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Quality of accounting information disclosure on technological R&D: comparative analysis of reports filed in Brazil and the United States by Brazilian companies

Calidad de la divulgación de información contable sobre I+D tecnológica: análisis comparativo de informes presentados en Brasil y Estados Unidos por empresas brasileñas

Qualidade da evidenciação da informação contábil sobre P&D tecnológico: análise comparativa dos relatórios arquivados no Brasil e nos Estados Unidos por empresas brasileiras

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Abstract

Purpose: To analyze and compare the accounting information disclosure level on technological Research & Development (R&D) expenditures in accounting reports filed in Brazil and the United States by publicly traded Brazilian companies from different industrial sectors and listed as American Depositary Receipts (ADR) on the New York Stock Exchange.

Methodology: Qualitative comparative analysis, based on a multiple case study, with an emphasis on documentary analysis of the 2022 accounting reports filed with the Brazilian Securities Commission (CVM) and the U. S. Securities and Exchange (SEC).

Results: The evidence shows that there are differences in quality, such as organization, clarity and detailing, in the disclosure of initiatives and expenditures in technological R&D activities presented by the companies studied. In the Form 20-F reports, filed with the SEC, the information is more detailed and organized than the information disclosed in the Standardized Financial Statements (DFP), filed with the CVM, characterizing dependence on the target market and non-compliance with CVM guidelines. The deficiencies identified in the disclosure of information on R&D expenditures highlight the existence of opportunities to reduce information asymmetry between reports.

Contributions of the Study: The study contributes by highlighting the importance of the actions of capital market regulators in complying with current regulations, improving monitoring mechanisms and improving the quality level of information disclosure on R&D expenses in Brazil.

Keywords: Intangible Assets; Quality of Accounting Information, Research & Development; American Depositary Receipts.

Resumen

Objetivo: Analizar y comparar el nivel de divulgación de la información contable sobre gastos con Investigación y Desarrollo (I+D) tecnológico en informes contables presentados en Brasil y Estados Unidos, por empresas brasileñas que cotizan en bolsa, de diferentes sectores industriales y listadas como *American Depositary Receipts* (ADR), en la Bolsa de Nueva York.

Metodología: Análisis comparativo cualitativo, basado en casos múltiples, con énfasis en el análisis documental de los reportes financieros de 2022 presentados ante la Comisión de Bolsa y Valores (*Comissão de Valores Mobiliários* - CVM) y la *U. S. Securities and Exchange* (SEC).

Resultados: La evidencia encontrada demuestra que existen diferencias en la calidad, como organización, claridad e detalle en la divulgación de las iniciativas y gastos en actividades de I+D tecnológica presentadas por las empresas estudiadas. En los informes del Form 20-F, presentados ante la SEC, la información es más detallada y organizada que la información divulgada en el Estados Financieros Estandarizados (*Demonstrações Financeiras Padronizadas* – DFP), presentado ante la CVM, caracterizando la dependencia del mercado al que está destinado y el incumplimiento de las directrices de la CVM. Las deficiencias identificadas en la divulgación de información sobre gastos de I+D resaltan la existencia de oportunidades para reducir la asimetría de información entre informes.

Contribuciones del Estudio: El estudio contribuye destacando la importancia de las acciones de los reguladores del mercado de capitales para cumplir con las regulaciones vigentes, mejorar los mecanismos de seguimiento y mejorar el nivel de calidad de la divulgación de información sobre los gastos de I+D en Brasil.

Palabras clave: Activos Intangibles; Calidad de la Información Contable; Investigación y Desarrollo; *American Depositary Receipts*.

Resumo

Objetivo: Analisar e comparar o nível da evidenciação da informação contábil sobre gastos com Pesquisa e Desenvolvimento (P&D) tecnológico nos relatórios contábeis arquivados no Brasil e nos Estados Unidos, por empresas brasileiras de capital aberto, de setores industriais distintos e listadas como *American Depositary Receipts* (ADR) na bolsa de valores de Nova York.

Metodologia: Análise comparativa qualitativa, baseada em caso múltiplo, com ênfase na análise documental dos relatórios contábeis de 2022 arquivados na Comissão de Valores Mobiliários (CVM) e na *U. S. Securities and Exchange* (SEC).

Resultados: As evidências encontradas demonstram que existem diferenças de qualidade, como organização, clareza e detalhamento, na divulgação das iniciativas e dispêndios em atividades de P&D tecnológicos apresentadas pelas empresas estudadas. Nos relatórios *Form 20-F*, arquivados na SEC, as informações são mais pormenorizadas e organizadas do que as informações divulgadas nas Demonstrações Financeiras Padronizadas (DFP), arquivados na CVM, caracterizando dependência ao mercado a que se destina e descumprimento das orientações da CVM. As deficiências identificadas na divulgação de informações sobre gastos com P&D evidenciam a existência de oportunidades de redução da assimetria informacional entre relatórios.

Contribuições do Estudo: O estudo contribui por destacar a importância da atuação dos reguladores do mercado de capitais para o cumprimento dos normativos vigentes, melhoria dos mecanismos de monitoramento e melhoria do nível de qualidade da divulgação de informações sobre gastos de P&D no Brasil.

Palavras-chave: Ativos Intangíveis; Qualidade da Informação Contábil; Pesquisa e Desenvolvimento; *American Depositary Receipts*.

1 Introduction

In the 2022-2026 work agenda of the International Accounting Standards Board (IASB), the need to prioritize the revision of the International Accounting Standard IAS 38 – Intangible Assets was identified, given the increasing relevance of these assets today as the primary driver of value creation within organizations. This shift has led to capital flow moving from tangible to intangible investments (Govindarajan, Rajgopal, & Srivastava, 2018).

Regarding expenditures on internally generated intangible assets, feedback received by the IASB indicates the need to expand the criteria for asset recognition and improve financial statement disclosures, including those for expenses not recognized as assets and therefore classified as expenses. Since then, the IASB has prioritized this topic, although it has acknowledged that this will be a large and complex project, with expected completion beyond the next five years (IASB, 2022).

Among the internally generated intangible assets not recognized in company financial statements are R&D expenditures, which are generally classified as expenses despite being perceived as potential generators of future economic benefits and the primary destination for company investments nowadays (Lev & Gu, 2016). The growing consensus is that the market value of companies, their competitive advantage, and even their sustainability rest in their intangible assets, which are critical to the economy, not only due to technology derived from

R&D but also through other capital investments in innovation (Hulten & Hao, 2008; Chen, Gavigous, & Lev, 2015).

Barth, Li and McClure (2023) argue that this phenomenon is not exclusive to digital economy-oriented companies, but applies, to varying degrees, to all sectors, including those producing or dealing with commodities, which struggle to provide significant and enduring business differentials.

