

THE INFLUENCE OF FINTECHS ON ESG PERFORMANCE: A CASE STUDY OF NUBANK

DANIELA BALDIVIEZO ROSAS
UNIVERSIDADE ESTADUAL DE CAMPINAS (UNICAMP)

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1. INTRODUCTION

In recent years, growing global awareness of sustainability has pushed the financial sector to adopt Environmental, Social, and Governance (ESG) criteria as part of its strategic agenda. Simultaneously, financial technologies (FinTechs) have emerged as key drivers of innovation, reshaping the foundations of market practices. These technologies are not only disrupting traditional financial models, but also enabling the integration of ESG principles into corporate strategies, thereby contributing to the promotion of responsible and ethical investment (IMF, 2019).

In Latin America, this dual transformation holds particular relevance, given that many firms still struggle with structural and technological limitations that hinder the consistent implementation of ESG frameworks. Within this landscape, FinTechs have positioned themselves as catalysts for sustainable finance, providing digital tools that expand access to financial services and facilitate the funding of environmentally and socially responsible initiatives (Trotta, Rania, & Strano, 2024).

International organizations, including the United Nations, have underscored the role of FinTechs in advancing the Sustainable Development Goals (SDGs) and the 2030 Agenda, promoting both green development and social inclusion (UN, 2019). The concept of sustainable development, as outlined by the SDGs, encompasses a wide range of objectives, including the eradication of poverty and climate action, requiring an integrated approach that considers the economic, social, and environmental impacts of business activities (Atayah et al., 2023). In this context, FinTechs provide advanced technological solutions that improve the efficiency, transparency, and personalization of financial services, which are essential for the integration of ESG principles into corporate strategies. Digital platforms, blockchain applications, and artificial intelligence-based analyses are examples of how FinTechs are facilitating the incorporation of ESG principles into corporate decision-making (El Khoury et al., 2023; Atayah et al., 2023).

The growing academic and corporate interest in the influence of FinTechs on companies' ESG performance underscores the relevance of these technologies in enhancing ESG data collection and analysis, fostering transparency, and ensuring accountability. These tools allow companies to monitor and report their ESG performance in real-time, which contributes directly to improved risk oversight and greater investor confidence (Almaqtari et al., 2024; Zhou et al., 2022). Furthermore, FinTechs hold significant potential for improving corporate governance, as emerging technologies contribute to greater operational efficiency, reduce the risk of corruption, and strengthen stakeholder trust (Macchiavello & Siri, 2022).

From a social standpoint, FinTechs have been instrumental in promoting financial inclusion. By reaching populations historically excluded from formal financial systems, these institutions contribute to reducing inequality and enabling more equitable economic growth (Rastogi et al., 2023). Mobile payment systems, digital credit platforms, and alternative scoring mechanisms are allowing millions of users to participate in financial markets for the first time.

Several studies have documented these contributions. Wang et al. (2022) and Du et al. (2022) demonstrate how FinTechs in emerging markets have improved ESG performance by enhancing data accessibility and reducing financial barriers. Similarly, Ma and Liu (2017) note that digital financial services have reduced credit access barriers, thereby facilitating investments in sustainable initiatives. Zhou et al. (2022) further suggest that FinTechs help mitigate information asymmetries, which remain a significant obstacle for companies and investors seeking to implement ESG practices effectively.

In light of the growing relevance of ESG principles and the expanding role of FinTechs in emerging economies, this study focuses on understanding how these technologies relate to sustainable business practices. Taking Nubank as a case study due to its strong presence in Latin America and its digital-first approach, the research investigates how financial innovations may influence environmental performance, social inclusion, and governance practices in the FinTech sector. By analyzing Nubank's

practices and indicators from 2021 to 2023, the research seeks to provide insights into the mechanisms through which digital financial institutions in emerging economies can incorporate ESG principles into their operational frameworks in a structured and verifiable manner.

RESEARCH PROBLEM

In recent years, the convergence between financial technologies and ESG practices has introduced significant changes in the financial sector. FinTechs are reshaping how companies obtain financing, operate internally, and manage their environmental and social responsibilities (Arner et al., 2020; Rambaud & Pascual, 2023). This transformation is especially relevant in the context of emerging markets, where ESG implementation faces additional structural and institutional challenges.

Despite increasing recognition of FinTechs' role in advancing sustainable finance, there remains limited clarity about how these technologies concretely influence ESG performance. While many FinTechs claim to support sustainability goals, the mechanisms through which they contribute to tangible ESG outcomes are still insufficiently documented. Understanding this dynamic is essential for evaluating the credibility and effectiveness of digital financial institutions in fostering long-term sustainability (Maslennikov et al., 2017).

FinTechs have introduced a wide range of tools, from innovative software to disruptive business models, that surpass traditional financial services. Technological tools such as big data, artificial intelligence, and blockchain offer opportunities for enhancing decision-making, transparency, and personalization in the financial sector. These innovations have become central to integrating ESG metrics into strategic planning and operational processes (Trotta, Rania & Strano, 2024). In Brazil specifically, this technological shift has coincided with efforts to promote sustainability and extend financial access to historically marginalized groups (El Khoury et al., 2023; Atayah et al., 2023).

