

# ESG DUE DILIGENCE AND CLIMATE TRANSITION: BRAZIL-MEXICO CROSS-SECTORAL COMPARATIVE ANALYSIS

## 1 INTRODUCTION

The integration of environmental, social, and governance (ESG) criteria into corporate management has become a central axis of contemporary global governance (Chen *et al.*, 2021; Zhao *et al.*, 2025). This movement has transcended voluntary practices of social responsibility to establish itself as a requirement for legitimacy and competitiveness in global markets. In this context, the reliability of ESG assessments plays a key role in reducing informational asymmetries and protecting organizational legitimacy (Aragón-Correa *et al.*, 2020; Nicolo' & Andrades-Peña, 2024).

The strengthening of the international regulatory framework, exemplified by the European Union's green taxonomy and due diligence requirements in supply chains, has impacted business practices on an international scale through the Brussels Effect (Alamillos & de Mariz, 2022; Barth *et al.*, 2012). This process has raised the demand for corporate accountability, influencing business practices in both developed and emerging countries.

Given these limitations of traditional ESG ratings, it is possible to observe the strengthening of a regulatory framework aimed at institutionalizing disclosure and due diligence practices. The European Union has played a hegemonic role by exporting regulatory standards through initiatives such as the Corporate Sustainability Due Diligence Directive (CSDDD), supply chain due diligence requirements, and carbon pricing mechanisms. This process has impacted not only countries in the bloc but also external contexts that depend on access to the European market (Eccles *et al.*, 2020).

Latin America, particularly Brazil and Mexico, is positioned as a strategic region for comparative analysis of ESG practices, given the role of these economies as suppliers of critical commodities for the global energy transition and their growing exposure to physical and transition climate risks.

## 2 THEORETICAL FOUNDATIONS

ESG due diligence is based on consolidated international frameworks, including the Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), Task Force on Climate-related Financial Disclosures (TCFD), and the UN Sustainable Development Goals (SDGs). These normative references provide methodological standardization for identifying risks, opportunities, and management mechanisms in line with national and international best practices (Leite *et al.*, 2025; Nicolo' & Andrades-Peña, 2024).

The GRI establishes standards for ESG reporting, focusing on materiality for *stakeholders*, while the SASB identifies financially material ESG topics by sector. The TCFD provides a framework for assessing and disclosing climate risks, classified into physical (acute and chronic) and transition (political, technological, market, and reputational) risks (Eccles & Krzus, 2019).

The literature suggests that the effectiveness of climate due diligence depends on an organization's ability to align strategic commitments with verifiable results, consistent with global carbon neutrality goals (Folsom *et al.*, 2025; Ioannou *et al.*, 2023). The absence of substantive actions can reduce this process to the exercise of documentary conformity, operating as a mechanism of symbolic legitimation rather than a tool for organizational transformation.

This phenomenon, known as greenwashing or ESG washing, occurs when public commitments fail to translate into effective emission reductions, investments in clean technologies, or improvements in the environmental management of production chains (Utz, 2019). Adequate due diligence, therefore, requires integration between governance, strategy, risk management, and performance metrics (Alamillos & de Mariz, 2022).

Brazil and Mexico represent the largest Latin American economies, with complementary characteristics that make them suitable for an ESG comparative analysis. Brazil stands out for its abundance of renewable natural resources, a relatively clean energy matrix, and a financial sector that is increasingly mature in sustainable finance. Mexico has a deep integration with the U.S. economy, growing regulatory pressures stemming from trade agreements (T-MEC – Treaty between Mexico, the United States, and Canada), and significant exposure to physical climate risks.

### **3 METHODOLOGY**

The study was based on a comparative documentary analysis of ESG due diligence reports from eight leading companies, distributed in four strategic sectors: financial (Itaú Unibanco/Grupo Financiero Banorte), telecommunications (Vivo/América Móvil), pulp and paper (Suzano/Kimberly-Clark), and mining (Vale/Grupo México). All companies are listed on the stock exchange (B3 – Brazil and BMV – Mexico) and have a valuation above US\$10 billion. Sectors such as Retail and Consumer were excluded, as companies like Assaí (Brazil) and FEMSA or Walmex (Mexico) have very different valuations. Additionally, in Mexico, retail is based on FMCG (Fast-Moving Consumer Goods), which far exceeds the listed market value. Sectors such as animal protein and cosmetics were also excluded due to valuation criteria and the lack of comparability between companies in the same sector. The Kimberly-Clark versus Suzano comparison was maintained, as both companies use pulp and paper as their primary input. The methodological standardization followed the Norwegian Due Diligence Act model, facilitating the comparative identification of risks, opportunities, and management mechanisms.