Previous quantitative studies, following Hulten and Hao's (2008) working paper, have focused on the relevance of R&D expenditures in the creation of economic value for companies. International research, particularly on the U.S. capital market and based on financial statements filed with the SEC, consistently demonstrates a statistically significant positive impact of R&D expenditures on value creation (Hulten & Hao, 2008; Banker, Huang, Natarajan, & Zhao, 2019; Peters & Taylor, 2017; Iqbal, Raigopal, Srivastava, & Zhao, 2022), research focusing on the Brazilian capital market, based on statements filed with the CVM, yields inconclusive results. Some studies indicate positive significance (Figari, Tortoli, Da Silva, & Ambrozini, 2016; Tortoli, Figari, Ambrozini, & Moraes, 2020), others show negative (Oliveira, Magnani, Tortoli, Figari, & Ambrozini, 2019; Soares, Guimarães, Rosa, Ribeiro, & Lopes, 2023), and still others find no significance (Faria, Carvalho, Peixoto, & Borsatto, 2020).

Furthermore, national researchers have criticized the insufficient level of disclosure in the explanatory notes concerning R&D and technological innovation expenses. These critiques highlight a lack of transparency and detail in how these expenditures are reported, which hampers a comprehensive understanding of their impact on companies' performance and innovation efforts. (Avelino, Pinheiro, & Lamounier, 2012; Liszbinski, Kronbauer, Macagnan, & Patias, 2014).

Since the financial statements filed with the CVM and SEC, including explanatory notes, are governed by the same International Financial Reporting Standards (IFRS), specifically IAS 38 for intangible assets, despite differences in regulatory regimes due to distinct institutional environments, similar results would be expected in quantitative studies on the influence of R&D expenditures on value creation in both capital markets.

However, as highlighted by the aforementioned academic studies, there is a clear dichotomy between the consistent findings of a positive influence of R&D expenditures on value creation in the U.S. capital market and the inconsistent, sometimes contradictory results in the Brazilian capital market. To better understand this phenomenon, it is necessary to compare the quality of financial statement disclosures in both capital markets, focusing on the criteria and preparation characteristics used in reporting these expenditures.

Nonetheless, regardless of which capital market they belong to, even companies within the same market and industry display varying amounts, objectives, and projects related to R&D and technological innovation. This variation makes direct comparisons subjective and challenging, as each company's R&D efforts are tailored to their unique strategic goals and operational contexts. However, a group of Brazilian companies is simultaneously traded on both the Brazilian and U.S. capital markets. These are Brazilian companies listed and traded on the São Paulo Stock Exchange (B3) and the New York Stock Exchange (NYSE) through American Depositary Receipts (ADRs). Specifically for this group of companies, when comparing the level of disclosure in financial statements filed with the CVM and SEC, a greater similarity and high degree of equivalence in terms of the criteria and characteristics of the accounting information regarding technological R&D projects and expenditures would be expected. After all, these are the same companies, with the same amounts, goals, and technology projects, governed by the same accounting standards, differing only in the institutional environments to which they are subject.

Therefore, considering the dichotomy in the influence of technological R&D expenditures on value creation for companies listed with the CVM and SEC, the research question can be formulated as follows: **What are the quality of disclosure differences, in terms of criteria and preparation characteristics, of accounting information on technological R&D expenditures in the 2022 financial statements filed with the CVM and SEC by non-financial Brazilian companies with ADRs on the NYSE?**

In this context, the main objective of this study is to analyze and compare the level of accounting information disclosure on technological R&D expenditures in financial reports filed in Brazil and the United States by publicly traded Brazilian companies from distinct industrial sectors and listed as ADR on the NYSE.

This investigation also supports a secondary objective: analyzing the detail level in the technological R&D projects and initiatives disclosed in the financial statements submitted to the CVM and SEC. The analysis will focus on a documentary review of the 2022 financial reports to identify significant differences in disclosure practices. Creswell (2010) recommends the use of qualitative research techniques for this type of investigation, as they are well-suited for examining complex and nuanced differences in reporting standards and practices.

On the one hand, the absence of significant differences in the criteria and preparation characteristics of accounting information on technological R&D expenditures in the financial statements filed with the CVM and SEC will not be sufficient to conclude similarity in disclosure in both capital markets. On the other hand, the identification of significant differences, since the reports are produced by the same companies, will be enough to demonstrate that the criteria and characteristics adopted for the preparation of the financial statements are dependent on the capital market for which they are intended. Therefore, only if the results reveal differences will this study contribute to explaining the dichotomy evidenced in previous research.

This study is relevant because it qualitatively analyzes not only the nature of R&D expenditures and technological innovation initiatives implemented by Brazilian companies listed as ADRs on the NYSE but also evaluates the level of disclosure of this information in the financial reports made available to the CVM and SEC. Qualitative studies on the financial and capital markets are relatively uncommon in academic literature, with a low percentage of publications (Pereira, Constantino, Sauerbronn, & Macedo, 2019). Therefore, this research addresses an existing gap in qualitative studies on this topic, contributing to a deeper understanding of disclosure practices in different regulatory environments.

Additionally, this study focuses on companies with dual listings, meaning those whose shares are traded on both B3 and the NYSE. Since the companies selected for this research operate under two distinct regulatory regimes, the analysis provides an opportunity to observe how these companies approach the disclosure of information through two different financial reports, each subject to different enforcement mechanisms due to the distinct institutional environments. The first report refers to the DFP, required by the CVM, and the second refers to the Form 20-F, required by the SEC. Although these documents share the same objectives, differences in the level of information disclosure are anticipated. These differences could offer valuable insights into how technological R&D expenditures are reported and understood across both markets.

Finally, a third distinctive aspect is that this study enables both researchers and users of accounting information to examine how financial reports are prepared, identifying the main drivers, deficiencies, and opportunities for reducing information asymmetries related to the description of technological R&D projects and initiatives, innovation, and associated expenditures, where applicable. Specifically for capital market regulators in Brazil, the

comparison of company reports offers an opportunity to reduce the diversity of formats and styles, thereby promoting greater standardization in the procedures for preparing reports, which in turn facilitates easier access and consultation of the information.

2 Theoretical Framework

According to the international standard IAS 38 and the corresponding Brazilian standard CPC 04 (R1), an intangible asset is a resource without physical substance, capable of generating future economic benefits for the entity, and not arising from a business combination. Barker, Lennard, Penman, and Teixeira (2021) define three categories of intangible capital: (i) intellectual capital, including human capital (employee training and qualifications, customer satisfaction, knowledge, R&D, organizational climate, etc.); (ii) organizational capital, related to operational processes; and (iii) social capital, related to business perception.