Evidence suggests that the FinTech ecosystem has played a relevant role in advancing ESG principles by facilitating real-time monitoring, reducing information asymmetries, and promoting more transparent stakeholder engagement. These digital solutions not only strengthen compliance but also foster a culture of accountability in financial operations (El Khoury et al., 2023; Atayah et al., 2023; Dicuonzo et al., 2024). In this context, Nubank is examined as a representative FinTech actively engaged in fostering sustainable and inclusive financial practices. As one of Latin America's leading digital institutions, Nubank's technological strategies and commitment to ESG reporting make it a suitable case through which to investigate how FinTechs may support the adoption of structured and measurable ESG actions.

The primary aim of this study is to assess how FinTechs analysis of Nubank's case can contribute to the improvement of ESG performance in emerging markets. The analysis emphasizes the ways in which digital financial solutions are employed to support ESG data management, reinforce regulatory compliance, and expand access to inclusive financial services . (Rastogi et al., 2023; Anshari et al., 2021). This research also offers insights into how other FinTechs might integrate ESG considerations into their core operations and governance practices in a systematic and verifiable manner.

1. RESEARCH OBJECTIVE

This study seeks to understand how financial technologies are connected to ESG performance in the context of emerging economies. Using Nubank as a case study, the research analyzes how digital financial practices may influence environmental responsibility, social inclusion, and corporate governance, considering the growing integration of sustainability principles into financial sector strategies.

3.1 Specific Objectives

The study aims to:

1. Analyze the implementation of ESG practices at Nubank, focusing on environmental, social, and governance indicators.

2. Compare ESG reports from 2021 to 2023 to identify trends and developments in the company's actions regarding its sustainability goals.
3. Assess the influence of financial technologies on ESG performance, particularly in promoting financial inclusion and reducing social exclusion.
4. Examine the relationship between Nubank's ESG initiatives and the United Nations Sustainable Development Goals (SDGs), considering the implications for corporate sustainability and governance frameworks.

2. THEORETICAL FRAMEWORK

In recent years, the global financial sector has undergone a profound and rapid transformation, marked by an increasing focus on responsible and sustainable practices. This movement is being driven by growing demand for environmental, social, and governance (ESG) criteria, which companies are now incorporating more strategically into their operations. Within this context, financial technologies (FinTechs) have emerged as an innovative force, disrupting traditional financial practices and introducing a new dynamic to the sector (Arner et al., 2020; Rambaud & Pascual, 2023). These technologies not only reshape the delivery of financial services but also enable a more effective integration of ESG principles into corporate strategies.

FinTechs leverage technological innovations such as big data, artificial intelligence, blockchain, and mobile applications to offer more efficient and inclusive financial solutions. These innovations are accessible to a broader segment of the population, including individuals historically excluded from the traditional banking system. In Latin American countries, this movement is particularly significant, as FinTechs have managed to overcome infrastructure barriers and limitations in access to financial services, bringing innovative solutions to underserved populations (Trotta et al., 2024).

4.1 FinTech

The term FinTech refers to the integration of digital technologies into the financial sector, aimed at transforming traditional financial services—such as lending, payments, and investments—through technological innovation to improve, automate, and democratize financial services. This concept encompasses a wide range of services and products that utilize technologies such as the internet, mobile applications, big data, artificial intelligence, and blockchain to provide more efficient, accessible, and inclusive financial solutions (Gomber et al., 2017; Lee & Shin, 2018).

According to the Financial Stability Board (FSB), FinTech represents a new business model that combines financial services and information technology, highlighting the rapid increase in global investment in this sector as a sign of its acceptance and trust. Navaretti et al. (2018) define FinTech as the integration of technology in the delivery of financial services, enabling new business models, applications, processes, or products that significantly influence markets and financial institutions—representing a paradigm shift by redefining the structures and relationships of the financial sector, promoting personalization, efficiency, and accessibility.

The 2008 financial crisis spurred the search for more transparent and accessible alternatives, accelerating the development of financial technologies (Mhlanga, 2020). The evolution of FinTech has transformed the financial sector in various ways by introducing new technologies, business models, and practices beyond traditional financial services, offering innovative and alternative services (Trotta et al., 2024). These companies provide more personalized, efficient, and accessible services to a broad range of individuals, including those who have traditionally been excluded from the financial system (Thakor, 2020). FinTech not only enhances the operational efficiency of the financial sector but also contributes significantly to sustainable development.

The main technological components of FinTechs include:

- **Digital payments and mobile banking:** Services that allow payments and money transfers to be made electronically through mobile applications, eliminating the need to visit bank branches (Lee & Shin, 2018).

- **Cryptocurrencies and blockchain:** Provide a secure and decentralized financial transaction system without traditional intermediaries, increasing transparency and efficiency (Gomber et al., 2017).
- **Artificial intelligence and machine learning:** Used to improve credit analysis, detect fraud, and provide personalized financial advice, enhancing operational efficiency (Xu, 2022).
- **Big data:** Allows companies and consumers to analyze large volumes of data, assisting in making more accurate and tailored financial decisions (Hargrave, 2022).

4.2 FinTech and Sustainability

FinTechs not only facilitate access to innovative financial products but also promote investments in sustainable and responsible initiatives. Mhlanga (2020) argues that the digital transformation driven by FinTechs not only facilitates access to sustainable investments but also enhances innovation in the financial sector, connecting investors to sustainable projects through more accessible and transparent solutions. This transformation is reflected in two interconnected phenomena: technological innovation and sustainable finance (Kumar et al., 2022).

