renewable Energy**	**ROE**	**Stock Price**	**Market Cap**	**Volatility**	**ESG Score**
Danone	2024	N/A	71.1%	11.36%	€74	€47,8 bln	3%	18.2
Saipem		N/A	N/A	12.12%	€2.27	€4,48 bln	23%	20.4
Oji-Group		7.479KT	N/A	5.32%	¥670	$4,24 bln	N/A	24.2
BNP Paribas		17.75 Tons	65%	9.12%	€79	€89,9 bln	5%	21

(Financial data was gathered on Evaluatio.it [62])

The following data has been entered into the R system, following a series of codes:

1. The first code was created to install and load basic packages:

install.packages("readr"): to install packages from CRAN;

install.packages("dplyr")

install.packages("ggplot2")

library(readr): to load, read, manipulate, and create the downloaded packages into the R session to use their functions;

library(dplyr)

library(ggplot2)

2. The second code was used to import the table of the dataset above:

data <- read_csv("VALORE_AZIENDE_CLEAN.csv").

This code reads the table file and stores it as a data frame named ‘’data’’, which is what was used for the analysis.

3. The next step was to explore the dataset:

[62] https://www.evaluation.it/

summary(data): gives descriptive statistics for each column (min, max, mean, NA…).

str(data): shows the structure of the dataset (variable names, types, and example values).

4. The fourth code was the creation of the linear regression model:

model <- lm(ROE ~ `ESG Score` + `% of Use of Renawable Energy` + `CO2 emissions (tons)`, data = data)

summary(model)

lm(…): It's a code in R used to define a linear regression model, the model explains ROE based on the sustainable factors selected (ESG Score, % of Use of Renewable Energy, and CO2 Emissions).

Summary(model): It prints the estimated coefficients, intercept, p-values (statistical significance), and R-squared (how precise the model is).

5. The fifth code is to compare the ESG Score and the ROE plot within a graph:

```
ggplot(dati, aes(x = `ESG Score`, y = ROE, color = Company)) +
  geom_point(size = 3) +
  geom_smooth(method = "lm", se = FALSE) +
  theme_minimal() +
  labs(title = "Relationship between ESG Score and ROE", x = "ESG Score", y = "ROE (%)").
```

Ggplot(…) initializes a plot while using the ESG score on the X-axis and ROE on the Y-axis, while different companies have different colors.

geom_point(…): adds the points for each company.

Geom_smooth(…): adds a regression line.

Theme_minimal(…): makes the plot visually clean.

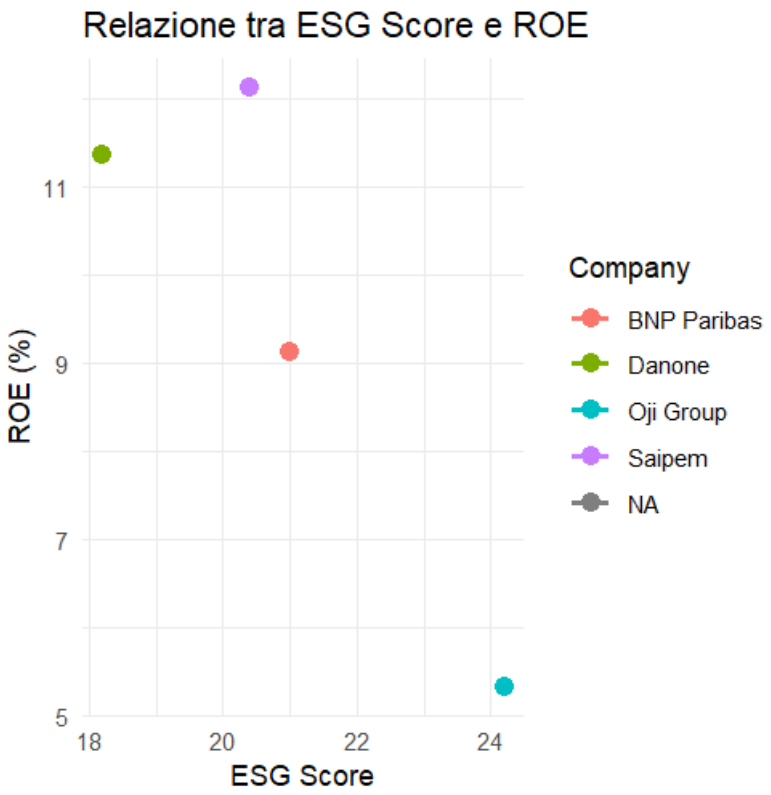
Labs(…): sets the title and axis labels

6. The last code is to create a correlation between the two values:

```
cor(dati$`ESG Score`, dati$ROE, use = "complete.obs").
```

If the result is +1, there's a perfect positive correlation, 0 no correlation, and -1 a perfect negative correlation.

Figure 9: Correlation between ROE and ESG Score.



The data points do not follow a clear upward or downward trend, indicating no evident pattern between the ESG path and higher ROE.

The interesting case of Oji Group, the company with the highest ESG Score and the lowest ROE, may suggest that a high ESG Score is not automatically associated with strong financial performance, or that industry-specific factors may be at play.

Therefore, an ESG commitment alone may not be a sufficient factor for achieving economic returns.

This chart reconfirms that de-correlation in the short term of financial results and ESG Ratings, despite some financial advantages. This should not lead to negative judgment on the validity of ESG policies, even if this regression analysis reveals no statistically significant correlation in the short term between sustainability commitments and immediate financial returns for the companies considered, unless shareholders pursue a clear short-term strategy.

This finding supports the core idea of the thesis, that adopting pro-biodiversity and ESG practices is not primarily driven by quick economic gains but rather by a broader, long-term strategic vision.

Most companies make investments in sustainability not merely to comply with regulations or improve their reputation in the short term but to deliver business and even additional business development, as well as resilience over the long term.

BNP Paribas, for instance, has developed a high-quality portfolio of green loans, financing projects with a positive environmental contribution. This approach positions the bank as a leader in sustainable finance and opens up new business opportunities in an evolving marketplace, where companies, investors, and individual customers are requesting these dedicated new products to support their strategic journey, beyond the short-term financial results.

Similarly, Saipem has expanded its business model to embrace additional areas of development, utilizing its existing technology to enter new markets, led by Energy Transition, such as the deployment of offshore wind farms, worth multi-million-euro contracts. These investments reflect a shift from the traditional business models to more sustainable and resilient businesses that guarantee energy supply and competitiveness in a world where the focus is increasingly on reducing the consumption of fossil fuels.[63]

The value of preservation strategy lies in the early understanding and mitigation of risks linked to resource scarcity and energy price volatility, this attracts investors who are structurally focused on long-term results and value creation, like pension funds and life insurance.

These examples illustrate that sustainability is increasingly viewed as an investment in innovation and long-term resilience, and less as a compliance imperative or a short-term way of improving financial performance. Therefore, the lack of a clear short-term correlation between ESG scores and ROE, as the graph illustrates, should not be confused with a lack of value in sustainable strategies but rather as evidence of their strategic and forward-looking nature.

CHAPTER 3: The regulatory framework.

3.1 International biodiversity framework: Directives and their utility with an in-depth analysis of the European Green Deal.

The international sustainability framework has two objectives: to drive the transition to a more eco-sustainable market system and to make companies more competitive.

The different reporting systems aim to promote greater accountability and compliance in economic activities, offering more modern, transparent business models capable of generating long-term competitive value. This system has undergone a major development and presents numerous models from which it can be drawn.

This section explores the current state of a segment of the international framework, both in the public and business spheres, focusing on its nature and the competitive advantages it can generate.

- The Science Based Targets Initiative:

The Science Based Targets Initiative (SBTi) is a corporate climate action organization that enables companies and financial institutions worldwide to play their part in fighting the climate crisis[64].

Born after a collaboration between: CDP (Carbon Disclosure Project), UN Global Compact, World Resources Institute, and WWF.[65]

[63] *Offshore wind farms for a sustainable future | Saipem*.
[64] *Ambitious corporate climate action*. Science Based Targets Initiative. https://sciencebasedtargets.org/.
[65] Ibid.

The SBTi does not force any predefined targets but rather assesses whether a company's self-determined climate objectives align with scientifically established sustainable pathways. These targets typically cover both direct emissions and indirect emissions from energy consumption (Scope 1 and Scope 2), requiring companies to reduce them in absolute terms by at least 90% by 2050 in order to achieve net-zero alignment.