The data collection took place during a Compliance and ESG course at a confessional university in the first semester of 2025. The choice of companies was made through intentional selection by the participants, prioritizing organizations with publicly available ESG reports and recognition as sector leaders.

Cross-sectoral comparative analysis was used, examining: (i) climate commitments and Net Zero targets; (ii) risk assessment methodologies; (iii) performance indicators (ESG KPIs); (iv) strategies for the transition to a low-carbon economy; (v) supply chain management; (vi) ESG governance and organizational structures.

The analysis followed a standardized structure, including an introduction and geographical-temporal scope, normative references adopted, business information and value chain, ESG commitments and policies, risk assessment methodology, supply chain mapping, materially relevant risks, mitigating measures, monitoring indicators (KPIs), and conclusions with strategic next steps.

## **4 ANALYSIS AND DISCUSSION OF THE RESULTS**

### **4.1 DECARBONIZATION COMMITMENTS**

Brazilian companies demonstrated more ambitious goals in time. Vivo has set a Net Zero goal for 2035, while other organizations have committed to achieving it by 2050. This anticipation reflects both competitive pressures and the country's availability of a renewable energy matrix.

In the financial sector, Itaú Unibanco mobilized R\$469 billion in sustainable finance, projecting R\$1 trillion by 2030. This quantification represents approximately 15% of the current Brazilian GDP, indicating a significant dimension of the commitment. In contrast, Grupo Financiero Banorte has a growing green portfolio, although its specific quantification is not provided, reflecting differences in maturity and transparency.

In the telecommunications sector, the disparity is striking. Vivo has achieved 100% renewable energy, while América Móvil reports 65% and has goals for 100% by 2030. This difference reflects not only different corporate strategies but also the differentiated availability of renewable energy in the respective domestic markets.

Suzano and Kimberly-Clark, in the pulp and paper sector, presented similar commitments (Net Zero 2050), but with different approaches. Suzano emphasizes bioeconomy and forest conservation, while Kimberly-Clark prioritizes packaging circularity and fiber traceability.

## 4.2 CLIMATE RISK MANAGEMENT

The analysis revealed different methodological approaches between countries. Grupo Financiero Banorte has demonstrated exemplary alignment with the TCFD, using climate scenario modeling (Net Zero 2050, NGFS, IEA) and climate stress analysis. The Mexican bank maps specific physical (hurricanes, droughts, floods) and transition (policies, market, technology) risks, reflecting Mexico's particular geographic exposure to extreme weather events.

Itaú Unibanco, although presenting a higher volume in sustainable finance, utilizes a SAC (Social, Environmental, and Climate) risk matrix and has already incorporated the TNFD (Taskforce on Nature-related Financial Disclosures), indicating an emerging focus on nature-related risks. This anticipation positions the Brazilian bank ahead of global regulatory trends.

In the mining sector, Vale and Grupo México face specific operational risks. Vale has implemented a post-dam recharacterization program in Brumadinho, while Grupo México focuses on water management in mining operations. Both organizations recognize the social license risks associated with operating in local communities.

## 4.3 SECTORAL PERFORMANCE

In the pulp and paper sector, both Suzano and Kimberly-Clark showed similar performance in decarbonization (42% and 40% reduction in emissions since 2015, respectively). Suzano stands out in forest conservation (1 million hectares destined for conservation), while Kimberly-Clark leads in fiber certification (85% FSC/PEFC) and packaging circularity (78% designed for recyclability).

The strategic differentiation reflects different business models: Suzano, as an integrated pulp producer, focuses on the bioeconomy, and Kimberly-Clark, a manufacturer of personal care products, prioritizes the sustainability of its supply chain.

The mining sector showed the most significant disparity. Vale achieved 97% renewable energy in Brazil and a social investment of R\$1.6 billion, demonstrating a significant transformation following the Mariana and Brumadinho disasters. Grupo México,

although committed to achieving Net Zero by 2050, has limited quantitative disclosure, indicating different stages of ESG maturity.

This difference may reflect both specific regulatory and social pressures faced by Vale, as well as the competitive availability of renewable energy in Brazil compared to Mexico.

#### 4.4 CIRCULAR ECONOMY AND WASTE MANAGEMENT

América Móvil demonstrated leadership in recycling scale (3 million electronic devices in 2023), numerically surpassing Vivo (12 tons of electronic waste). This difference reflects the use of different measurement metrics (units vs. weight) and América Móvil's broader geographic scope of operations.