In Latin America, FinTechs play a particularly important role in reducing carbon emissions and promoting the use of renewable energy, simplifying access to sustainable investment opportunities and promoting financial inclusion (Bayram et al., 2022; Deng et al., 2019). Therefore, FinTechs become not only facilitators of sustainable financing, connecting responsible investors through digital platforms and advanced analytics (Atayah et al., 2023), but also a vehicle to promote sustainable development, both from an environmental and social perspective.

4.3 FinTechs and Sustainability: The Integration of ESG Practices

The integration of FinTechs with ESG practices is undoubtedly one of the most significant evolutions in the financial sector. In recent years, the increasing emphasis on responsible business practices has led companies across various sectors to adopt ESG criteria (environmental, social, and governance). FinTechs have a strategic role in implementing these practices, especially in terms of sustainability and social responsibility. El Khoury et al. (2023) highlight that FinTechs are powerful tools for improving the collection and analysis of ESG data, allowing companies to monitor their performance in real-time, ensuring greater transparency and accountability. Technological innovation, especially in FinTechs, provides critical tools to optimize the collection and interpretation of ESG data and enhance the diligence in its integration (Natanelov et al., 2022).

The integration of FinTech with ESG practices manifests in several forms, including:

- **Transparency and Data Management:** FinTech tools allow companies to gather, analyze, and report ESG data effectively, promoting transparency and accountability. This facilitates informed decision-making, allowing companies to proactively identify and address environmental and social impacts (Anshari et al., 2021; Rastogi et al., 2023).
- **Sustainable Investments:** FinTech platforms are revolutionizing sustainable investment practices by simplifying access to ESG-aligned opportunities. They facilitate sustainable financing, connecting investors to responsible projects through digital platforms and advanced analytics (Atayah et al., 2023). They connect investors with responsible projects, directing capital to sustainable ventures (Chueca Vergara & Ferruz Agudo, 2021).
- **Financial Inclusion:** Financial technologies provide accessible banking services to underserved populations, promoting equity and social justice. Digital solutions such as mobile wallets and payment platforms have proven effective in including segments of the population previously excluded from traditional banking services, contributing to the sustainable economic growth of their communities (Macchiavello & Siri, 2022).
- **Corporate Governance:** The adoption of FinTech technologies can improve transparency and accountability within organizations. Advanced technologies such as blockchain ensure secure and verifiable transactions, reducing fraud risks and increasing consumer trust (Tapscott & Tapscott,

2016; Kumar et al., 2022). Additionally, FinTech solutions simplify reporting and auditing processes, ensuring that companies comply with ESG regulations more effectively and efficiently (Deng et al., 2019; Rastogi et al., 2023).

- **Green Finance:** FinTechs play an important role in promoting green finance, facilitating the financing of sustainable projects and improving environmental risk management. Green FinTech solutions are designed to facilitate environmental reporting and the management of ESG data, using technologies like machine learning and artificial intelligence to reduce costs and efforts associated with ESG disclosures (Lee et al., 2022).

Thus, digital technology has the potential to transform the financial sector not only in terms of operational efficiency but also in how companies report and manage ESG risks. The transparency provided by technologies such as blockchain, for example, ensures that transactions are secure and verifiable, while big data tools enable continuous and effective monitoring of ESG goals (Tapscott & Tapscott, 2016; Kumar et al., 2022).

4.4. Global Insights on FinTech and ESG Integration

Understanding the conceptual relationship between FinTech and ESG is important, but it is also necessary to look at how this plays out in practice. A recent study by Dicuonzo, Palmaccio, and Shini (2024), based on data from 180 banks worldwide, shows a positive relationship between FinTech development and better ESG performance in financial institutions.

This improvement is not driven by technology alone. Governance factors like more independent boards and greater gender diversity also play a significant role in strengthening ESG outcomes. Technologies such as blockchain are no longer used only in finance. They are helping improve supply chain transparency and ensure data integrity. Artificial intelligence and machine learning are also becoming essential for processing ESG data, allowing for better risk assessments and helping identify investment opportunities that align with sustainability goals.

Digital payment systems are closing financial access gaps, especially in underserved and remote communities. This contributes not only to financial inclusion but also to social equity and local economic development (Shahzad et al., 2023; Semenova & Hassel, 2015; Rastogi et al., 2023). At the same time, blockchain-based solutions are being used to monitor energy consumption and track carbon emissions in real time, which is becoming increasingly important in climate strategies (Tao et al., 2022).

All of this shows how FinTech is supporting ESG integration across both developed and emerging markets. But progress does not depend on technology alone. Achieving real influence requires strong collaboration between FinTech companies, traditional financial institutions, regulators, and international stakeholders (Costa-Climent & Martínez-Climent, 2018). Without this kind of alignment, the sector's potential to drive sustainability may remain underused.

4.5 Challenges in the Implementation of FinTechs and ESG: The Need for Standardization

Despite the promises, the implementation of FinTechs in the ESG context still faces substantial challenges. The lack of standardized ESG data and the variable quality of information are two of the biggest obstacles to adopting reliable ESG practices. As Chueca Vergara & Ferruz Agudo (2021) point out, the absence of global standards for collecting and analyzing ESG data can create uncertainties and increase the risks of greenwashing—a real risk in a market where transparency of companies is still limited.

Moreover, the lack of independent external audits in FinTech companies undermines the credibility of their ESG initiatives, making it difficult to compare international data and verify the claims made by companies. Transparency and corporate governance are essential for FinTechs to be seen as leaders in social and environmental responsibility (Kumar et al., 2022).