The second targets cover Scope 3 emissions, or the result of activities from assets not owned or controlled by the reporting organization, but that the organization indirectly affects its value chain.[66]

Companies may commit to one of two options driven by the SBTi:

Option 1 – Setting science-based emissions reduction targets across all relevant scopes, in line with 1.5°C

Option 2 – Setting a long-term target to reach net-zero value chain emissions by no later than 2050, alongside science-based targets across all the relevant scopes.[67]

As now over 4000 companies have committed to or already set science-based targets[68], among the most renowned, we can cite:

Company	Target Type
IKEA	Overall Net-Zero Target, committing to reach net-zero greenhouse gas emissions across the value chain by 2050. Reducing Scope 1,2, and 3 emissions by 50% by 2030.
Microsoft	Sourcing 100% renewable electricity through 2030, reducing Scope 3 GHG emissions per unit of revenue by 30% by 2030.
Volkswagen	Reducing Scope 1 and 2 emissions by 50% before 2030, while reducing scope 3 GHG emissions from the use of sold products of light-duty vehicles by 30% per vehicle by 2030.
Unilever	Unilever commits to reducing Scope 1 and 2 GHG emissions by 100% by 2030. It also commits to reducing absolute Scope 3 GHG emissions from purchased goods and services, fuel and energy related activities, upstream transport and distribution, use of sold products, end-of-life treatment of sold products, and downstream leased assets by 42% by 203
Nestlé	Committing to reach net-zero GHG emissions across the value chain by 2050. It also commits to reducing absolute scope 1, 2, and 3 GHG emissions from purchased goods

[66] *Scope 3 Inventory Guidance | US EPA*. (2024, December 9). US EPA. https://www.epa.gov/climateleadership/scope-3-inventory-guidance#:~:text=Scope%203%20Resources-,Description%20of%20Scope%203%20Emissions,its%20upstream%20and%20downstream%20activities.

[67] Foodmark AB Target Validation Report, About the Science Based Targets initiative, Jan, 2022.

[68] *Target dashboard - Science Based Targets*. Science Based Targets Initiative. https://sciencebasedtargets.org/target-dashboard

	and services, fuel and energy related activities, waste generated in operations, upstream transportation and distribution, business travel, employee commuting, downstream transportation and distribution, and end-of-life treatment of sold products by 50% by 2030.

Today, many climate targets that are called “science-based” face severe scrutiny as misrepresenting the realities of limiting global heating to 1.5°C.

One central concern is the misunderstanding regarding the differences between net-zero carbon dioxide emissions and net-zero absolute emissions for all greenhouse gases. The IPCC is clear that it’s necessary to reach net-zero CO_2 in the early 2050s, but net-zero for all greenhouse gases (CO_2, methane, and the range of other gases) is unlikely until much later, if at all.

However, many initiatives and campaigns (see, for example, the UN Goals and Climate Pledge) often cite "net zero by 2050" as the net part of climate effort, which is both misleading and creates unrealistic expectations, especially for difficult-to-abate sectors like agriculture or for countries with different emissions signatures. Additionally, the platforms and methods used by the initiatives and companies, such as the Science-Based Targets initiative (SBTi), often operate with rigid, narrow methodologies that take complex global climate pathways and convert them into reduced targets at the company level.

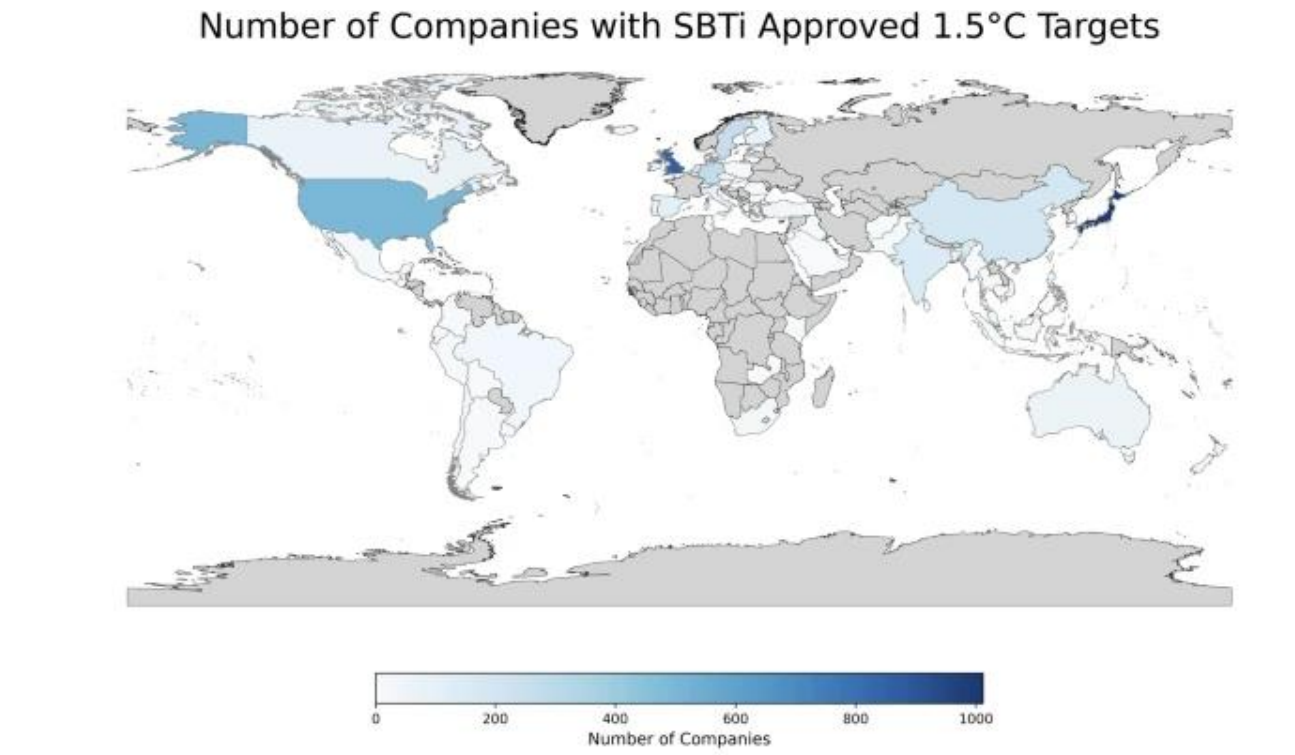
SBTi and similar initiatives often have fixed annual reductions, strict limits on the use of carbon offsets, and a strict definition of what is legitimate carbon dioxide removal. Frameworks such as SBTi hope to avoid greenwashing by companies while motivating climate leaders to take climate action safely. These restrictions, however, will also have the unintended consequences of taking away climate finance from regions where it is needed and preventing system-based practices that have direct relationships to carbon.

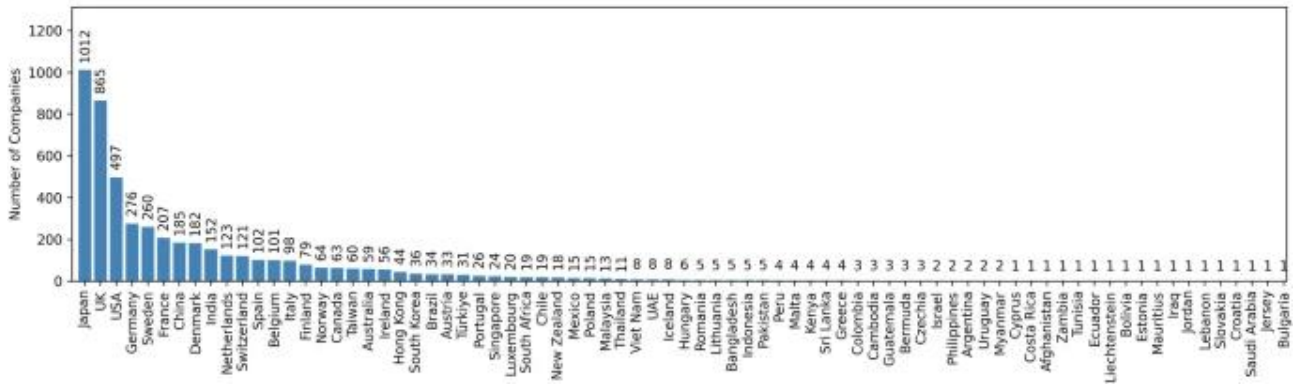
Lastly, many science-based targets rely on global or regional averages to allocate emissions reductions, a method that effectively grants historically high emitters the right to pollute more in the future. This approach, known as grandfathering, embeds value-laden distributional assumptions into what is presented as neutral science.