According to CPC 04 (R1), the recognition (item 21) of R&D technological initiatives as intangible assets requires identification (item 12), control (item 13), and can only be accepted when the expenses incurred occur during the development phase and meet the six specific criteria outlined in item 57 (De Oliveira, Schossler, Campos, & Luce, 2014; Garanina, Hussinki, & Dumay, 2021). Otherwise, the expenditure must be recorded as an expense in the Income Statement (DRE).

While identification, control, and the expectation of future economic benefits apply to assets in general, not just intangibles, what uniquely defines an intangible asset is its lack of physical substance. When an asset is tangible, identification and control are straightforward due to its physical presence. However, when an asset is intangible, identification and control are complex and open to interpretation, especially concerning faithful representation.

The European Financial Reporting Advisory Group (EFRAG, 2021) identifies four main common characteristics of intangible assets: (i) investments in intangibles carry a high degree of uncertainty regarding future economic benefits, where the costs associated with developing intangibles are often lost, unrecoverable, or at least diffuse and difficult to identify; (ii) there is a challenge in demonstrating control, which makes it difficult to restrict and protect access to intangibles through legal measures; (iii) financial value creation arises from network effects and synergies from how a particular intangible interacts with other assets, including other intangibles. This potential value is latent but dependent on other factors, making measurement particularly challenging due to uncertainty regarding how, when, or if it will be realized; (iv) they are scalable at low or "zero margin" cost, meaning that, unlike tangible assets, intangibles can be utilized simultaneously, repeatedly, and across multiple locations with little or no additional investment.

From an innovation perspective, which is currently the primary focus of company investments (Lev & Gu, 2016), the high degree of uncertainty noted in characteristic (i) by EFRAG (2021), is mitigated, and outcomes are accelerated by increasingly open business initiatives, with cost-sharing across various levels among related participants, reducing individual risks and fostering faster progress in innovation efforts.

Open innovation, in the context of technology and innovation (Bogers, Chesbrough, & Moedas, 2018), and open book accounting, in the context of management and accounting (Agndal & Nilson, 2008), are open initiatives that aim to reduce and control risks and uncertainties, delivering faster results. Regarding characteristic (ii), the sharing of interorganizational information—encompassing not only R&D and operational costs but also aspects such as quality, price, cost structures, and movements—diminishes the need for stringent control over assets, especially intangible ones, thereby challenging traditional

accounting standards (Dhaifallah, Auzair, Maelah, & Ismail, 2020). As for characteristics (iii) and (iv), the ability to quickly expand innovations through synergistic and scalable processes at low cost is a key driver of digital technologies and the increasing intangibility of production, which has the potential to significantly contribute to broader economic growth and improved performance (Corrado, Criscuolo, Haskel, Himbert, & Jona-Lasínio, 2021).

Therefore, the high degree of uncertainty, the difficulty in identifying and controlling intangible assets due to their lack of physical substance, and the limitations imposed by IAS 38's criteria for recognizing costs, even in the development phase, as intangible assets result in internally generated R&D and innovation expenditures being recorded as expenses. This occurs even though these expenditures may represent some of the most critical assets for the company's activities, driving future growth and competitiveness.

Regarding the nature of expenditures related to internally generated intangible assets, IAS 38 includes a dedicated chapter (items 51 to 67), which outlines the phases of creating such assets within an organization. It also emphasizes the importance of disclosing R&D expenses that are recognized as expenses, as specified in items 126 and 127. This disclosure is crucial for providing transparency and a clearer understanding of how companies allocate resources to R&D, even when these expenditures are not capitalized as intangible assets.

IAS 38 advises that R&D activities should be segmented into either the research or development phases. If there is difficulty or a degree of subjectivity in determining which phase an activity belongs to, the standard recommends treating the activity as being in the research phase. Since the same standard clarifies that it is impossible to recognize any intangible asset during the research phase, the expenditure must be recorded as an expense. However, separate disclosure of R&D expenditures recognized as expenses is required (items 126 and 127). Therefore, regarding technological R&D expenditures by entities, IAS 38 is restrictive in recognizing these expenditures as intangible assets, particularly those related to internally generated projects. However, when such expenditures are recorded as expenses, the standard requires separate disclosure to ensure transparency. This requirement highlights the need for clear reporting of R&D expenses, even when they do not meet the criteria for capitalization as intangible assets, providing stakeholders with valuable insights into the company's innovation activities.

The risk for companies that are considered intensive in intangibles is higher, due to the significant, often irreversible costs that may be lost, as well as the lack of property rights over many intangible assets (such as human capital, including R&D), or the difficulty in enforcing those rights (such as with know-how), or the unlicensed use of technologies (EFRAG, 2021). However, this risk is partially mitigated by the dynamics of scalability at low cost and the network effects that intangible assets can generate (Haskel & Westlake, 2018), allowing companies to achieve significant returns on these assets once they are successfully developed and applied.

The fact that a company does not have a significant intangible asset on its balance sheet does not necessarily classify it as having low intensity of intangible investments, since part of these investments, such as those related to R&D and innovation initiatives, may be recorded as expenses, as required by IAS 38. Thus, to better understand the intensity of activities and investments in intangibles, it is essential to contextualize these initiatives within the company's business model and its stage of maturity. Qualitative research provides the tools to examine and verify these aspects, offering insights into how intangible investments align with the company's overall strategy and contribute to its long-term development.

The growing understanding is that the value of companies, their competitive advantage, and even their sustainability lie in their intangible assets, not only regarding R&D but also other

capital investments (Chen et al., 2015). These intangible investments include expenditures on brands, patents, reputation, copyrights, information systems, business models and processes, technical skills, logistical and operational optimization processes, customer portfolios and relationships, product development, and marketing activities, which are categorized as innovation and strategy expenses (Zambon et al., 2020). Quantitative studies (Hulten & Hao, 2008; Banker et al., 2019; Tortoli et al., 2020; Iqbal et al., 2022) demonstrate the relationship between R&D expenditures and the market value of companies. However, without understanding the detail level in which these initiatives are carried out, the evidenced relationship does not necessarily reflect the potential for future economic benefits.

3 Methodological Procedures

Qualitative analysis through relevant case studies allows for an in-depth exploration of the activities conducted by companies, based on the collection of detailed information. This method enables the assessment of whether the preparation of financial statements is influenced by the specific environment for which they are intended (Creswell, 2010).

The research method adopted in this study consists of qualitative comparative analysis (QCA), which is based on set theory and Boolean algebra (Betarelli Junior & Ferreira, 2018). Each company with ADRs produces two separate reports, one to be filed with the CVM and another with the SEC. Thus, the companies studied form two distinct sets of reports, with each set composed of the same companies as the other, differing only in terms of the regulator regime and the institutional environment associated with the report to be filed. There is no intersection between the two sets, as no common reports are prepared for both capital markets. The study focuses on determining whether a company's reporting practices are influenced by the specific capital market for which the financial statements are prepared. This is assessed by examining differences in the organization, completeness, and level of detail within each report. The goal is to identify whether the variations in disclosure are driven by the distinct regulatory and market requirements of each capital market.