4.6 Justification of ESG Indicators

This study evaluates the environmental, social, and governance (ESG) performance of Nubank using three primary indicators: Greenhouse Gas Emissions (GGE), Financial Inclusion, and Salary Equity. These indicators were selected due to their direct relevance in assessing the sustainability and social responsibility of FinTech companies. The aim of this study is to analyze how Nubank's practices in these areas contribute to broader global sustainability efforts and align with established ESG standards.

Greenhouse Gas Emissions (GGE):

The Greenhouse Gas Emissions indicator was chosen to assess Nubank's environmental impact. Emissions data is crucial for understanding the company's efforts to reduce its carbon footprint. FinTech companies like Nubank are increasingly expected to measure and manage their emissions in line with climate action goals. According to Li et al. (2025), the adoption of FinTech in emerging markets has been shown to contribute to carbon emissions reduction, thanks to the efficiencies enabled by digital technologies. This indicator provides an important measure of how FinTechs like Nubank can play a significant role in environmental sustainability.

Financial Inclusion:

Financial Inclusion is a central indicator in this study due to its strong link to social equity and economic development. Nubank, as a leading FinTech in Latin America, has expanded access to financial services for underserved populations. This includes individuals previously excluded from traditional banking systems, particularly in low-income communities. Financial inclusion has proven to be a powerful tool in reducing inequality and improving economic participation, which is essential for the achievement of sustainable development goals. This indicator reflects Nubank's role in promoting social justice through digital financial services.

Salary Equity:

Salary Equity is a critical indicator for assessing a company's commitment to internal social responsibility and gender equity. Nubank's 2024 Salary Equity Report indicates that while the company has made progress toward pay parity between genders, challenges remain in achieving full equality, particularly in leadership positions. The selection of this indicator was based on the company's efforts to address wage disparities and ensure equal opportunities for all employees. Salary equity directly relates to the company's governance practices and its adherence to social sustainability principles. The ongoing challenge in achieving true equality at the leadership level makes this indicator highly relevant for the governance dimension of ESG.

3. METHODOLOGY

This study is an **exploratory case study** with a **qualitative approach**. The methodology is based on **documentary and comparative analysis** of secondary data from Nubank's ESG reports from 2021 to 2023, as well as the 2024 Salary Equity Report.

The research aims to examine how Nubank's environmental practices, social inclusion initiatives, and corporate governance measures reflect the broader integration of ESG principles within the FinTech sector.

5.1 Data Sources

Data collection is based on the following reports:

1. Nubank's ESG Reports (2021–2023), which include information on the company's environmental, social, and governance initiatives.
2. The 2024 Salary Equity Report, which presents official data on remuneration practices and gender diversity, including leadership representation and pay equity.
3. Social impact and financial inclusion reports, which show Nubank's contribution to the inclusion of populations previously excluded from the traditional banking system.

These documents were systematically analyzed to identify ESG indicators and understand how financial technologies have supported the implementation of sustainable and socially responsible business practices.

5.2 Method of Analysis

The analysis was carried out in four interrelated stages:

1. Comparative Temporal Survey of ESG Data: Based on the 2021–2023 ESG reports, a comparative survey will be conducted on the key environmental, social, and governance indicators. The comparative analysis will include the evolution of practices and results over time, considering the actions implemented each year. The main aim is to observe how Nubank has responded to sustainability challenges and how it has enhanced its operations in terms of energy efficiency, carbon emissions reduction, and financial inclusion.
2. Observation of Performance Trends in ESG Dimensions: The analysis will focus on the three ESG dimensions (environmental, social, and governance) to identify trends and patterns. Specifically, the following will be observed:
 - **Environmental**: How sustainability practices have been implemented, with a focus on energy efficiency and carbon emissions reduction.
 - **Social**: How Nubank has promoted financial inclusion and social empowerment, particularly for underbanked populations and social impact actions.
 - **Governance**: How corporate governance is structured, with a focus on transparency, business ethics, and risk management.
3. Critical Interpretation of Key Indicators: Each ESG indicator will be analyzed, questioning not only the data presented but also the strategies and methodologies used to measure these indicators. The analysis will include the interpretation of the following aspects:
 - Greenhouse Gas Emissions (GGE): How Nubank has managed its direct (Scope 1) and indirect (Scope 2 and Scope 3) emissions, and the impacts of its reduction actions.
 - Diversity and Salary Equity: The analysis of gender equity and salary distribution within the company, especially in leadership positions.
 - Innovation in Financial Inclusion: The effectiveness of financial technologies (such as blockchain, artificial intelligence, and digital platforms) in promoting financial inclusion and reducing barriers to access to banking services.
4. Evaluation of SDGs and International Frameworks: The analysis will include a comparison of Nubank's ESG initiatives with the UN Sustainable Development Goals (SDGs), examining how Nubank's practices align with the SDGs, particularly SDG 8 (Decent Work and Economic Growth) and SDG 10 (Reduced Inequalities). The study will also explore Nubank's practices in relation to international frameworks such as the WEF Core Metrics and the UN Global Compact Guidelines.

This is an exploratory case study based on secondary sources, particularly ESG reports and public impact data. The goal is not to establish causality or statistical generalizations, but to offer a first analytical approximation of how FinTechs represented here by Nubank are engaging with ESG practices. The study seeks to identify trends, highlight contradictions, and raise relevant questions for future research, especially in emerging markets.