As a result, these targets disproportionately benefit companies and countries in wealthy economies, with the vast majority of SBTi-aligned companies located in North America, Europe, and the OECD Pacific, and with minimal participation from regions like Africa. This raises serious questions about fairness, equity, and the broader credibility of science-based climate governance.[69]

Figure 10: Number of Companies with SBTi Approved 1.5° C Targets;

[69] Reisinger, A., Cowie, A. L., Geden, O., & Khourdajie, A. A. (2024). Science-based targets miss the mark. *Communications Earth & Environment*, *5*(1). https://doi.org/10.1038/s43247-024-01535-z





Source: https://www.nature.com/articles/s43247-024-01535-z#Fig1

- International Sustainability Standards Board (ISSB):

The ISSB is a global standard-setting body created in 2021 by the IFRS Foundation to develop high-quality, globally consistent, and comparable sustainability disclosure standards for the capital markets.

The ISSB has international support with its work to develop sustainability disclosure standards backed by the G7, the G20, the International Organization of Securities Commissions (IOSCO), the

Financial Stability Board, African Finance Ministers, and Finance Ministers and Central Bank Governors from more than 40 jurisdictions.[70]

The ISSB has set out four key objectives:

1. To develop standards for a global baseline of sustainability disclosures;
2. To meet the information needs of investors;
3. To enable companies to provide comprehensive sustainability information to global capital markets;
4. To facilitate interoperability with disclosures that are jurisdiction-specific and/or aimed at broader stakeholder groups.[71]

As of mid-2023, the ISSB released its first two standards, now embedded by regulators and companies. The first IFRS S1, or General Requirements for Disclosure of Sustainability-related Financial Information, provides a broad framework for reporting sustainability-related risks and opportunities that could affect a company's future cash flow or enterprise value.

In particular, an entity is required to provide disclosures about:

a. the governance processes, controls, and procedures the entity uses to monitor, manage, and oversee sustainability-related risks and opportunities;
b. the entity's strategy for managing sustainability-related risks and opportunities;
c. the processes the entity uses to identify, assess, prioritize, and monitor sustainability-related risks and opportunities; and
d. the entity's performance in relation to sustainability-related risks and opportunities, including progress towards any targets the entity has set or is required to meet by law or regulation.[72]

The second, IFRS S2, or Climate-related Disclosures, focuses on climate risks, aligned with the TCFD framework. The main pieces of information required by these standards is:

a. the governance processes, controls, and procedures the entity uses to monitor, manage, and oversee climate-related risks and opportunities;
b. the entity's strategy for managing climate-related risks and opportunities;
c. the processes the entity uses to identify, assess, prioritize, and monitor climate-related risks and opportunities, including whether and how those processes are integrated into and inform the entity's overall risk management process;
d. the entity's performance in relation to its climate-related risks and opportunities, including progress towards any climate-related targets it has set, and any targets it is required to meet by law or regulation.

[70] *IFRS - International Sustainability Standards Board*. (2021). https://www.ifrs.org/groups/international-sustainability-standards-board/
[71] Ibid.
[72] *IFRS - IFRS S1 General requirements for Disclosure of sustainability-related Financial information*. (n.d.). https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/ifrs-s1-general-requirements/

Among the most important entities that have met those standards, we can find:

Company	Disclosure Approach
HSBC	Physical risk metrics introduced to consider climate impact.[73]
Unilever	All the financial statements are prepared following International Financial Reporting Standards (IFRS).[74]
United States	The US Securities and Exchange Commission finalized its climate-related disclosure rules on March 6, 2024. Large and accelerated filers -- companies with an initial public float of at least $700 million and a subsequent public float of at least $560 million — will be required to start submitting disclosures in their registration statements and annual reports from fiscal year 2025, and GHG emissions (if material) from fiscal year 2026. The rule was paused by a federal judge shortly after its finalization. The SEC issued a stay on April 4, 2024, on implementing the rules amid legal challenges, and hearings are expected in 2025.[75]
United Kingdom	The UK plans to publish UK-specific standards based on the ISSB standards by the first quarter of 2025. Listed companies with more than 500 employees and large non-listed companies with more than 500 employees and annual revenues of more than £500 million have been subject to mandatory disclosures based on the TCFD recommendations since 2022.[76]
European Union	The EU has adopted European Sustainability Reporting Standards (ESRS) to comply with the Corporate Sustainability Reporting Directive. The ISSB and European Commission have stated that the ESRS climate disclosure requirements have a high degree of alignment to the ISSB climate standards, where they overlap.[77]

[73] Environmental, Social and Governance review, 2023, HSBC Group.
[74] Unilever Annual Report and Account, 2023.
[75] *December 2024 – Where does the world stand on ISSB adoption?* (n.d.). S&P Global. https://www.spglobal.com/esg/insights/december-2024-where-does-the-world-stand-on-issb-adoption?utm_source=chatgpt.com
[76] Ibid.
[77] Ibid.

- The UN Sustainable Development Goals:

In 2015, the Open Working Group created by the UN General Assembly proposed a set of global Sustainable Development Goals (SDGs), which comprises 17 goals and 169 targets,[78] each of which presents different targets.

The birth of these indicators was due to the need to create an international framework and guidelines able to dictate the change towards a more sustainable future at the environmental and social level, focusing on the crucial role and responsibility companies possess.

A 'SDG Compass', created by the Global Reporting Initiative alongside the United Nations Global Compact and the World Business Council for Sustainable Development, offers a guide for business action on the SDGs, designed, in particular, to assist companies in maximizing their contribution to the SDGs.[79]

This guide includes 'five steps':

1) Identifying future business opportunities:
   The SDGs aim to redirect global public and private investment flows towards the challenges they represent.

2) Enhancing the value of corporate sustainability:
   The SDGs may strengthen economic incentives for companies to use resources more effectively or use more sustainable alternatives.

3) Strengthening stakeholder relations and keeping the pace with policy developments:
   SDGs reflect stakeholder expectations as well as future policy direction at the international, national, and regional levels. Companies that align their priorities with these targets can strengthen the engagement of customers, employees, and other stakeholders.

4) Stabilizing societies and markets:
   Businesses cannot succeed in societies that fail. Investing in the achievement of the SDGs supports pillars of business success, including the existence of rules-based markets, transparent financial systems, and non-corrupt and well-governed institutions.
5) Using a common language and shared purpose:
   The SDGs define a common framework of action and language that will help companies communicate more consistently and effectively with stakeholders about their impact and performance. The goals will help bring together synergistic partners to address the world's most urgent societal challenges. [80]

[78] Hák, T., Janoušková, S., & Moldan, B. (2015). Sustainable Development Goals: A need for relevant indicators. *Ecological Indicators*, *60*, 565–573.
[79] Jones, Peter ORCID logoORCID: https://orcid.org/0000-0002 9566-9393, Hillier, David and Comfort, Daphne (2016) The sustainable development goals and business. International Journal of Sales, Retailing and Marketing, 5 (2). pp. 38-48.
[80] SDG Compass, The guide for business action on the SDGs, 2015.

- The European Green Deal:

In December 2019, the European Green Deal (EGD)[81] was published, and it presented the new growth strategy of the European Union with the primary goal of achieving climate neutrality by 2050.[82]

Within the EU new policy framework, the European Union legislation was swiftly and profoundly evolving its domains to corporate sustainability governance. This sphere influences companies' oversight of environmental, social, and governance (ESG) issues.[83]

Among the Green Deal's central components is the European Climate Law, which mandates carbon neutrality by 2050, with a 55% reduction in emissions by 2030 (compared with 1990 levels).[84]

It also has policies focused on particular sustainability challenges. The Just Transition Mechanism, for example, is a key tool to ensure that the transition towards a climate-neutral economy happens fairly, leaving no one behind. It provides targeted support to help mobilize around €55 billion over the period 2021-2027 in the most affected regions, to alleviate the socio-economic impact of the transition.[85]

Another one is the Farm to Fork Strategy, aiming to make food systems fair, healthy, and environmentally friendly.[86]

Figure 11: Farm to Fork Strategy pillars.