3.1 Selection of Analyzed Companies

Based on data collected from publicly traded companies between 2018 and 2022, 153 non-financial, active companies with positive market value and equity (PL) were identified. Of this set, 65 companies reported R&D expenditures during the period. According to the Topforeignstocks website (2024), 27 Brazilian companies are listed on the NYSE as ADRs. Of these, 20 companies are part of the set of 153 identified companies, and 14 of these ADR companies disclosed R&D expenditures. **Figure 1** presents the profile of annual average R&D expenditures relative to general administrative expenses, for both the 65 Brazilian companies and the 14 companies with ADR listed on the NYSE that reported R&D expenditures during the 2018 to 2022 period.

From the set of 20 companies with ADRs listed on the NYSE, whether or not they reported R&D expenditures, five companies operating in different sectors were selected for the proposed qualitative comparative analysis. It is understood that this sample, although small, is representative and sufficient to determine whether the criteria and characteristics adopted in the preparation of the financial statements depend on the capital market for which they are intended, considering the evidence found in previous studies. Furthermore, Fields, Lys, and Vincent (2001) suggest that researchers should conduct studies with small samples to encourage

professional experience as accountants, despite the limitations and costs associated with such research projects.

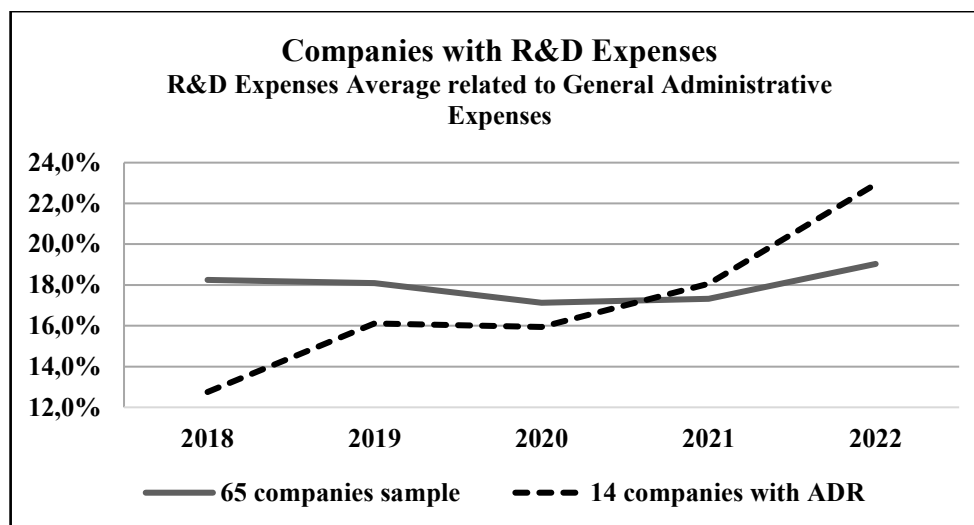


Figure 1 Profile of average R&D expenditures in relation to General Administrative expenses for companies and those traded as ADRs on the NYSE

Notes: (a) Based on a sample of 65 companies that reported R&D expenditures in at least one year during the period from 2018 to 2022, selected from an original sample of 153 non-financial publicly traded Brazilian companies with a positive market value and equity. (b) The overall average of R&D expenditures in relation to general administrative expenses for the sample of 65 companies, over the period from 2018 to 2022, is 17.95%.

Source: Data collected from Economatica® platform on 08/21/2023.

Table 1 presents the list of the five selected companies studied. It is worth noting that these companies present their financial statements to both the CVM and the SEC in compliance with the accounting standards defined by IFRS, under IAS 38 and CPC 04 (R1).

Table 1
Brazilian companies analysed

	Ticker	IBOV Partic,	IBOV Ranking	Corporate Governance Segment	B3 Sector	External Auditor (2022)
Vale	VALE3	15,15%	1	New Market	Basic Materials	PwC
Petrobrás	PETR4	10,37%	2	N2	Oil, Gas & Biofuels	KPMG
Telefonica Brasil	VIVT3	0,89%	27	Traditional	Communications	Baker Tilly 4Partners Auditores Independentes
Embraer	EMBR3	0,65%	52	New Market	Industry Goods	KPMG
BRF	BRFS3	0,41%	82	New Market	Non-Cyclical Consumption	KPMG

Notes: (a) Partic. IBOV – Company's percentage participation in the Ibovespa index; (b) Ranking IBOV – Company's position within the Ibovespa index; (c) Corporate Governance Segment and B3 Sector – Corresponds to the classification adopted by B3 (according to www.b3.com.br); (d) External Auditor – Independent auditor responsible for reviewing the financial statements in the year 2022.

Source: Research data.

Finally, it is important to highlight that the five companies selected for analysis account for 27.45% of the Ibovespa index composition, with Vale and Petrobras alone representing 25.5% of the index. This substantial participation underscores the significance of the selected companies in the context of this analysis, reflecting their considerable influence on the overall Brazilian capital market and emphasizing the importance of their financial reporting practices. The weight these companies carry in the index demonstrates their role in shaping investor perceptions and market dynamics.

3.2 Documents and Period Considered for Analysis

For the study, the Standardized Financial Statements (DFP) filed with the CVM and the Form 20-F reports filed with the SEC for the year 2022, the most recent period available at the start of this study, were analyzed.

To enhance the quality of the analysis, reports from 2018 to 2021 were also reviewed. The extension of the analysis period aimed to verify the consistency of the disclosed information and whether the studied companies maintained a steady flow of technological R&D expenditures over at least the last five years. The data collection took place between October 2023 and February 2024.

3.3 Procedures for Identifying and Analyzing Information

The phenomenon studied here is the practice of disclosing information on technological R&D expenditures, as well as innovation expenditures, by Brazilian companies listed as ADRs on the NYSE. To achieve the research objective, a sequence of steps involving reading, comparative analysis, and the identification of differences and similarities was required, based on the explanatory notes and, complementarily, on the management reports of the financial statements submitted to the CVM and SEC. The comparative analysis focused on the quality and quantity of information regarding each company's R&D projects, as well as the use of key search terms essential for a broader understanding of the reports. Since these are official company disclosure documents, a larger amount of information about an R&D project is understood to indicate a greater concern for organization, completeness, and detail in addressing the target market.

To be more accurate in data collection, given the lack of standardization of the information presented in the DFP explanatory notes, where the information may be scattered throughout the reports, manual data collection was aided by searching for various keywords. These include: "research," "development," "innovation," "technology," "R&D," "PD&I," "intangible," "expenditure," "expense," "benefit," "subsidy," and "Lei do Bem" (the latter three due to some companies utilizing tax benefits covered by Law No. 11.196/2005, known as "Lei do Bem," which encourages R&D activities by Brazilian companies).