4. DISCUSSION

Nubank, founded in 2013, is one of the most prominent digital financial institutions in Latin America and represents a compelling example of how FinTechs can incorporate ESG principles into their core strategies. With a fully digital and inclusive approach, Nubank has expanded access to financial services for millions who were traditionally underserved by the banking system (Nubank, 2023). By partnering with other FinTechs and emphasizing innovation, it has enhanced financial accessibility and contributed to broader sustainability efforts (Chen et al., 2022).

This section analyzes Nubank's integration of ESG practices, focusing on its environmental actions, strategies for social inclusion, and governance policies. These findings align with existing literature, including Rastogi et al. (2023), which highlights the transformative role of FinTechs in improving access to financial services and promoting responsible corporate behavior. The analysis follows the structure of ESG dimensions and corresponds to the research's central objective.

6.1 Environmental Dimension

6.1.1 Energy Efficiency and Sustainability

Energy efficiency is one of the areas in which Nubank has demonstrated concrete progress, reflecting its declared commitment to environmental responsibility. According to the 2022 and 2023 ESG reports, the institution adopted several measures to optimize energy consumption, particularly through the application of digital technologies and artificial intelligence. One notable achievement was the 15% reduction in energy intensity in 2023 relative to 2022. Nevertheless, the reports do not specify which activities or operational areas contributed most to this reduction, which limits a deeper evaluation of the effectiveness of these strategies. The absence of disaggregated data compromises a more nuanced interpretation of the results.

Furthermore, Nubank has dedicated efforts to using renewable energy sources, aligning itself with sustainability principles. The integration of blockchain technology in the bank's operations, mentioned as an innovation for sustainability, also deserves attention. However, an important point is that the use of blockchain can, paradoxically, result in significant energy consumption, especially in public networks, which raises questions about the actual environmental efficiency of this technology. This concern is highlighted by Delmas & Burbano (2011), who discuss the risks of greenwashing when companies claim sustainability benefits without sufficiently addressing the environmental cost of their technologies. When adopting these technologies, the bank must ensure that the sustainability benefits are not overshadowed by an increase in the consumption of natural resources.

6.1.2 Carbon Emission Reduction

The ESG reports from 2022 and 2023 demonstrate Nubank's continued efforts to mitigate its carbon footprint, indicating a proactive stance toward environmental management. However, fluctuations in emissions data reveal the complexity of maintaining consistent reductions in a digitally expanding business model

Looking at Table 1, the emissions are divided into three categories: Scope 1, Scope 2, and Scope 3. These categories help us see the main trends between 2021 and 2023. For example, Scope 1 emissions, which are direct emissions like fuel use and refrigerant leaks, jumped in 2022 because of technical problems with cooling systems but went down again in 2023 after fixing those issues. Scope 2 emissions, linked to the electricity Nubank uses, dropped in 2022 when most people worked remotely but rose again in 2023 as the company shifted to a hybrid work model. Scope 3, which includes all the indirect emissions from things outside the company's direct control, is the biggest piece of the puzzle. You can see the details of these in Table 2.

Breaking it down more, Scope 1 emissions were low in 2021 at 9.2 tCO_{2e}, rose sharply to 67.3 tCO_{2e} in 2022, and then fell to 37.3 tCO_{2e} in 2023. Scope 2 emissions were 169.4 tCO_{2e} in 2021, dropped to 92.0 tCO_{2e} in 2022, and then climbed to 207.3 tCO_{2e} in 2023. The company mentions a move towards renewable energy, but the reports don't say exactly how much of their electricity is green.

Scope 3 is where things get really complex. This includes emissions from logistics, cloud services, employee commuting, business trips, and cryptocurrency activities. In 2023, these emissions were over 13,000 tCO_{2e}. Major contributors were card production (1,160.2 tCO_{2e}), cloud data storage (1,898.2 tCO_{2e}), card delivery logistics (3,816.0 tCO_{2e}), business travel (2,637.9 tCO_{2e}), cryptocurrency operations (2,133.3 tCO_{2e}), and employee commuting (540.7 tCO_{2e}) all detailed in Table 2.

These figures underscore the intricate nature of emission management in digital financial institutions like Nubank. While the company has made measurable progress in reducing emissions from internal

operations, its environmental impact is heavily influenced by external service providers and operational networks, many of which continue to generate significant emissions.

To keep moving forward, Nubank will need to keep improving its own operations and also work closely with suppliers and partners on sustainability. Being more open about where their energy comes from and how suppliers behave will be key to broadening their environmental impact beyond just their own offices.

This section addresses Objectives 1 and 2 by analyzing Nubank’s environmental indicators from the 2021 to 2023 ESG reports, focusing on energy efficiency, emissions control, and the use of technologies such as blockchain in sustainability efforts.

The numerical trends regarding greenhouse gas emissions (GHG) are detailed in **Table 1**, which presents the evolution of Scope 1 (direct emissions), Scope 2 (electricity-related emissions), and Scope 3 (indirect emissions). These values reflect Nubank’s operational and environmental efforts between 2021 and 2023.