[81] Communication from the commission to the European parliament, the European council, the council, the European economic and social committee and the committee of the regions The European Green Deal, Brussels, 11, Dec, 2019
[82] Dupont, C., Moore, B., Boasson, E. L., Gravey, V., Jordan, A., Kivimaa, P., Kulovesi, K., Kuzemko, C., Oberthür, S., Panchuk, D., Rosamond, J., Torney, D., Tosun, J., & von Homeyer, I. (2024). Three decades of EU climate policy: Racing toward climate neutrality? WIREs Climate Change, 15(1), e863 https://doi.org/10.1002/wcc.863
[83] Kettlewell, Niejahr And Galdino European Union: the new Corporate Sustainability Due Diligence Directive has been provisionally agreed upon- what does this mean for companies? , Global Compliance News, feb 2024
[84] *The European Green Deal*. (2021, July 14). European Commission. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
[85] *The just transition mechanism*. (n.d.). European Commission. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en
[86] *Farm to fork strategy*. (n.d.). Food Safety. https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en

Source: https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en

Generally, following an important study created by the consulting company PwC, three different types of Green Deal regulations could be highlighted as follows:

Policies with a direct financial impact	**Policies on transparency and reporting**	**Policies relating to value chains**
Carbon Border Adjustment Mechanism (CBAM)	Corporate Sustainability Reporting Directive	Corporate Sustainability Due Diligence Directive
EU Emissions Trading System	Green Claims Directive	EU Deforestation Regulation
Foreign Subsidies Regulation	Sustainable Finance Disclosure Regulation	Single-Use Plastics Directive
Energy Taxation Directive	Taxonomy Regulation	Ecodesign for Sustainable Products Regulation
European Hydrogen Bank	Energy Efficiency Directive	Packaging and Packaging Waste Regulation
Just Transition Fund	Ecolabel	Forced Labour Regulation
Innovation Fund	FuelEu Maritime Regulation	Critical Raw Materials Act
Net-Zero Industry Act	ReFuelEU Aviation Regulation	Conflict Minerals Regulation
REPowerEU	Water Framework Directive	Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation
InvestEU Fund	EU Pay Transparency Directive	Renewable Energy Directive

[87]

(All directives can be detailed on the official European Commission Website.)

We can observe how the numerous policies coming from the Green Deal, including national laws and regulations implemented by EU member states, introduce complexity for corporate decision-makers

[87] Claudia Buysing Damstè, Ron Kinghorn and Ivy Kuo, PwC (2024), How the EU's Green Deal is driving business reinvention

by imposing a wide range of compliance obligations, while simultaneously sending strong demand signals that can open up new business opportunities.

- The US Inflation Reduction Act (IRA):

Another important international directive I wanted to go into detail on was the US Inflation Reduction Act, which, in 2022, made the single largest investment in climate and energy in American history[88], enabling $3.6 B for innovative Clean Energy Loans.

Unfortunately, as of April 8, 2025, the Trump administration has implemented significant changes to the IRA.

President Trump signed an executive order titled ‘’Unleashing American Energy’’, which directed federal agencies to "immediately pause" the disbursement of funds appropriated through the IRA. This action affected numerous clean energy projects and initiatives that were previously funded under the act.[89]

3.2 The EU Corporate Sustainability Reporting Directive (CSRD).

On the 21st of April 2021[90], the EU Commission announced the adoption of the Corporate Sustainability Directive (CSRD) in line with the European Green Deal directives.

The CSRD amended the existing Non-Financial Reporting (NFRD) and substantially increased reporting requirements on companies within its scope in an effort to expand the sustainability information available to users.[91]

The main characteristics of the CSRD and its differences with the NFRD could be summarized in such a way:

	NFRD	**CSRD**
When Was It First Applied?	FY 2018	In February 2022, the Council of the European Union proposed a delay in the implementation timeline: - January 2024: Reporting entities already subject to the NFRD report in 2025 on 2024 data; - January 2025: Large reporting entities not

[88] U.S. Department of Energy, 2022, Inflation Reduction Act of 2022.
[89] The White House, Unleashing America Energy, January 20, 2025.
[90] European Commission website, 2021.
[91] Frikkee, M. (n.d.). *Corporate Sustainability Reporting Directive*. KPMG. https://kpmg.com/nl/en/home/topics/environmental-social-governance/corporate-sustainability-reporting-directive.html

		currently subject to the NFRD report in 2026 on 2025 data; - January 2026: Listed SMEs, small and non-complex credit institutions, and captive insurance entities report in 2027 on 2026 data
To Which Companies Will It Be Applicable?	Large public interest entities with > 500 employees (Listed companies, banks, and insurance companies)	All (listed or non-listed) large companies, with the following criteria: - > 250 employees and/or; - > €40M Turnover and/or; - > €20M Total Assets
How Many Companies Are Subject to The Directive?	EU: 11,600 NL: 115	49,000 Covering > 75% of total EU companies' turnover NL: More than 2000
What Is the Scope of The Reporting Requirements?	Companies are to report on: • Environmental protection • Social responsibility and treatment of employees • Respect for human rights • Anti-corruption and bribery • Diversity on company boards (in terms of age, gender, educational and professional background)	Overall Requirements: • Inclusion in the Annual Report • External (limited) assurance (as from FY2024) • Reporting principles • Format and timing General disclosures: • Business model, strategy, and policies • KPIs and targets (forward-looking information) • Company and sustainability governance • Double materiality assessment and due diligence • Risk and opportunity management Topic-specific disclosures: • Environmental (incl. EU Taxonomy)

		• Social • Governance • Sector-specific standards
Is Independent 3rd Party Assurance Mandatory?	Non-mandatory (for most countries) In some countries, part of the legal audit requirements (for example, in NL under NVCOS 720 requirements).	Mandatory – limited level of assurance including: • Integration in Auditor's Report • Involvement of key audit partner • Scope to include EU Taxonomy information and process to identify key relevant information.
Where Should Companies Report?	Included in the Annual Report (for NL companies)	Inclusion in the Management Report
In What Format should Companies Report?	Online or PDF version	To be submitted in electronic format

[92]

3.2.1 Opportunities and Challenges:

Both substantial challenges and opportunities arise from complying with the CSRD mandate to provide ESG reporting. As a relative starting point, sustainability demands continuous change in companies' internal systems, data processes, and reporting expectations. In short, this would lead to a fair share of perplexity but also has the potential for creating business resilience, transparency, and long-lasting business value. This section formulates the critical components impacting that transition.

Double Materiality, for example, is a more recent factor introduced, which determines a larger extent of scope, the execution of which requires more complexity for many companies that are not used to it. It requires companies to identify both their impacts on people and the environment, as well as the sustainability matters that financially impact the undertaking.

In addition to a bigger set of information, the CSRD requires companies to set targets, select a baseline, and report progress towards these KPIs. All information considered, indeed, should contain forward-looking and retrospective data extending the scope and regarding the whole value chain, furthermore, following the European Taxonomy.

Limited assurance on sustainability data is only required initially, with the possibility of migrating to reasonable assurance in the future. Disclosures have to be included within the Management Report itself, perhaps involving re-structuring to accommodate new and diverse types of data. Reporting will also need to follow the TCFD framework to facilitate the shift to a sustainable economy aligned with the 1.5°C global warming limit and the goal of climate neutrality by 2050. To

[92] Ibid.

meet these undertakings, corporations will need to incorporate technical sustainability reporting capabilities into their organizations.[93]

But following the guidelines introduced by the CSRD, does it actually manage to impart some kind of competitive advantage within a company? Some believe that, if one considers the future development of the market and new stringent international legislation.

A company reaps valuable strategic benefits by preemptively responding to the Corporate Sustainability Reporting Directive (CSRD) requirements. Establishing control of non-financial indicators yields applicable information regarding your company's operations, often leading to the identification of opportunities for cost savings (e.g., energy savings) and innovation in production processes. As the EU fortifies its climate objectives, no question that heightened ESG legislation will commence over the years, impacting publicly listed firms and SMEs alike.

By analyzing how any firm could be affected by these changes and devising a strategic plan for potential risk mitigation, any company could enhance its agility and resilience in addressing future challenges. Additionally, there is a market advantage to being an early adopter of ESG, as it offers a competitive edge over firms that are not yet required to meet reporting standards.

