


Uniformity and consistency of choices in the recognition and measurement of biological assets


Uniformidade e consistência das escolhas no reconhecimento e mensuração de ativos biológicos

Uniformidad y consistencia de opciones en el reconocimiento y medición de activos biológicos

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Abstract

The lack of uniformity of choices leads to limitations in the consistency of accounting policies, which tend to reduce the comparability of information. This research analyzes the comparability of choices in recognizing and measuring biological assets in terms of uniformity and consistency. For this, it uses reports collected from stock exchanges/corporate sites of 24 companies listed in Brazil, Argentina, and Chile in the forestry segment, in two periods (2011 and 2020). Through content analysis, we found a diversity of choices, although the entities adopt an international standard and operate similar assets. In the Brazilian, Chilean, and Argentine contexts, we found that the choices in the recognition and measurement of forests have a reasonable level of consistency over time and some improvement in accounting practices, although with reduced comparability between companies and a high number of uninformed choices. Accounting standard setters should reduce implicit and explicit choices incorporated in IFRS, as choices interfere with the comparability of information.

Keywords: Measurement choices; Accounting uniformity; Fair value hierarchy; Forests; Consistency of choices

Resumo

A falta de uniformidade de escolhas conduz a limitações na consistência de políticas contábeis, o que tende a reduzir a comparabilidade da informação. Esta pesquisa analisa a comparabilidade de escolhas no reconhecimento e mensuração de ativos biológicos em termos de uniformidade e consistência. Para isso, utiliza relatórios coletados de bolsas/sítios corporativos de 24 empresas listadas no Brasil, Argentina e Chile do segmento florestal, em dois períodos (2011 e 2020). Mediante análise de conteúdo, constata-se diversidade de escolhas, embora as entidades adotem padrão internacional e operem ativos semelhantes. Nos contextos brasileiro, chileno e argentino, constata-se que as escolhas no reconhecimento e mensuração de florestas apresentam razoável nível de consistência no tempo e alguma melhoria nas práticas contábeis, embora com reduzida comparabilidade entre empresas e elevado índice de escolhas não informadas. Os construtores de padrões contábeis deveriam reduzir escolhas implícitas e explícitas incorporadas nas IFRS, já que elas interferem na comparabilidade da informação.

Palavras-chave: Escolhas na mensuração; Uniformidade contábil; Hierarquia de valor justo; Florestas; Consistência de escolhas

Resumen

La falta de uniformidad de opciones conduce a limitaciones en la consistencia de las políticas contables, que tienden a reducir la comparabilidad de la información. Esta investigación analiza la comparabilidad de opciones para reconocer y medir activos biológicos en términos de uniformidad y consistencia. Para ello, utiliza informes recolectados de bolsas de valores o sitios web corporativos de 24 empresas listadas en Brasil, Argentina y Chile en el segmento forestal, en dos períodos (2011 y 2020). A través del análisis de

contenido, existe una diversidad de opciones, aunque las entidades adoptan un estándar internacional y operan activos similares. En los contextos brasileño, chileno y argentino, encontramos que las opciones en el reconocimiento y medición de bosques tienen un nivel razonable de consistencia en el tiempo y alguna mejora en las prácticas contables, aunque con una menor comparabilidad entre empresas y una alta tasa de elecciones desinformadas. Los creadores de estándares contables deben reducir las opciones implícitas y explícitas incorporadas en las NIIF, ya que interfieren con la comparabilidad de la información.

Palabras clave: Opciones de medición; uniformidad contable; Jerarquía de valor razonable; bosques; consistencia de las opciones

1 Introduction

Among the purposes of the International Accounting Standards (IAS, replaced in 2001 by IFRS – International Financing Reporting Standards) are the improvement in the overall quality of statements and information comparability, through standards, interpretations, and frameworks based on principles and used for preparing financial statements (IASB, 2018), in order to faithfully represent entities' economic and financial situation (Cavalheiro, Gimenes, & Binotto, 2019). The comparability provided in IFRS is the attribute that enables investors and creditors to evaluate similarities and differences in statements between entities, assuming that similar things should look similar, and different things should look different (IASB, 2018).

However, the apparent side effect of principle-based standards lies in the possibilities of implicit and explicit accounting choices (Dantas *et al.*, 2010; Reisch, 2021), which enable management judgment and distinct procedures that interfere with information comparability (Herbohn & Herbohn, 2006; J. S. Oliveira *et al.*, 2015), as shown by studies on biological assets (Figueira & Ribeiro, 2015; Ganassin, Rodrigues & Borges, 2016; Talaska & Oliveira, 2016).

Although comparability is an expected and intended feature of IFRS adoption (IASB, 2018; Jung, D. J., Hur, & Jung, A. R., 2020), studies identify differences in accounting choices across countries and firms within an industry (Cavalheiro *et al.*, 2019; Giertlova, Dobsinska, & Sulek, 2017), which has different explanations, such as firm-specific and institutional environment factors (Reisch, 2021), and limitations of IFRS translations into local language (Hellmann, Patel, & Tsunogaya, 2021), among others. However, comparability is a desirable feature for foreign investors (Chauhan & Kumar, 2019), which facilitates highlighting company's performance within the industry, allowing faster and more convenient decisions (Liem, 2021), enhances investors' monitoring of resource use, and increases shareholder value (J. Kim *et al.*, 2021), besides reducing management results by accruals (Sohn, 2016), especially in frontier markets (Martens, Yapa, & Safari, 2020).