Table 1 – Greenhouse Gas (GHG) Emissions by Scope (tCO₂e), Nubank (2021–2023)

Emission Scope	2021 (tCO ₂ e)	2022 (tCO ₂ e)	2023 (tCO ₂ e)
Scope 1 (Direct Emissions)	9.2	67.3	37.3
Scope 2 (Indirect Emissions – Purchased Energy)	169.4	180.2	207.3
Scope 3 (Other Indirect Emissions)	1,098.7	1,125.5	1,160.2

Source: 2023 and 2022 ESG Reports

The data in Table 1 show a significant variation in Scope 1 emissions, which increased in 2022 due to issues in cooling systems, and then decreased in 2023, likely reflecting improvements in operational control. Scope 2 emissions have risen steadily, consistent with the company’s expansion and partial transition back to office-based work. Scope 3 emissions remain the most challenging due to their indirect nature.

To complement the scope analysis, **Table 2** presents a more granular breakdown of GHG emission sources. This detailed view allows for a deeper understanding of the contributors to Nubank’s environmental impact, especially regarding digital infrastructure, logistics, and financial technologies.

Table 2 – Detailed GHG Emission Categories (tCO₂e), Nubank (2021–2023)

Emission Category	2021	2022	2023
Stationary Combustion	9.1	2.1	4.2
Fugitive Emissions	0.1	65.2	18.8
Purchased Electricity (location-based)	169.4	92.0	207.3
Diesel Generator Electricity	3.2	0.5	13.8
Card Production and Re-issuance	1,098.7	1,283.2	1,160.2
Electricity Consumption – Data Storage Services	1,102.6	1,410.2	1,898.2
Fugitive Emissions in Coworking Spaces	3.4	22.8	0.0
Cryptocurrency Operations	N/A	3,057.6	2,133.3
Card and Other Transportation and Distribution	1,411.8	4,709.1	3,816.0
Landfilled Waste and Effluents	15.3	168.4	158.9
Business Travel	263.1	1,465.3	2,637.9
Employee Commuting	1,276.0	542.4	540.7

Source: 2023 and 2022 ESG Reports

Table 2 illustrates that logistics (card transportation and delivery), cloud-based services (data storage), and cryptocurrency-related operations account for a considerable share of Scope 3 emissions. While Nubank discloses initiatives such as the use of renewable energy and supplier engagement, the lack of detailed methodological transparency and external audits limits the strength of these claims.

These findings contribute directly to the objective of this study by highlighting both the progress and limitations in Nubank's environmental practices from 2021 to 2023. The analysis offers a critical view of the data's transparency and credibility, while also pointing out the challenges faced in measuring and reporting indirect emissions, especially in the absence of external verification.

6.2. Social Dimension: Inclusion, Hiring, and Paradoxes

6.2.1 Financial and Social Inclusion of Clients (External)

Nubank has stood out as one of the leading FinTechs in Latin America, spearheading financial inclusion initiatives and significantly contributing to the democratization of credit access. According to the 2023 ESG report, approximately 75% of Nubank's new customers in 2023 had no prior access to traditional banking services. This aligns with Rastogi et al. (2023), who found that FinTechs are instrumental in financial inclusion, especially in emerging markets where traditional banking services are limited. The case of Nubank is particularly noteworthy in countries like Mexico and Colombia, where 46% and 30% of customers, respectively, obtained their first credit card through Nubank (Nubank, 2023). These figures illustrate the company's significant social impact in including unbanked populations, especially women and the elderly, who have historically been marginalized by the traditional financial system.

Financial inclusion is not limited to access to banking products. Nubank also invests in financial education programs, such as NuFuturo and other initiatives focused on technological training in partnership with universities and other organizations. These programs are important for regional development and strengthening the financial capabilities of the populations served, ensuring that customers not only have access to services but also understand how to use them efficiently and responsibly. This aligns with the findings of Macchiavello & Siri (2022), who argue that digital financial services must go beyond service delivery, focusing on financial literacy as a tool for empowering marginalized groups.

6.2.2 Expansion Overview and Social Reach of Nubank

Before analyzing the social indicators and financial inclusion data in detail, it is essential to first understand the broader context of Nubank's growth and its expansion across Latin America. The company's trajectory, marked by a consistent increase in customer base and the gradual rollout of innovative digital products provides important insights into how Nubank has positioned itself not only as a financial institution, but also as a driver of social transformation in historically underbanked regions. This aligns with El Khoury et al. (2023), who highlight the capacity of FinTechs to reshape access to capital and financial inclusion in marginalized populations.

The rapid growth in customer numbers, combined with strategic launches of inclusive financial services, reflects Nubank's commitment to democratizing access to banking. These efforts have enabled millions of people in countries like Brazil, Mexico, and Colombia to access financial tools for the first time, breaking down long-standing barriers to economic participation. These observations reflect the work of El Khoury et al. (2023), which highlights that FinTechs can reshape access to capital and financial services for populations that have been traditionally excluded.

The following table presents key milestones in Nubank's development between 2014 and 2023, offering an overview of its geographic expansion and the main financial products and innovations introduced throughout the period. This timeline provides a foundation for analyzing the company's broader social performance in the subsequent section.

Table 3 – Evolution of Nubank Customer Base (2014-2023)

Year	Number of Clients (millions)	Countries of Operation	Highlights and Products Launched
2014	3	Brazil	Credit card, digital account
2017	30	Brazil, Mexico, Colombia	PIX, insurance, international transfers
2020	54	Brazil, Mexico, Colombia	IPO NYSE and B3, Google Pay, Apple Pay
2022	74	Brazil, Mexico, Colombia	"Caixinhas" (savings), Nubank Crypto, marketplace
2023	100	Brazil, Mexico, Colombia	40+ new products, international banking licenses

Source: Nubank ESG Reports (2022 and 2023); Data Nubank 2022.