Moreover, as an early adopter of ESG, it will likely optimize production and supply chains from a sustainability perspective. This provides not only a means for developing strategic partnerships but also for identifying potential future bottlenecks early enough to guarantee sustainability continuity in your supply chain when it becomes mandated.

Regulations such as the Corporate Sustainability Report (CSRD) are targeting transparency and embed significant reporting costs on companies; their long-term objective transcends mere regulatory compliance. These systems are meant to encourage firms to adopt future-oriented practices that integrate biodiversity and ESG considerations at their very core of operation.

Most importantly, companies recognize that the payoff from such activities may be postponed in generating financial performance. Instead, reporting and sustainability provide long-term stability through the sustaining of critical natural capital, promoting stable supply chains, and access to future green finance flows, such as BNP Paribas and Saipem, as previously cited.

Therefore, regulatory systems are drivers of change, encouraging companies to prepare for systemic environmental threats and market shifts that define the competitive environment in the long run, even if economic returns within the short term are rare. The value lies in a correct anticipation and addressing of systemic risks, both for mitigating and adopting these risks.

3.2.2: The CSRD to date:

The year 2025 begins on a notably negative note compared to previous years regarding the sustainable reporting situation in Europe, primarily due to significant influences and setbacks from the global context, especially in the USA, where the Trump administration, as previously noted, tends to favor a more liberal market approach.[94]

[93] Ibid.

[94] Cohen, S., PhD. (2025, April 7). Trump's Securities and Exchange Commission abandons sustainability reporting. *Columbia University School of Professional Studies*. https://sps.columbia.edu/news/trumps-securities-and-exchange-commission-abandons-sustainability-reporting.

On February 26, 2025, the European Commission announced the release of its first' Omnibus' package, which includes a series of proposals aimed at reducing sustainability reporting requirements for companies, including plans to exclude 80% of businesses from the scope of its CSRD, and limiting information that large companies and banks can request from smaller companies.[95]

Since these changes are still part of a proposal, they are not yet official and may be subject to modifications during future negotiations.

The major changes could be summarized as follows, also considering the first application of the CSRD:

Aspect	Original Text	After the 2025 proposals
Scope of Reporting	Applies to large undertakings (>250 employees) and listed SMEs	Applies to large undertakings with >1000 employees, excluding listed SMEs
Value Chain Cap	SMEs are exempt but could face indirect data requests	Cap applies to all <1000 employee entities; limits info requests to voluntary standards
Sector-Specific Standards	Commission to adopt sector-specific ESRS by June 2026	Sector-specific standards removed
Assurance Requirements	Limited assurance required; reasonable assurance potentially required later	Only limited assurance required; no transition to reasonable
Voluntary Reporting Standards	No formal voluntary standard for non-listed SMEs	Voluntary standard introduced based on EFRAG's VSME*
Taxonomy Reporting	Mandatory taxonomy reporting with strict criteria	Optional taxonomy reporting for companies with turnover <450M; allows partial alignment
Reporting Timeline	Waves 2 and 3: Reporting starts in 2026 and 2027	Waves 2 and 3 postponed by two years to 2028 and 2029
Digital Tagging	Digital tagging is mandatory upon adoption of the taxonomy format	Digital tagging is not required until the taxonomy format is adopted via a delegated act

[96]

*EFRAG's VSME: The Voluntary Sustainability Reporting Standard for non-listed SMEs (VSME) is a voluntary reporting system conceived by the European Financial Reporting Advisory Group, It stems from the market need to have a simple reporting tool to be used by SMEs to face growing sustainability data requests from business counterparties efficiently and proportionately as well as to facilitate their participation in the transition to a sustainable economy.[97]

[95] Segal, M., & Segal, M. (2025, March 13). *EU to Exempt 80% of Companies from CSRD Sustainability Reporting Requirements*. ESG Today.
[96] DIRECTIVE OF THE EUROPEAN PARLIAMENT AND of THE COUNCIL amending Directives 2006/43/EC, 2013/34/EU, (EU) 2022/2464 and (EU) 2024/1760 as regards certain corporate sustainability reporting and due diligence requirements
[97] *Voluntary reporting standard for SMEs (VSME), Concluded*. EFRAG.

CHAPTER 4: The future of business in a biodiversity-driven economy.

4.1 New Professional Figures & Governance Models.

While numerous studies indicate that organizations advance through different stages as they strengthen their commitment to sustainability over time, new professional roles arise from recent developments.

Over the past few years, an increasing number of companies have engaged in various activities related to sustainability. Their approaches range widely from activities connected to regulatory compliance to transforming their corporate identity.

The literature indicates that CEO commitment is critical to the successful implementation of sustainability strategies.[98] Indeed, one recent trend has been the increasing appointment of Chief Sustainability Officers (CSOs) to drive the formulation and execution of an organization's sustainability strategy. The number of CSOs has grown substantially over the past few years, and while the growth has leveled off, companies are continuing to create and fill these positions.[99]

In terms of responsibilities, we find that almost all CSOs in the first two stages (Compliance and Efficiency) perform a generic set of activities such as formulating and executing a sustainability strategy, identifying material sustainability issues, learning from external sources, reporting sustainability data, managing stakeholder relations, and educating employees about sustainability.[100]

CSOs are not limited to public relations or risk mitigation roles. Instead, many now serve as strategic leaders, working closely with CEOs and investor relations to embed sustainability into core business strategy.[101]

Chief Sustainability Officers, within a company, are linked with an increase in sustainability disclosure, such as the Sustainability Disclosure Requirements (SDR)[102], which is a comprehensive regulatory framework that mandates companies and financial institutions to disclose their impacts, both positive and negative, on the environment and society[103].

Appointing a CSO is not a symbolic act, it measurably improves how deeply and transparently companies report their sustainability performance, especially when that role is empowered.[104]

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[98] Eccles, R. G., Ioannou, I., & Serafeim, G. (2012). *The Impact of a Corporate Culture of Sustainability on Corporate Behavior and Performance.* Harvard Business School Working Paper No. 12-035.
[99] Miller, K. W., & Serafeim, G. (2014). *Chief Sustainability Officers: Who Are They and What Do They Do?* Harvard Business School Working Paper No. 15-011.
[100] Ibid.
[101] Eccles, R. G., & Taylor, A. (2023). *The evolving role of Chief Sustainability Officers*. Harvard Business Review, July–August 2023.
[102] Kim, S., Kim, J., & Kang, S. (2023). *The role of chief sustainability officers in enhancing corporate environmental performance*. Sustainability, 15(20), 14819.
[103] *UK Sustainability Disclosure Requirements (SDR)*. Plan A. https://plana.earth/policy/sustainability-disclosure-requirements-sdr
[104] Michelon, G., Pilonato, S., & Ricceri, F. (2021). Do Chief Sustainability Officers matter for sustainability reporting quality? *Business Strategy and the Environment, 30*(3), 1233–1250.

Another important professional position that is finding increasing space within companies is the Biodiversity Controller.

While the specific title "Biodiversity Controller" is not yet a standardized role in corporate structures, organizations are increasingly integrating biodiversity-focused positions into their sustainability frameworks.[105]
Similarly, organizations like WWF Uganda employ Biodiversity Conservation Managers whose work involves species conservation planning, sustainable funding structures, and mainstreaming biodiversity targets into local development programs.[106]

Heart of England Forest is also an example of the implementation of local-level biodiversity management by a Biodiversity Officer responsible for over 7,000 acres of forest, conducting ecological surveys, and coordinating community stakeholders.[107]
As the World Economic Forum has pointed out, these new jobs are part of a broader trend in corporate governance. The forum is calling on directors and CEOs to incorporate biodiversity and ecosystem health into board-level risk management systems.

In this context, the role of a Biodiversity Controller can evolve to mirror that of a Chief Sustainability Officer, responsible for managing disclosure strategies, monitoring biodiversity performance indicators, and adhering to guidelines such as the Global Biodiversity Framework (GBF) and the Taskforce on Nature-related Financial Disclosures (TNFD).

The formalization of these functions represents a strategic shift: from an adaptive response to environmental standards toward the anticipatory integration of biodiversity as a driver of innovation, resilience, and sustainable long-term value creation. As biodiversity remains on the corporate agenda, the future of business will increasingly depend on financial capital and the preservation and regeneration of natural capital, with these new functions at the center of that change.