In the case of Form 20-F reports filed with the SEC, information on R&D expenditures is consolidated and standardized under item 5C - Research and Development, Patents and Licenses, etc., facilitating the identification and analysis process. It is worth noting that, in addition to the information provided under item 5C, there has been a data registry available on the financial, statistical, and market information platform of the U.S. capital market (Compustat®) since 1975 (Peters & Taylor, 2017). In Brazil, despite the requirements of CPC 04 (R1) and the CVM, there is no corresponding registry for financial, statistical, and market data on the Brazilian capital market (Economatica®).

The process of identifying the characteristics of the technological R&D investment disclosures adopted a qualitative comparative analysis technique to verify similarities and differences in the level of detail between the financial statements filed with the CVM and the SEC. Elements of quality, particularly in terms of organization, detail, and completeness in the disclosure of technological R&D activities were assessed, including complementary information regarding the business development of each company in the different markets regulated by the CVM and SEC, as well as particularities and similarities in the information.

The CVM requires that Brazilian listed companies make available to national investors all information disclosed in other capital markets, due to specific requirements. Thus, the lack of equivalence between the contents disclosed in the two reports analyzed (DFP and Form 20-F) would not only indicate dependence on the target market but, if the quality elements of the reports filed with the CVM are inferior to those filed with the SEC, would also characterize non-compliance with CVM guidelines. However, if content equivalence is observed, given that only five Brazilian companies were selected, the results of this research will not be sufficient to extend the conclusion that there is similarity in the preparation of financial statements in both capital markets. The conclusion will remain limited to the companies studied.

4 Results and Analyses

This section presents the findings from the evidence obtained for each of the companies analyzed, as highlighted in the following subsections.

4.1 Disclosure of R&D Expenditures by Petrobras

a) Disclosure in the DFP:

The income statement (DRE) separates and discloses technological R&D costs and the costs of research for oil and gas extraction in distinct items, in addition to other general and administrative expenses. From the financial statements covering the period 2018 to 2022, it was evidenced that the company has maintained a steady flow of R&D expenditures over the last five years.

Regarding the information provided by business segment, Petrobras defines four segments: exploration and production (E&P), refining, transportation, and commercialization (RTC), gas and energy (G&E), and corporate and other businesses (C&ON). The DRE by business segment shows that 85.2% of the technological R&D expenditures are allocated to E&P, and 13.4% to C&ON. R&D expenditures in RTC and G&E are insignificant.

Since the DRE contains a separate and specific cost item for "exploration for oil and gas extraction," it is necessary to differentiate between what the company considers exploration costs for oil and gas extraction and R&D expenditures for E&P. The explanatory notes define E&P as:

"Encompasses exploration, production development, and production of oil, NGL (natural gas liquids), and natural gas in Brazil and abroad, aiming primarily to supply the country's refineries while also partnering with other companies and holding equity in companies in this segment abroad."

The above description does not clearly differentiate R&D for E&P from other E&P costs that are not categorized as R&D, making it difficult to discern the financial allocations for each

item. The explanatory notes on intangible assets focus solely on concessions and exploration rights.

b) Disclosure in the Form 20-F:

The Form 20-F report provides greater completeness on the financial allocations highlighted in the DFP. However, to give an initial sense of the differences between the two documents issued by Petrobras, a keyword search for “innovation” reveals that the DFP mentions the word twice, solely to reference the existence of a department focused on innovation. In contrast, Form 20-F mentions “innovation” 38 times. It is only through Form 20-F that we learn the information presented in Table 2.

Table 2

Information Disclosed by Petrobrás in the 2022 Form 20-F Report

32.6% of the R&D portfolio is focused on digital-intensive technologies, such as big data, high-performance computing, and artificial intelligence, aimed at business development.

The patent portfolio spans all areas of operation, with 1,218 patent applications under review, 740 of which are international. In 2022, 351 patents were registered: 223 abroad and 128 in Brazil, surpassing the annual record for patent registrations among Brazilian institutions.

The *Conexões para Inovação* (Connections for Innovation) program, based on open innovation, was designed to accelerate technological development. The program's main objective is to find technological partners and foster the innovation ecosystem.

Source: Research data.

The Form 20-F report enriches the information regarding R&D expenditures and facilitates the understanding of the absence of a specific item in intangible assets on the balance sheet (BP) related to R&D in the development phase. It becomes clear that Petrobras' R&D efforts are not aimed at creating marketable products and services, which are easier to identify and measure, but rather at the evolution and improvement of the company's core business, particularly in its E&P and C&ON processes, or as a source of new revenue through royalties from patent usage by third parties.

The descriptions explain the stages of development in actions toward digital transformation, the internal development of specialized business-use software, and patent registrations, all of which are difficult to identify and/or financially measure. The latent potential of these elements, dependent on external factors, makes measurement particularly difficult due to uncertainties regarding how, when, or if it will be realized.

Petrobras' DFP does not provide sufficient elements to identify which portions of the technological R&D expenses, recorded as expenses in previous income statements (DRE), were subsequently capitalized as intangible assets on later balance sheets after reaching the development phase. This omission makes it difficult for investors to identify the rationale behind classifying R&D expenses as such. The Form 20-F report partially resolves this issue by highlighting ongoing R&D initiatives and suggesting that the most likely reason for the absence of a specific item for R&D in the development phase on the balance sheet is the inability to identify and measure these assets, as evidenced by new patent registrations.

4.2 Disclosure of R&D Expenditures by Vale

a) Disclosure in the DFP:

The company discloses R&D expenditures as a separate item in its operational expenses within the income statement (DRE), distinct from other general and administrative expenses. From the analysis of DFP reports from 2018 to 2022, it is clear that the company has maintained a consistent flow of R&D expenditures for at least the past five years.

Vale defines four reportable business segments: steel solutions, energy transition materials, coal (discontinued operation), and others. The "others" segment includes revenue and costs from other products and services, R&D, investments in joint ventures and associates from other businesses, corporate expenses not allocated to reportable segments, and expenses related to the Brumadinho ecological disaster. R&D expenditures are present in all business segments, with 32.6% allocated to steel solutions, 36.6% to energy transition materials, and 30.7% to others. R&D expenditures in the coal segment are insignificant.

The explanatory note regarding consolidated intangible assets on the balance sheet is segmented into goodwill, concessions, software, and R&D projects. The description of the R&D project segment refers exclusively to ongoing research, development projects, and patents identified in the business combination with New Steel Global N.V., a company that develops iron ore processing and beneficiation technology, acquired in 2019. At the time of acquisition, in the 2019 financial statements, the explanatory notes related to the acquisition of New Steel Global N.V. highlighted an "adjustment to fair value of intangible R&D assets" of the same value as the 2022 intangible R&D project segment, indicating stable values consistent with the statement that intangible R&D assets are not subject to amortization until the operational phase of the projects is complete (DFP 2022, p. 53).