In order to better understand Nubank's social performance, it is necessary to consider how the company has contributed to enhancing financial behavior and expanding financial inclusion. The data below highlights figures related to clients who obtained their first credit cards or personal loans through Nubank, as well as information on financial education, default rates, and perceived financial autonomy.

Although some of the most recent data is not yet available in full, the indicators already suggest that many clients started saving, investing, or learning more about personal finance after becoming Nubank customers. These actions reinforce the company's role in advancing financial inclusion in Brazil, Mexico, and Colombia.

The table below presents key figures from 2022 and 2023, based on ESG reports and internal surveys.

Table 4 – Social and Inclusive Financial Indicators (2022-2023)

Indicator	2022	2023	Notes / Source
Customers with their first Nubank credit card	5.7 million	5.2 million (Mexico only)	ESG Reports 2022–2023 – Includes Mexico and Colombia
Customers with their first personal loan	2.5 million	–	ESG Report 2022 – Brazil only
Credit card delinquency rate (Q4)	5.3%	–	Nubank vs. market avg. (7.8%) – Central Bank of Brazil
Customers who regularly consume financial education content	52%	–	Data Nubank Survey 2022
Customers who created financial goals after becoming clients	28%	–	Data Nubank Survey 2022
Customers who increased their financial literacy after joining	19% (22% women)	–	Data Nubank Survey 2022
Customers who feel more financially independent	71%	–	Data Nubank Survey 2022

Source: Nubank ESG Reports (2022 and 2023); Data Nubank 2022.

The data presented in Table 4 underscores Nubank's contributions to financial inclusion and education. High rates of first-time access to credit products and positive indicators of improved financial behavior suggest a strong social return from the company's initiatives. However, the absence of 2023 data in several categories limits comparative analysis across time.

6.2.3 Internal Inclusion, Diversity, and Gender Equity

Nubank has made notable progress in advancing financial inclusion externally, yet persistent internal challenges remain concerning diversity and inclusion. According to the 2024 Salary Equity Report, women at Nubank earn approximately 99% of what men do in equivalent positions. However, this figure does not include variable compensation such as bonuses or profit-sharing, potentially concealing disparities particularly at leadership levels, where female representation is still limited.

The high employee turnover rate 93.1% in 2023 raises concerns regarding organizational sustainability and talent retention. Despite increased hiring (from 881 in 2021 to 1,638 in 2023), the lack of disaggregated turnover data by hierarchical levels impedes a more thorough analysis of diversity in decision-making roles.

Nonetheless, Nubank has launched several promising initiatives. By 2023, 44% of leadership positions were held by women, while 36.2% of employees self-identified as Black or Brown, and 11.3% identified as LGBTQIA+. The company also introduced career development programs aimed at historically underrepresented groups. These figures reflect a structured effort toward inclusive human capital development. However, transparency and continuous monitoring at the upper echelons of management remain necessary to evaluate the impact and sustainability of these policies

Table 5 – Internal Social Practices: Diversity, Equity, and Inclusion (2023-2024)

Social Indicator	2021	2022	2023
% Women in Leadership	N.A.	42%	44%
Salary Parity (Median Women vs. Men)	N.A.	98%	99%
Employees Identifying as LGBTQIA+ (Brazil)	N.A.	10.80%	11.30%
Employees Identifying as Black or Brown (Brazil)	N.A.	35.30%	36.20%

Source: Nubank ESG

Reports (2022 and 2023)

The trend across these indicators suggests an increased organizational sensitivity to internal equity matters. Nonetheless, the lack of longitudinal data disaggregated by department, professional function, or organizational tier hinders a comprehensive academic analysis of the real outcomes of inclusion strategies and the internal mechanisms shaping the retention of historically underrepresented groups.

Table 6 – Social Indicators: Inclusion and Diversity

Indicator	Value (%)	Details
Average salary for women vs. men	98%	Difference of 1% considered within the oil margin
Management positions held by women 44% Target for increase through empowerment programs	44%	Target for increase through empowerment programs
Management positions held by women (Nu Group)	51%	Including diversity and intentional non-recruitment
Extended parental leave	Up to 180 days	Support for parental figures and flexibility of remote work

Source: 2024 Salary Equity Report

The data reflects promising initiatives, particularly in female leadership and parental leave policies. Nevertheless, further transparency regarding career progression, retention outcomes, and pay equity especially in higher bands remains essential to fully evaluate the company's structural inclusiveness. These sections contribute directly to Objective 3 by examining Nubank's internal equity frameworks, highlighting both advances and areas that require further empirical validation and strategic improvement.

6.3 Governance Dimension

Corporate governance at Nubank has progressed significantly in recent years, reflecting an increasing alignment with global best practices in terms of transparency and ethical management. The bank has implemented a formal governance structure that includes committees dedicated to ESG issues, such as the Sustainability Committee and the Diversity and Inclusion Committee. This is consistent with global best practices, as Dicuonzo et al. (2024) and Shahzad et al. (2023) emphasize the growing importance of governance structures in improving ESG performance. Nubank’s adherence to the UN Global Compact and its alignment with the Sustainable Development Goals (SDGs), as reported in the 2022 and 2023 ESG reports, supports these findings. These efforts underscore the company’s commitment to incorporating sustainability into its strategic decisions.