4.2 The evolution of industrial processes: integrating biodiversity into the global supply chain.

An ever-increasing demand for products and their consumption has put pressure on industrial output and their supply chains, and that demand has resulted in negative impacts on the environment and society. [108]

The concept of sustainability in supply chains is relatively recent. It is driven by the public sector through regulations or directives, as well as by the private sector via internal organizational policies that influence suppliers and distributors.

New special operations have been introduced into the supply chain organization of multinational companies to reduce their environmental impact, making their systems even more transparent.

[105] Savage, S., & Bernard, S. (2024, October 21). The new corporate green goal: being ‘nature positive.’ *Financial Times*.
[106] WWF Uganda. (2024). *Job Description: Biodiversity Conservation Manager*.
[107] Heart of England Forest. (2024). *Biodiversity Officer: Job Description*.
[108] Rajeev, A., Pati, R. K., Padhi, S. S., & Govindan, K. (2017). Evolution of sustainability in supply chain management: A literature review. *Journal of Cleaner Production*, 162, 299–314.

4.2.1 Companies Integrating Biodiversity into Supply Chains.

A growing number of companies have recently restructured their supply chains to better align with international regulations and the increasing consumer focus on sustainability. Among the most prominent examples are:

McDonald's:

McDonald's is working globally to embed regenerative agricultural practices in its supply chain, especially for beef, dairy, and produce.

Initiatives:

- USA: Using enhanced cattle feed to reduce methane emissions.
- Canada: Supporting farmers with soil-friendly machinery.
- UK: Partnering on rotational grazing research.

The main goal is to reduce agriculture-related GHG emissions by 16% by 2030, while defending biodiversity regarding soil health. This is an important shift from sourcing efficiency to ecosystem regeneration, aligned with biodiversity and climate resilience.[109]

Unilever:

Unilever has begun publishing supplier lists for commodities like palm oil, soy, and paper, trying to ensure deforestation-free sourcing and increase transparency in biodiversity-critical areas.

This open supply chain disclosure pressures suppliers to comply with sustainability standards and allows stakeholders to trace origins and practices.[110]

Nobody's Child:

Nobody's Child was among the first fashion brands to test Digital Product Passports (DPPs), which document full supply chain information per garment.

The purpose of which was to enhance the traceability of inputs and suppliers, linking products to biodiversity and sustainability credentials (e.g., organic cotton sources, water use).

This requires close cooperation with tier 1 and tier 2 suppliers and greater investment in digital tools and data sharing, but allows clearer visibility into environmental impacts and improved sustainability reporting.[111]

Kering (Luxury Fashion Group: Gucci, Bottega Veneta, etc.):

[109] Geller, M. (2025, April 14). No lettuce, no Big Mac: Why Beth Hart is steering McDonald's towards regenerative. *Reuters.* https://www.reuters.com/sustainability/land-use-biodiversity/no-lettuce-no-big-mac-why-beth-hart-is-steering-mcdonalds-towards-regenerative-2025-04-14/

[110] Ramboll. (2023). 15 businesses leading the way for biodiversity and Target 15 implementation. *Ramboll.* https://www.ramboll.com/galago/15-businesses-leading-the-way-for-biodiversity-and-target-15-implementation

[111] Vogue Business. (2024, March 7). *Digital product passports: Lessons from an early adopter.* https://www.voguebusiness.com/story/technology/digital-product-passports-lessons-from-an-early-adopter

The main objective is to launch a full Biodiversity Strategy in 2020, aligned with the Science-Based Targets for Nature (SBTN).

- Commitments:
    - Source 100% of leather from sustainable sources by 2025.
    - Fund ecosystem restoration projects where they source raw materials.
    - Created a regenerative fund to support cotton and wool suppliers in biodiversity-focused farming.

The tool used is Environmental Profit & Loss (EP&L) accounting to quantify biodiversity impacts across the supply chain.

4.2.2 International Regulations Promoting Biodiversity in Supply Chains.

A change within a supply chain must necessarily be supported from a legislative point of view. In this paragraph, some modern regulations aimed at promoting a new commercial organization of supply chains will be analyzed, given that, very often, change must be driven by an external and international force.

EU Deforestation Regulation (EUDR):
Aimed to take effect in December 2024, the EU Deforestation Regulation is a pillar of the European Green Deal's efforts to halt global biodiversity loss and mitigate climate change.

It suggests halting imports and sales in the EU of products associated with deforestation and forest degradation. Businesses involved in commodities such as soy, palm oil, beef, coffee, cocoa, and timber will be required to demonstrate, through due diligence reports and traceability systems, that their products are not linked to deforestation that occurred after December 31, 2020.

This is expected to change supply chains at a fundamental level by enforcing compliance through penalties and market exclusion risk. Although environmental organizations have generally received the EUDR as a positive move towards the protection of biodiversity, the exporting countries, especially those that are endowed with tropical forests, have been concerned about being subject to trade barriers and economic loss, claiming the regulation may unwittingly punish developing nations that aspire to economic growth through the use of natural resources [112]

Nagoya Protocol:
The Nagoya Protocol, which was adopted in 2010 and entered into force in 2014 under the Convention on Biological Diversity, seeks to enhance fair and equitable benefit-sharing of benefits obtained from the utilization of genetic resources. It binds states to implement legal, administrative, and policy tools to facilitate access to genetic material (e.g., seeds, microbes, or plant extracts) and ensure that benefits, in the form of money or other forms, are shared fairly with the communities or states that have provided such resources. The treaty reinforces indigenous and local communities'

[112] European Commission. (2023). *EU Deforestation Regulation*.

rights over their traditional knowledge and plays a crucial role in the safeguarding of genetic diversity. It has immediate implications in industries such as pharmaceuticals, agriculture, and cosmetics, encouraging ethical procurement and conservation of biodiversity.[113]

EU Nature Restoration Law:
Enacted in 2023, the EU Nature Restoration Law is the first-ever pan-continental legal instrument to mandate the restoration of damaged ecosystems.

The legislation sets legally binding targets to restore at least 20% of the EU's terrestrial and marine habitats by 2030 and all restoration-required ecosystems by 2050.

Industries such as agriculture, forestry, and fashion will probably be transformed as the legislation obliges member states to prepare national restoration plans, accompanied by measurable indicators and funding instruments.

This rule is considered crucial not only to avert loss of biodiversity but also to counter climate risks, improve air and water quality, and promote food security. However, industry stakeholders have questioned the feasibility and expense of carrying out such large-scale restoration work, once more highlighting the necessity to balance ecological requirements with economic constraints.[114]

CONCLUSIONS:

As businesses transition from a reactive stance toward environmental issues to incorporating biodiversity into the very essence of their strategy, a fresh vision of corporate responsibility is beginning to emerge. Nature is no longer viewed merely as a liability or resource but increasingly as a source of innovation, resilience, and long-term value creation. This thesis has demonstrated that business models aligned with biodiversity targets can unlock new pathways for economic and ecological regeneration.

But this shift is only just getting underway, and by no means complete.

While some of the first-wave adopter firms have made rapid strides, the broader business universe remains stagnant.

Short-term fiscal imperatives, isolated data, and a lack of in-house capability constrain most businesses. Regulatory uncertainty, incomplete global standards, and limited access to reliable biodiversity metrics continue to hinder progress.

Transitioning to truly biodiversity-positive systems requires not just capital and technology, but also profound cultural and organizational change.

[113] Secretariat of the Convention on Biological Diversity. (2020). *Nagoya Protocol on Access and Benefit-sharing*.
[114] avage, S., & Bernard, S. (2024, October 21). *The new corporate green goal: being 'nature positive'. Financial Times*.

Furthermore, the creation of new governance roles, such as Chief Nature Officers or Biodiversity Controllers, is a welcome development, but one that will require time, training, and cross-disciplinary alignment to mature.

These roles must be granted real authority, not just symbolic authority, if they are to influence decisions at the top. Otherwise, sustainability will simply become another checklist for compliance, rather than an agent of strategic transformation.

In the future, the challenge is not to demonstrate that biodiversity matters, but to scale the systems, incentives, and leadership models that make it a reality. The work is imperative, but also multifaceted, requiring patience, persistence, and a willingness to reimagine core assumptions about growth and value.

Companies that can accommodate this complexity, rather than trying to circumvent it, will be better prepared not just to weather the decades ahead, but to define them.