In fact, over the past three years, the specific R&D project segment has remained unchanged from 2022 to 2021, with a 0.11% decrease from 2020, indicating no additions or amortizations. Therefore, it is clear that there is insufficient detail in Vale's financial statements to connect R&D expenses in the DRE to subsequent developments in intangible assets on the balance sheet. In contrast, no additions or amortizations are observed in Vale's intangible R&D asset segment.

b) Disclosure in the Form 20-F:

The word "innovation" does not appear in the DFP, while it is mentioned 16 times in the Form 20-F report. It is only through Form 20-F that we learn the details presented in Table 3.

The Form 20-F report provides more detailed information regarding internally generated R&D expenditures and clarifies the absence of a specific item in intangible assets on the balance sheet related to the development phase. The descriptions in Table 3 illustrate the reasons behind the expenses incurred.

Table 3***Information Disclosed by Vale in the 2022 Form 20-F Report***

In 2021, Vale announced the development of commercially viable sand for use in civil construction, a sustainable alternative resulting from 7 years of research and an investment of R\$50 million.

The green iron ore briquettes are the result of an internally developed technology, stemming from 18 years of research and patented by Vale. They enable a reduction of up to 10% in greenhouse gas emissions throughout the steel production chain.

The increase in R&D expenditures from 2021 to 2022 is attributed to drilling, geological, and mineral exploration projects across all segments.

The Innovation Committee is a permanent advisory body to the Board of Directors, providing strategic guidance on "Digital Transformation, R&D, and Innovation."

Source: Research data.

R&D expenditures are part of the investments aimed at the evolution and performance of the core business and are directed towards solutions for steelmaking and energy transition metals (copper and nickel). Thus, the natural path for these completed initiatives is to be directly associated with fixed assets.

It is important to note that, for Vale, the term "research" is broad and not solely focused on technology; it also includes the search for new mineral sources, which has an exploratory nature for the subsequent extraction, processing, industrialization, transportation, shipment, and trade of mineral goods (Form 20-F, pg. 174).

Unlike Petrobras, which reserves a specific item in the income statement (DRE) for technological R&D expenditures, Vale incorporates not only technology-related expenses but also exploratory research expenditures into its R&D item (Form 20-F, pg. 110).

4.3 Divulgação dos gastos com P&D pela Telefonica Brasil

a) Disclosure in the DFP:

The Management Report highlights that the beginning of 2022 was marked by the effective arrival of 5G technology in Brazil for mobile networks in all 27 capitals, and by the end of 2022, Vivo, the commercial brand of Telefónica Brasil, had covered more than 23 million homes in 409 Brazilian cities.

According to the analysis of DFP information from 2018 to 2022, the company has maintained a steady flow of R&D expenditures over at least the past five years. However, the explanatory notes do not provide details about these expenditures.

Regarding technology, the company is positioned as an ecosystem, with notable developments such as the launch of Ovvi, its own brand of smartphone accessories; the strengthening of the smart home segment, aimed at transforming homes into high-tech environments; and providing the best experience across its 1,800 physical stores.

In the innovation segment, in 2022 the company invested in the creation of Vivo Ventures, a R\$ 320 million Corporate Venture Capital (CVC) fund to invest in Brazilian startups with solutions in the areas of Entertainment, Smart Homes, Marketplace, Health, Finance, and Education, which are considered key sectors for Vivo's positioning. The company invested R\$ 10 million in Klubi, the first fintech authorized by the Central Bank to operate as a consortium administrator, and around USD 3 million in Klavi, a company focused on open finance and B2B (Business to Business) and B2C (Business to Customer) solutions. Additionally, Wayra Brasil, an open innovation hub, ended 2022 with 26 startups in its portfolio, 50% of which generated business for the company.

Despite not being part of the top corporate governance segment of the Brazilian capital market, as it is in the traditional segment, the fact that Telefônica Brasil has ADRs traded on the NYSE raises the expectation of finding R&D projects in the development phase. However, the amounts declared by Telefônica Brasil are cited not as research expenditures but rather as development and innovation investments, including business incubators and testing initiatives.

An analysis of the balance sheet shows that intangible assets exceed fixed assets, with the largest contribution being goodwill with an indefinite useful life, followed by licenses (concessions and authorizations for public services such as the use of mobile frequencies), which have a defined useful life. The licenses for the use of mobile frequencies represent the most significant portion of intangible assets with a defined useful life. There is no mention of internally generated R&D assets.

b) Disclosure in the Form 20-F:

When searching for the word "innovation," it appears 12 times in the DFP and 35 times in the Form 20-F. It is only through Form 20-F that we learn the information presented in Table 4.

Telefônica Brasil considers the main segments of intangible assets with a defined useful life to be: (i) software; (ii) customer portfolio and brands; and (iii) licenses, which include concessions and authorizations acquired from ANATEL. Licenses obtained through business combinations are also included. The description indicates that Telefônica Brasil does not mention internally generated technological R&D that is already in the development phase, suggesting that this stage, when and if it exists, is accounted for as an expense.

Table 4

Information Disclosed by Telefonica Brasil in the 2022 Form 20-F Report

The main intellectual property assets include the permission to use the "Telefônica" brand and all names derived from "Telefônica."

The commercial brands in Brazil include "Vivo" along with its sub-brands: "Vivo Fibra," "Vivo Total," "Vivo Selfie," "Meu Vivo," "Vivo Empresas," "Vivo Play," "Vivo Easy," "Vivo Money," "Vivo Pay," "Vida V," and "Vivo Ads."

The "Aura" brand represents Vivo's Artificial Intelligence.

Permission to use the "Terra" brand, which provides media and digital services.

Source: Research data.

With the important indication that brands are the primary and only reported intellectual property asset, and that the customer portfolio and brands are recorded as intangible assets only when derived from business combinations, it is evident that there is little to no internal technological development within the organization.

4.4 Disclosure of R&D Expenditures by Embraer

a) Disclosure in the DFP:

In the analysis of the income statement (DRE), R&D expenses are itemized. According to the information from the DFP reports between 2018 and 2022, it is clear that the company has maintained a steady flow of R&D expenditures over at least the past five years.