In the pulp and paper sector, Suzano achieved a 95% recycling and reuse rate of industrial waste. In comparison, Kimberly-Clark focuses on designing recyclable packaging (currently at 78%, with a goal of 100% by 2030). These complementary approaches demonstrate different points of intervention in the sectoral circular economy.

Suzano invests in biomaterials innovation, exploring alternative applications for pulp production byproducts. These initiatives indicate the evolution of circular models beyond *compliance* to value creation.

#### 4.5 REGIONAL PATTERNS IDENTIFIED

Brazil has more ambitious time targets and greater penetration of renewable energy but requires methodological standardization across sectors. The availability of hydropower and the growth of solar/wind power provide a natural competitive advantage for decarbonization.

Brazilian companies demonstrate greater integration of social aspects (diversity, social investment) with environmental strategies, possibly reflecting historical pressures for corporate social responsibility in the country.

Mexico demonstrates more structured climate governance and robust methodologies but needs to accelerate the practical implementation of the energy transition. Integration with North American markets imposes increasing pressures for ESG compliance via supply chains.

Mexican companies have more detailed disclosure of risk methodologies, possibly reflecting the influence of U.S. regulatory standards and pressures from international institutional investors.

#### 4.6 COMMON CHALLENGES IDENTIFIED

Cross-cutting challenges in indirect supply chain management were identified. While companies demonstrate control over tier 1 suppliers, the traceability and ESG management of indirect suppliers (tier 2 and 3) remain limited.

Scaling up Scope 3 metrics represents a universal challenge. Financial companies face particular complexity in measuring financed emissions (financed emissions), while industrial companies struggle with quantifying emissions from the use of products sold. Mining companies (Vale, Grupo México) and pulp and paper (Suzano, Kimberly-Clark) face specific challenges in biodiversity and water management. The development of standardized metrics for biodiversity impacts is still in its early stages, with frameworks such as the TNFD being piloted.

#### 4.7 ESG GOVERNANCE AND ORGANIZATIONAL STRUCTURES

All the companies analyzed created organizational structures dedicated to ESG management, including sustainability committees at the board level, vice presidencies or specific directorates, and integration of ESG metrics into executive compensation systems.

Itaú Unibanco exemplifies organizational maturity with a Social, Environmental, and Climate Responsibility Policy (SECRP) integrated into its business strategy. At the same time, Banorte demonstrates a robust structure of committees specializing in climate risk management.

The companies developed structured channels of engagement with stakeholders, including specialized ombudspersons, regular public consultations, and participation in sectoral initiatives. América Móvil maintains a global whistleblowing program, while Vale has implemented specific protocols for dialogue with affected communities.

## **5 FINAL CONSIDERATIONS**

The study reveals varying levels of maturity in climate transition, with Brazilian companies presenting more ambitious goals and Mexican companies demonstrating greater methodological robustness. This differentiation reflects both characteristics of the respective regulatory and market contexts and specific pressures faced by each sector. Convergence towards Net Zero goals by 2050, increasing technological integration, and expansion of circular economy models indicate consolidated trends. However, the effectiveness of ESG due diligence will depend on the organizational ability to convert strategic commitments into verifiable and measurable results.

### **5.1 THEORETICAL AND PRACTICAL IMPLICATIONS**

The results confirm the importance of ESG due diligence as a strategic management tool, extending beyond mere regulatory compliance. The variation observed between sectors and countries suggests the need for contextualized approaches, considering regulatory specificities, resource availability, and stakeholder pressures.

The methodological superiority observed in some Mexican companies can be attributed to the pressure to integrate with North American markets. In contrast, the more ambitious goals of Brazilian companies reflect comparative advantages in renewable energy and natural resources.

### **5.2 STRATEGIC RECOMMENDATIONS**

The climate transition in the Brazil-Mexico context would benefit from greater bilateral integration, sharing of best practices, and joint development of innovative solutions to regional climate challenges. Thus, regulatory harmonization between countries is recommended, as is the creation of integrated carbon markets, the establishment of bilateral funds for transition projects, the development of compatible green taxonomies, and the intensification of technological cooperation in renewable energy and the circular economy.

### **5.3 LIMITATIONS AND FUTURE RESEARCH**

The study has limitations related to its dependence on voluntary disclosure by companies, possible selection bias in the choice of organizations analyzed, and an analysis restricted to a specific temporal snapshot. Future research could explore the longitudinal evolution

of ESG practices, the impact of specific regulatory changes, and the comparative effectiveness of different due diligence approaches.

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