This is only the beginning; it is not the end of the line.

BIBLIOGRAPHY:

1. *About the Climate Disclosure Standards Board | Climate Disclosure Standards Board*. (n.d.). https://www.cdsb.net/our-story
2. *Ambitious corporate climate action*. (n.d.). Science-Based Targets Initiative. https://sciencebasedtargets.org/
3. Balasubramanian, M. (2018). Climate change, famine, and low-income communities challenge Sustainable Development Goals. *The Lancet Planetary Health*, *2*(10), e421–e422. https://doi.org/10.1016/s2542-5196(18)30212-2
4. Barney, J. B. (1986). Organizational culture: Can it be a source of sustained competitive advantage? *Academy of Management Review*, *11*(3), 656–665. https://doi.org/10.5465/amr.1986.4306261
5. Bhutta, U. S., Tariq, A., Farrukh, M., Raza, A., & Iqbal, M. K. (2021). Green bonds for sustainable development: Review of literature on development and impact of green bonds. *Technological Forecasting and Social Change*, *175*, 121378. https://doi.org/10.1016/j.techfore.2021.121378
6. BNP Paribas. (2024, November 7). *BNP Paribas in Italia - Chi siamo*. Italia. https://www.bnpparibas.it/it/chi-siamo/
7. Borsa Italiana. (n.d.). *Cosa sono i Green Bond - Borsa Italiana*. https://www.borsaitaliana.it/notizie/sotto-la-lente/green-bond-definizione.htm
8. *Carbon Border Adjustment Mechanism*. (n.d.). Taxation and Customs Union. https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en
9. Christie, M., Fazey, I., Cooper, R., Hyde, T., Deri, A., Hughes, L., Bush, G., Brander, L., Nahman, A., De Lange, W., & Reyers, B. (2008a). An evaluation of economic and non-economic techniques for assessing the importance of biodiversity to people in developing countries. *DeFra*. https://users.aber.ac.uk/mec/Publications/Reports/Defra%20valuation%20BD%20in%20DC%20final%20%20report.pdf
10. Christie, M., Fazey, I., Cooper, R., Hyde, T., Deri, A., Hughes, L., Bush, G., Brander, L., Nahman, A., De Lange, W., & Reyers, B. (2008b). An evaluation of economic and non-economic techniques for assessing the importance of biodiversity to people in developing countries. *Journal*. https://users.aber.ac.uk/mec/Publications/Reports/Defra%20valuation%20BD%20in%20DC%20final%20%20report.pdf
11. *Circular economy: definition, importance and benefits | Topics | European Parliament*. (n.d.). Topics | European Parliament. https://www.europarl.europa.eu/topics/en/article/20151201STO05603/circular-economy-definition-importance-and-benefits
12. *Climate change impacts on agriculture and food supply | US EPA*. (2025, February 6). US EPA. https://www.epa.gov/climateimpacts/climate-change-impacts-agriculture-and-food-supply
13. *Climate Risks and opportunities defined | US EPA*. (2025, March 3). US EPA. https://www.epa.gov/climateleadership/climate-risks-and-opportunities-defined
14. Cohen, S., PhD. (2025, April 7). Trump's Securities and Exchange Commission abandons sustainability reporting. *Columbia University School of Professional Studies*. https://sps.columbia.edu/news/trumps-securities-and-exchange-commission-abandons-sustainability-reporting
15. *December 2024 – Where does the world stand on ISSB adoption?* (n.d.). S&P Global. https://www.spglobal.com/esg/insights/december-2024-where-does-the-world-stand-on-issb-adoption?utm_source=chatgpt.com
16. Dyllick, T., & Hockerts, K. (2002). Beyond the business case for corporate sustainability. *Business Strategy and the Environment*, *11*(2), 130–141. https://doi.org/10.1002/bse.323

17. Eccles, R. G., Ioannou, I., & Serafeim, G. (2012). The impact of a corporate culture of sustainability on corporate behavior and performance. *Harvard Business School Working Paper*, No. 12-035.
18. Eccles, R. G., & Taylor, A. (2023). The evolving role of Chief Sustainability Officers. *Harvard Business Review, July–August 2023*.
19. *Economic losses from weather- and climate-related extremes in Europe*. (2024, October 14). European Environment Agency's Home Page. https://www.eea.europa.eu/en/analysis/indicators/economic-losses-from-climate-related
20. European Commission. (2021). *Regulation (EU) 2021/821 setting up a Union regime for the control of exports of dual-use items.* https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R0821
21. European Commission. (2022). *EU Bioeconomy Strategy: Progress Report.* https://research-and-innovation.ec.europa.eu/publications/eu-bioeconomy-strategy-progress-report-2022_en
22. European Commission. (2025). *Proposal for a Directive amending the CSRD and CSDDD (COM/2025/81 final).*
23. EU–US Trade and Technology Council. (2024). *Joint Statement of the 6th TTC Meeting*. https://digital-strategy.ec.europa.eu/en/library/joint-statement-sixth-meeting-eu-us-trade-and-technology-council
24. FAO. (2023). *The State of Food and Agriculture 2023: Climate-smart agrifood systems.* https://www.fao.org/publications/sofa/2023/en*Farm to fork strategy*. (n.d.). Food Safety. https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en
25. Field, C. B., Barros, V., Stocker, T. F., & Dahe, Q. (2012). Managing the risks of extreme events and disasters to advance climate change adaptation. In *Cambridge University Press eBooks*. https://doi.org/10.1017/cbo9781139177245
26. Finance for Bidiversity. (2023, November 22). *Briefing paper: Top 10 biodiversity-impact ranking of company industries - Finance for Biodiversity Foundation*. Finance for Biodiversity Foundation. https://www.financeforbiodiversity.org/publications/top-10-biodiversity-impact-ranking-of-company-industries/
27. Fowler, S. J., & Hope, C. (2006). Incorporating sustainable business practices into company strategy. *Business Strategy and the Environment*, *16*(1), 26–38. https://doi.org/10.1002/bse.462
28. Frikkee, M. (n.d.). *Corporate Sustainability Reporting Directive*. KPMG. https://kpmg.com/nl/en/home/topics/environmental-social-governance/corporate-sustainability-reporting-directive.html
29. *Gabe Brown – Center for Regenerative Agriculture and Resilient Systems*. (n.d.). Chico State. https://www.csuchico.edu/regenerativeagriculture/demos/gabe-brown.shtml#:~:text=In%20it%20he%20shares%20in,the%20importance%20of%20integrating%20animals.
30. Geller, M. (2025, April 14). No lettuce, no Big Mac: Why Beth Hart is steering McDonald's towards regenerative. *Reuters.* https://www.reuters.com/sustainability/land-use-biodiversity/no-lettuce-no-big-mac-why-beth-hart-is-steering-mcdonalds-towards-regenerative-2025-04-14/
31. *Green bonds in Europe*. (2024, November 4). European Environment Agency's Home Page. https://www.eea.europa.eu/en/analysis/indicators/green-bonds-8th-eap#:~:text=In%20recent%20years%2C%20green%20bond,2020%20to%205.9%25%20in%202023.
32. Hák, T., Janoušková, S., & Moldan, B. (2015). Sustainable Development Goals: A need for relevant indicators. *Ecological Indicators*, *60*, 565–573. https://doi.org/10.1016/j.ecolind.2015.08.003
33. Hanley, N., & Perrings, C. (2019). The economic value of biodiversity. *Annual Review of Resource Economics*, *11*(1), 355–375. https://doi.org/10.1146/annurev-resource-100518-093946
34. Heart of England Forest. (2024). Biodiversity Officer: Job description.
35. *How many species are we losing?* (n.d.). WWF. https://wwf.panda.org/discover/our_focus/biodiversity/biodiversity/#:~:text=These%20experts%20calculate%20that%20between,2%2C000%20extinctions%20occur%20every%20year.