Regarding innovation, the company highlights significant progress in consolidating its presence in the emerging Urban Air Mobility (UAM) industry. In May, Embraer completed the

spin-off of Eve, which will be listed on the NYSE. With a comprehensive portfolio of solutions for the UAM market, including the design of an electric vertical take-off and landing aircraft (eVTOL) and a global services and support network, Eve ended 2022 with potential orders for 2,770 vehicles valued at USD 8.3 billion. Also noteworthy is Embraer-X, an incubator and accelerator for market opportunities, which operates from idea to new business launch. In 2022, the company expanded its international presence by opening an office at the Aerospace Innovation Hub@TUD at Delft University of Technology (TU Delft) in the Netherlands, aiming to accelerate partnerships in emerging technologies for new businesses, and foster joint education, research, and innovation projects. Other initiatives include Beacon, focused on aviation maintenance and digitalization, and XMobots, which is dedicated to drone manufacturing in Latin America. Research expenses in 2022 were 142.8% higher than in 2021, primarily driven by Eve's activities, but other initiatives, such as research into sustainable aviation fuel (SAF), are also significant.

In the balance sheet (BP), intangible assets exceed fixed assets, and there is no contribution from goodwill, indicating organic growth at Embraer. In the information on intangible assets, the values are separated into internally developed and third-party acquired assets, corresponding to Embraer's four business segments: commercial aviation, executive aviation, defense and security, and services and support. Internal development for commercial aviation (53.1%) and executive aviation (39.2%) accounts for 92.3% of the company's total intangible assets. Including internal development for defense and security, 96.4% of the intangible assets are internally generated. The BP shows that Embraer is almost self-sufficient in its intangible assets, as they are primarily generated internally, with the exception of the software used. In the segment presentation of the DRE, R&D expenditures are not broken down by business segment.

b) Disclosure in the Form 20-F:

In a search for the word “innovation,” it appears 21 times in the DFP and 54 times in the Form 20-F. It is only through the Form 20-F that we learn the information described in Table 5.

Table 5

Information Disclosed by Embraer in the 2022 Form 20-F Report

In commercial aviation:
The first family of aircraft was the ERJ, with 330 aircraft still in service worldwide.
In 2022, the 1,700th aircraft from the Embraer 170/190 Jet family, with seating capacity ranging from 66 to 124, was delivered.
The newest family is E2, an evolution of the 170/190 series, with seating capacities ranging from 70 to 144. The first delivery of the 190-E2 model took place in 2018. By the end of 2022, a total of 69 aircraft had been delivered.
The main competitors are Airbus, Bombardier, COMAC, Sukhoi, ATR and Mitsubishi.
In executive aviation:
The products include the Phenom, the Praetor 500 and 600, the Lineage 1000, and the Legacy 650.
The limited production of the Phenom 300 paired with the Porsche 911-S, in partnership with Porsche, concluded in 2022.
By 2022, 1,650 units had been delivered to 1,000 clients across 65 countries.
The main competitors are Textron, Honda, Dassault, Pilatus and Gulfstream.
In defense and security:
By 2022, 1,400 defense units had been delivered.

The main products are the F-39 Gripen fighter, the C-390 cargo aircraft, and the A-39 Super Tucano.

A notable highlight is the agreement between Embraer and Telebrás to establish Visiona Tecnologia Espacial S.A. for the development of a geostationary communications satellite.

Embraer's intellectual property includes utility patents, design patents, trade secrets, know-how, and trademarks. By 2022, there were 796 patent applications and 640 patents granted.

The innovation pillars are: zero carbon emissions, autonomous flight, artificial intelligence and data science, Industry 4.0, aeronautical competitiveness, business-based platforms, passenger experience, and cybersecurity.

Source: Research data.

Current R&D expenditures account for 4.8% of Embraer's intangible assets. On average, from 2010 to 2022, Embraer's R&D expenditures represented 9.4% of its intangible assets. The amortization of internally generated intangible assets is declared by Embraer as being "according to the estimated series of aircraft sales." Intangible assets acquired from third parties are amortized on a straight-line basis according to the estimated useful life of the assets.

4.5 Disclosure of R&D Expenditures by BRF

a) Disclosure in the DFP:

BRF is a Brazilian multinational in the food sector, operating in the breeding, production, and slaughtering of poultry and pigs, as well as the industrialization, commercialization, and distribution of fresh meats, processed products, pasta, margarines, pet food, and others. The company owns major brands such as Sadia, Perdigão, Qualy, Chester®, Kidelli, Perdix, Banvit, Biofresh, and Gran Plus, which are primarily present in Brazil, Turkey, and Middle Eastern countries. The company is listed on the Novo Mercado segment. BRF operates through a vertically integrated production system, supplying supermarkets, retail stores, wholesalers, restaurants, and other institutional clients.

The analysis of financial statements from 2018 to 2022 shows that the company has maintained a steady flow of R&D expenditures over the past five years. However, the explanatory notes related to R&D expenditures do not provide details about projects, segments, or associated initiatives, even in the years with higher expenditures.

BRF adopts geographic segmentation with three defined and reportable areas: Brazil, International, and Other Segments. Net revenue is divided into three categories of sales: fresh (poultry and pork), processed, and other sales.

Intangible assets are not presented by segment. The increase in intangible assets compared to 2021 is 17.8%, mainly due to business combinations with Joody Al Sharqiya Food Production Factory and Grupo Hercosul.

b) Disclosure in the Form 20-F:

In a search for the word "innovation," which appears 3 times in the DFP, it is mentioned 26 times in the Form 20-F. It is only through the Form 20-F that we learn the information described in Table 6.

Table 6*Information Disclosed by BRF in the 2022 Form 20-F Report*

In 2022, BRF launched 192 new consumer products (SKUs - Stock-Keeping Units), with 101 for the domestic market and 91 for the international market.

The R&D for the rooster breed under the Chester® brand is conducted by the American company Cobb Vantress.

R&D contributes to reducing fat, cholesterol, and calories in pork produced in Brazil.

R&D and innovation activities encompass agricultural research and innovation, as well as product and process development. The BRF Innovation Center (BIC) is headquartered in Jundiaí, São Paulo.

The BIC was funded by FINEP with a total investment of R\$106 million to establish technological development standards in the food industry.

BRF operates one of the world's largest experimental agricultural research facilities for poultry and swine, spread across four experimental farms in the state of Santa Catarina.

They have eight bromatology laboratories and five reception and classification laboratories.

BRF has field research initiatives to evaluate technologies under real production conditions.

Ongoing R&D projects aim to reduce additives in meat products and develop natural ingredient solutions to extend product shelf life.

BRF has established research partnerships in projects funded by EMBRAPA, FINEP, CNPq, and BNDES, covering various research areas.

In 2021, BRF signed a memorandum of understanding with Aleph Farms, Ltd, an Israeli startup that develops lab-grown proteins from animal cells.

The Seropédica factory in Rio de Janeiro was built based on the Industry 4.0 concept.

In 2022, Sadia was recognized as the most valuable brand in Brazil in the food segment, according to Kantar BrandZ®.

Source: Research data.

The BRF Form 20-F report provides more detailed information regarding internally generated R&D expenditures. However, beyond the description of initiatives, there are no clear data facilitating the allocation of these expenditures. The natural pathway for these produced initiatives is to be directly associated with products and/or fixed assets. In the descriptions above, there are no references to actions related to digital transformation, a movement that virtually every company of BRF's size undertakes, except for the recently inaugurated factory designed under the Industry 4.0 concept.