The 2023 report indicates that the proportion of board members with ESG experience grew significantly, from 22% in 2021 to 33% in 2023, reflecting the company’s effort to integrate sustainable practices into its strategic decisions. This increase in the representation of ESG specialists on the board is a positive indicator that Nubank is prioritizing sustainability in its strategic planning.

Table 7 - Internal Frameworks

Indicator	2021	2022	2023
Proportion of board members with ESG experience	22%	28%	33%
ESG, Diversity, and Risk Committees	Formed	Active	Active
Adoption of International Frameworks	Not Applicable	UN Global Compact	UN Global Compact, SDGs
External audit of ESG data	Not conducted	Not conducted	Not conducted

Source: 2023 ESG Report

This table synthesizes Nubank's governance evolution, offering a snapshot of key indicators relevant to ESG oversight and institutional maturity.

6.3.3. Global Alignment and ESG Innovation

Nubank’s practices reflect broader global trends in FinTech, particularly the use of emerging technologies to enhance ESG outcomes. International research underscores how FinTechs leverage tools such as artificial intelligence, blockchain, and big data to improve transparency, data-driven decision-making, and risk identification. Nubank’s adoption of blockchain is consistent with this movement, aiming to increase operational traceability. However, concerns about the environmental cost of blockchain, especially in energy-intensive public networks, highlight the importance of assessing the sustainability of these innovations (Shahzad et al., 2023).

In the realm of financial inclusion, Nubank has established itself as a regional leader. Its digital infrastructure has enabled access to financial services for millions of previously excluded individuals, aligning with global findings on the social contributions of FinTechs (Rastogi et al., 2023). Additionally, the integration of AI and data analytics supports ESG investment strategies by improving the assessment of risks and opportunities (Semenova & Hassel, 2015).

Nubank’s model illustrates how FinTechs can contribute meaningfully to inclusive and sustainable development. This subsection supports Objectives 1 and 2 by examining governance evolution and the strategic application of technologies to reinforce responsible management.

6.4 Alignment with Sustainable Development Goals (SDGs)

Nubank’s ESG strategy demonstrates partial alignment with key UN Sustainable Development Goals (SDGs), as outlined in reports from 2021 to 2023. In relation to SDG 8 (Decent Work and Economic Growth), the bank enabled over 5.7 million unbanked individuals to access digital financial services, a significant step toward inclusive economic participation.

Regarding SDG 10 (Reduced Inequalities), Nubank achieved 99% base salary parity between men and women. However, this statistic omits variable compensation such as bonuses and equity, which may obscure persistent disparities. A more detailed evaluation of total compensation is needed to confirm actual pay equity.

Under SDG 13 (Climate Action), Nubank reports its greenhouse gas emissions and maintains carbon neutrality goals. Nonetheless, limited transparency regarding indirect emissions (Scope 3) and the absence of third-party verification weakens the credibility of its environmental disclosures.

While Nubank adheres to frameworks such as the UN Global Compact, broader adoption of structured standards and external validation would improve accountability and comparability. This section addresses Objective 4 by assessing Nubank's performance against international benchmarks for sustainability.

Table 8. Nubank's Contribution to the SDGs (Based on 2022–2023 Reports)

SDG	Relevant Target	Nubank's Action
8	8.10: Financial Inclusion	Expansion of digital banking services to 5.7 million unbanked individuals
10	10.2: Social and Economic Inclusion	99% pay parity between men and women
13	13.2: Climate Change Policies	GHG emissions inventory and carbon neutrality commitments

Source: Nubank ESG Reports (2022 and 2023)

5. CONCLUSION

This research analyzed the relationship between financial technologies (FinTechs) and ESG (Environmental, Social, and Governance) performance, using Nubank as a reference case within the Latin American context. Drawing on data from 2021 to 2023, the study explored how digital financial institutions integrate technological solutions to promote sustainability, equity, and effective governance.

The findings demonstrate that Nubank has advanced financial inclusion through accessible digital services and has made relevant commitments to social diversity and environmental goals. These efforts align with Sustainable Development Goals (SDGs), particularly those related to decent work, reducing inequalities, and climate action. Nevertheless, the analysis highlights important limitations, such as the complexity of managing indirect environmental impacts, the need for more granular indicators of internal inclusion, and the lack of external validation for ESG data.

This study contributes to the academic understanding of sustainable finance by illustrating how a leading FinTech in an emerging economy addresses ESG dimensions. It also emphasizes the importance of improving the precision, consistency, and comparability of ESG disclosures. Further research is encouraged to examine how other digital financial institutions approach ESG integration, as well as the regulatory mechanisms that could support more robust, transparent, and context-sensitive sustainability strategies.

6. Uso de Inteligência Artificial Generativa (IAG) nesta Pesquisa

Durante a elaboração deste trabalho, foram utilizadas ferramentas de Inteligência Artificial Generativa com fins exclusivamente acadêmicos e sob supervisão crítica da autora. O uso foi restrito às seguintes etapas:

- Leitura e resumo de literatura: apoio da ferramenta ChatGPT (OpenAI) para auxiliar na síntese de artigos complexos e facilitar a compreensão conceitual de autores-chave.
- Tradução: uso das plataformas DeepL e ChatGPT para tradução preliminar de trechos específicos, posteriormente revisados pela autora.
- Revisão e formatação: uso do Grammarly e do ChatGPT para sugerir ajustes gramaticais e ortográficos no texto final, com validação crítica pela autora.

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