36. *IFRS - IFRS S1 General requirements for Disclosure of sustainability-related Financial information*. (n.d.). https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/ifrs-s1-general-requirements/
37. *IFRS - International Sustainability Standards Board*. (n.d.). https://www.ifrs.org/groups/international-sustainability-standards-board/
38. *ISO - ISO 14000 family — Environmental management*. (2023, January 19). ISO. https://www.iso.org/standards/popular/iso-14000-family
39. IPCC. (2022). *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report.* https://www.ipcc.ch/report/ar6/wg3/
40. King, C. (2024, October 23). Top 10: ESG Frameworks. *Sustainability Magazine*. https://sustainabilitymag.com/top10/top-10-esg-frameworks
41. Kruesi, G., & Kruesi, G. (2025, March 6). 5 Principles of soil health. *Chelsea Green Publishing*. https://www.chelseagreen.com/2024/5-principles-of-soil-health/?srsltid=AfmBOorTzPZRpuyUyQM62-_cJKx7CRQbTYV-6rD0TiGh3WW7JVTC-59Z
42. Miller, K. W., & Serafeim, G. (2014). Chief sustainability officers: Who are they and what do they do? *Harvard Business School Working Paper*, No. 15-011.
43. *Offshore wind farms for a sustainable future | Saipem*.
44. Michelon, G., Pilonato, S., & Ricceri, F. (2021). Do Chief Sustainability Officers matter for sustainability reporting quality? *Business Strategy and the Environment, 30*(3), 1233–1250.
45. *Mobilizing private finance for nature*. (2020). https://doi.org/10.1596/35984
46. National Academies Press (US). (1999). *What is Biodiversity?* Perspectives on Biodiversity - NCBI Bookshelf. https://www.ncbi.nlm.nih.gov/books/NBK224405/
47. *Natural capital accounting*. (2025, March 7). Environment. https://environment.ec.europa.eu/topics/nature-and-biodiversity/natural-capital-accounting_en#:~:text=Natural%20capital%20accounting%20is%20a,systems%20in%20a%20standard%20way.
48. *Natural Capital and Ecosystem Services FAQ | System of Environmental Economic Accounting*. (n.d.). https://seea.un.org/content/natural-capital-and-ecosystem-services-faq
49. Pimentel, D., Wilson, C., McCullum, C., Huang, R., Dwen, P., Flack, J., Tran, Q., Saltman, T., & Cliff, B. (1997). Economic and environmental benefits of biodiversity. *BioScience*, *47*(11), 747–757. https://doi.org/10.2307/1313097
50. *Plenty of Fish?* (2022). United Nations Climate Change.
51. Presidency of the Council of Ministers – Italy. (2024). *Piano d'Azione per la Bioeconomia 2025–2027*
52. Pointet, A. (n.d.). *Fostering a just transition | BNP Paribas Group*. BNP Paribas. https://group.bnpparibas/en/our-commitments/transitions
53. PricewaterhouseCoopers. (n.d.). *How the EU's Green Deal is driving business reinvention*. PwC. https://www.pwc.com/gx/en/issues/esg/eu-green-deal-reinvention.html#:~:text=Leading%20companies%20recognize%20that%20the,value%20in%20Europe's%20changing%20economy.
54. *Quarterly financials and reports | Saipem*. (n.d.). https://www.saipem.com/en/investors/quarterly-results
55. Ramboll. (2023). 15 businesses leading the way for biodiversity and Target 15 implementation. *Ramboll.* https://www.ramboll.com/galago/15-businesses-leading-the-way-for-biodiversity-and-target-15-implementation
56. Rajeev, A., Pati, R. K., Padhi, S. S., & Govindan, K. (2017). Evolution of sustainability in supply chain management: A literature review. *Journal of Cleaner Production*, 162, 299–314.
57. Reisinger, A., Cowie, A. L., Geden, O., & Khourdajie, A. A. (2024). Science-based targets miss the mark. *Communications Earth & Environment*, *5*(1). https://doi.org/10.1038/s43247-024-01535-z

58. Reporthink. (2024, December 24). Exploring the cost of Sustainability Report Services: What you need to know. *Reporthink.AI*. https://reporthink.ai/exploring-the-cost-of-sustainability-report-services-what-you-need-to-know/
59. Ruiz, S. (2024, April 18). *Forest carbon storage, explained - Woodwell Climate*. Woodwell Climate. https://www.woodwellclimate.org/global-forest-carbon-storage-explained/
60. Sanchez-Planelles, J., Segarra-Oña, M., & Peiro-Signes, A. (2022). Identifying different sustainable practices to help companies to contribute to the sustainable development: Holistic sustainability, sustainable business and operations models. *Corporate Social Responsibility and Environmental Management*, *29*(4), 904–917. https://doi.org/10.1002/csr.2243
61. Savage, S., & Bernard, S. (2024, October 21). The new corporate green goal: being 'nature positive.' *Financial Times*. https://www.ft.com/content/4d12f8d1-c0df-4ab6-b374-741e9517448b?utm_source=chatgpt.com
62. *Scope 3 Inventory Guidance | US EPA*. (2024, December 9). US EPA. https://www.epa.gov/climateleadership/scope-3-inventory-guidance#:~:text=Scope%203%20Resources-,Description%20of%20Scope%203%20Emissions,its%20upstream%20and%20downstream%20activities.
63. Segal, M., & Segal, M. (2025, March 13). *EU to Exempt 80% of Companies from CSRD Sustainability Reporting Requirements*. ESG Today. https://www.esgtoday.com/eu-to-exempt-80-of-companies-from-csrd-sustainability-reporting-requirements/
64. Soils. (2022, June 1). *Soil, the earth's living, breathing fragile skin - British Society of Soil Science*. British Society of Soil Science. https://soils.org.uk/news/soil-the-earths-living-breathing-fragile-skin/
65. Székely, N., & Brocke, J. V. (2017). What can we learn from corporate sustainability reporting? Deriving propositions for research and practice from over 9,500 corporate sustainability reports published between 1999 and 2015 using topic modelling technique. *PLoS ONE*, *12*(4), e0174807. https://doi.org/10.1371/journal.pone.0174807
66. *Target dashboard - Science Based Targets*. (n.d.). Science Based Targets Initiative. https://sciencebasedtargets.org/target-dashboard
67. *Task Force on Climate-Related Financial Disclosures | TCFD)*. (2023, December 5). Task Force on Climate-Related Financial Disclosures. https://www.fsb-tcfd.org/
68. The ecology and economics of biodiversity loss: the research agenda. (1993a). *Biological Conservation*, *63*(2), 189. https://doi.org/10.1016/0006-3207(93)90513-z
69. The ecology and economics of biodiversity loss: the research agenda. (1993b). *Biological Conservation*, *63*(2), 189. https://doi.org/10.1016/0006-3207(93)90513-z
70. *The European Green Deal*. (2021, July 14). European Commission. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
71. *The just transition mechanism*. (n.d.). European Commission. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en
72. *The SDGs explained for business | UN Global Compact*. (n.d.). https://unglobalcompact.org/sdgs/about
73. *Transition Risk Report*. (2025, March 11). GRESB. https://www.gresb.com/nl-en/products/transition-risk-tool/#:~:text=Transition%20risks%20are%20business%2Drelated,reputational%20risks%2C%20and%20legal%20risks.
74. University of Cambridge. (2024). Work with us: Biodiversity Manager.
75. *UK Sustainability Disclosure Requirements (SDR)*. (n.d.). Plan A. https://plana.earth/policy/sustainability-disclosure-requirements-sdr
76. *Voluntary reporting standard for SMEs (VSME), Concluded*. (n.d.). EFRAG. https://www.efrag.org/en/projects/voluntary-reporting-standard-for-smes-vsme/concluded

77. Vogue Business. (2024, March 7). *Digital product passports: Lessons from an early adopter.* https://www.voguebusiness.com/story/technology/digital-product-passports-lessons-from-an-early-adopter
78. WBCSD. (2022). *Climate Smart Agriculture Framework.*
79. Wegrowski, B. (2024, September 11). *Deforestation in the Amazon Rainforest - Ballard Brief*. Ballard Brief. https://ballardbrief.byu.edu/issue-briefs/deforestation-in-the-amazon-rainforest#:~:text=scale%20subsistence%20farming.-,Consequences%20of%20deforestation%20in%20the%20Amazon%20include%20a%20significant%20loss,water%20cycle%20around%20the%20globe.
80. *What are the drivers of sustainability reporting? A systematic review*. (2016).
81. *What is biodiversity?* (n.d.). WWF.
82. White, C. (2020). Why Regenerative Agriculture? *American Journal of Economics and Sociology*, *79*(3), 799–812. https://doi.org/10.1111/ajes.12334
83. WWF Uganda. (2024). Job description: Biodiversity Conservation Manager.
84. World Economic Forum. (2024). The role of directors in a nature-positive world.