It is observed that BRF has concrete research initiatives, in addition to its BIC center. However, part of this research is outsourced to a specialized partner, Cobb Vantress.

4.6 Discussion of Results

The research data indicate that all analyzed companies have maintained a stable flow of R&D expenditures over the past five years. A qualitative analysis of R&D spending among five companies with ADRs on the NYSE reveals that Embraer, BRF, and Petrobras are significant technological R&D investors. These companies report and disclose R&D expenditures as expenses within their financial statements. Sustained R&D investment is critical for these firms to retain competitive market positions and to achieve future growth through new products and ventures. Notably, Embraer demonstrates a high level of self-sufficiency, with intangible assets—primarily generated through internal development—exceeding its fixed assets.

For Vale, while it also reports a consistent R&D investment over the past five years, its disclosures—particularly in Form 20-F—are less transparent than Petrobras's in distinguishing between technological R&D and mineral extraction research focused on operational continuity. As highlighted by Iqbal et al. (2022), mineral exploration within mining or oil and gas industries is categorized as an operational activity rather than technological R&D, as it pertains directly

to resource extraction. This distinction underscores the need for clearer separation of technological R&D components from those related to mineral extraction.

In contrast, Telefônica Brasil, as a network and telecommunications service operator tied to a foreign parent company, does not invest significantly in R&D. Instead, the company has limited internal technological development, with R&D activities consolidated within the financial results of the Telefônica Group in Spain, which is also listed on the NYSE.

The five tables reveal that technological R&D information disclosed in Form 20-F reports filed with the SEC is notably more detailed and accessible—primarily due to the dedicated item 5-C—compared to the disclosures in DFP filings with the CVM. Interestingly, none of the companies studied apply the structured 5-C format in their DFP submissions to the CVM, despite including it in their Form 20-F reports, thereby enhancing the transparency and accessibility of R&D information for SEC filings.

Table 7 highlights additional reporting differences by summarizing the occurrences of the term “innovation” in each company's 2022 financial reports. Reports filed with the SEC place a stronger emphasis on detailing innovation-related information.

For example, assessing the commercial potential of Vale’s high-quality sand patents is complex. A similar challenge exists with the 1,218 patents under development at Petrobras, particularly as its R&D is focused more on process innovation than on developing marketable products and services. Similarly, Embraer’s advances in urban air mobility and its electric vertical take-off and landing aircraft (eVTOL) project are challenging to quantify. Equally difficult is quantifying the benefits of BRF’s projects focused on reducing fat, cholesterol, and calories in pork.

Table 7

Citations of the term "innovation"

Report	Form 20-F	DFP
Filed with the	SEC	CVM
Vale	16	0
Petrobras	38	2
Telefonica	35	12
Embraer	54	21
BRF	26	3

Source: Research data.

The R&D projects analyzed in this qualitative review of Brazilian companies across various industrial sectors highlight the diversity and complexity of these endeavors, which often differ in maturation timelines and operational impacts. Collectively, they illustrate the broad scope and potential value of diverse intangible assets.

5 Final Considerations

This study reveals notable differences in the quality, particularly in terms of organization, completeness, and detail of disclosures on technological R&D and innovation initiatives by the five Brazilian companies examined, all of which are listed on both B3 and the NYSE and disclose their financial reports under the same IFRS standards, as regulated by the CVM and SEC.

The findings indicate that the R&D expenditure information disclosed in the SEC Form 20-F reports is more detailed and systematically organized than the corresponding data in the

DFP reports filed with the CVM. Furthermore, SEC reports provide more comprehensive information on innovation-related activities.

The technological R&D projects undertaken by these companies, spanning various industrial sectors, exhibit a high degree of diversity, complexity, and varied maturation periods and operational lifespans, underscoring the broad spectrum of intangible asset types. However, there is no standardized presentation in the explanatory notes of the financial statements filed with the CVM, contrasting with the structured 5-C section in SEC filings, which consolidates relevant information.

The study highlights two major deficiencies in the disclosure practices of Brazilian financial statements related to internally generated R&D expenditures, resulting in information asymmetry between capital markets. First, the absence of a standardized section to consolidate R&D expenditure data—similar to section 5-C in Form 20-F—limits access to critical information in domestic reports. Second, the quality of financial information disclosed by Brazilian companies is notably more organized, rigorous, and detailed for the international market than for the domestic market, contrary to CVM's regulatory guidelines. These findings underscore the need for enhanced regulatory efforts by Brazilian capital market authorities to strengthen existing accounting standards and improve the monitoring of disclosure quality among publicly traded companies.

In addition to these two deficiencies, a third issue, although beyond the scope of this study, aligns with findings by Peters and Taylor (2017). Their research highlights that R&D expenditure information recorded as expenses, in compliance with IAS 38 and detailed in section 5-C of Form 20-F, has been integrated into the U.S. financial and market data platform Compustat® since 1975. However, such data are still not incorporated into Brazil's equivalent platform, Economatica®. Since financial analysts extensively rely on information platforms for data extraction, studies, and analyses, the absence of R&D expenditure data on the Brazilian platform restricts the capacity of accounting information users in Brazil.

In contrast, U.S.-based users and analysts can easily extract expense-recorded R&D data from financial platforms for research purposes. For example, analysts could incorporate R&D expenditures into a company's intangible asset portfolio to assess implications for financial metrics such as the book-to-market ratio (Hulten & Hao, 2008). In Brazil, due to the absence of this data on financial information platforms, conducting such a study would be challenging, as it would require manually retrieving R&D expenditure figures from each individual financial statement.

The treatment and disclosure of R&D expenditures, fundamentally linked to a company's intangible assets, presents a substantial challenge for both national and international accounting standard-setting bodies. Efforts to address this challenge aim to increase the relevance and utility of financial information, especially given the substantial impact and significance of intangible assets for companies operating in today's knowledge-driven economy.

Based on the evidence gathered in this research, the previously anticipated limitations—specifically, the potential lack of significant differences in the criteria and characteristics of accounting information on technological R&D expenditures between financial statements filed with the CVM and SEC—did not materialize. Increasing the sample size beyond the five companies analyzed would not have meaningfully contributed to the study's objectives, thus supporting Fields et al. (2001) recommendation to encourage researchers to undertake studies with smaller samples, promoting a deeper, experience-based understanding among accountants.

Future qualitative research should consider a more detailed examination of the explanatory notes in financial statements from Brazilian companies within the electric energy

sector. Such an analysis would elucidate the nature and location of R&D expenditures, which are mandated by regulatory authorities rather than conducted voluntarily, allowing for a better understanding of how these companies control and benefit from mandated R&D investments.

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