As for biological assets, there is a range of choices for measurement, considering IAS 41 requirements – Agriculture, and of the Conceptual Framework (Cavalheiro *et al.*, 2019; Ortiz & Oliveira, 2020). There are more choices for the segments that measure biological assets based on unobservable data, by applying valuation techniques, as occurs with sugarcane (Cavalheiro & Binotto, 2018) and forestry segments (Pereira *et al.*, 2020). Literature shows that there are no guidelines in international standards (e. g. IAS 41 and IFRS 13 - Measurement Fair Value) for the assessment of these assets (Grege-Staltmane, 2010), which can enhance the discretion of managers and those who prepare statements towards choices for preparing and disclosing financial information. Consistency of choices, in this case, means applying the same methods for the same items over time, for the reporting entity or across entities in a period (IASB, 2018).

The assumption of Conceptual Framework - "comparability is the goal; consistency helps achieving this goal" - was empirically tested in the literature, and found that accounting changes [lack of consistency] are negatively associated with statements' comparability (Y. S. Kim, 2020). Therefore, to conclude on comparability, it is necessary to analyze accounting choices over time and across countries, as well as their uniformity and consistency, as previous studies point out (Chauhan & Kumar, 2019; Martens *et al.*, 2020).

Considering the expected benefits of financial information comparability under IFRS, this study aimed to analyze the comparability of accounting choices in recognizing and measuring biological assets, in terms of uniformity and consistency, in entities of the forestry segment in Latin America, from the analysis of reports in two start and end periods, in 10 years of adopting IAS 41 (from 2011 to 2020).

It presents three differences from previous studies. First, information comparability has been analyzed through macro-approaches, which consider several IFRS standards simultaneously (Reisch, 2021), by adopting quantitative analysis (Martens *et al.*, 2020), without a careful assessment of the explanatory notes that support the choices. In this case, this study is limited to the analysis of one international standard (IAS 41) applied to a segment whose information relevance has been questioned in the literature, given the possibilities of accounting choices allowed by the standard (Machado, Martins, & Carvalho, 2014; Pereira *et al.*, 2020). Second, authors generally analyze accounting practices from multiple agribusiness segments (Figueira & Ribeiro, 2015; Ganassin *et al.*, 2016; Martins, Machado, & Callado, 2014; Scherch *et al.*, 2013; Silva, Machado, M. A. V., & Machado, M. R., 2013; Talaska & Oliveira, 2016), which tends to compromise the analysis of choice consistency, since differences could be explained by variables at the segment level (e. g.

particularities of the asset and operations, IFRS applied). Thus, this study focuses on one segment in three IFRS adopting countries (IAS 41), and is different from papers that addressed practices in only one country (Macedo, Campagnoni, & Rover, 2015; Wanderley, Silva, & Leal, 2012). Third, studies on choices usually focus on measurement bases (fair value *versus* cost), disregarding several choices within each base (Botinha & Lemes, 2017; Cairns *et al.*, 2011), which could affect users' decisions.

Therefore, it analyzes seven choices within the recognition (2) and measurement (5) of forests dimensions. The multidimensional approach, provided in the literature (D. M. Silva, Martins, & Lemes, 2016), considers that choices might not represent isolated actions, that is, managers could make several choices toward a single goal (Fields, Lys, & Vincent, 2001).

We chose the forest segment due to subjectivity in the measurement process (Machado *et al.*, 2014), the long production cycle (20-30 years), and uncertainties in the estimates of cash flows, discount rate, and biological conditions of asset realization (Pereira *et al.*, 2020). In addition, we analyzed if the different interpretations of the standard, already noted in the segment at the beginning of its adoption, and the distinct accounting choices (Budrionyte & Gaizauskas, 2018; Grege-Staltmane, 2010; Stárová *et al.*, 2016) are practices that persist.

This article responds to a research call for comparing accounting choices in the measurement of biological assets by entities, in different countries (Holtz & Almeida, 2013), as well as to the demand for cross-country research on choices in specific sectors that apply IAS 41, in order to compare the choices of Brazilian firms with those of other nations (Cavalheiro *et al.*, 2019), in two accounting dimensions: recognition and measurement. Additionally, Stárová *et al.* (2016) defended continuing the research, in order to introduce representative and meaningful rules for a uniform and 'uncomplicated' forest valuation, with results that could be compared, in general.

This research analyzed the set of statements and explanatory notes from 24 companies (Brazilian, Argentinean, and Chilean) that operate with the biological asset 'forests', in two start and end periods (2011 and 2020), to identify the uniformity and consistency of accounting choices on the recognition and measurement of this asset - totaling 48 analyzed reports. Once the accounting choices were identified, we proceeded to examine results and compared them with the literature, identifying differences and similarities, as well as relevant advances.

2 Accounting Choices and Measurement of Biological Assets

In subsection 2.1, we present a review of the measurement bases of biological assets, followed by the set of choices for recognizing and measuring forests (2.2).

2.1 Accounting choices for measuring biological assets

Specificities of each activity - such as forests, temporary and perennial plantations, beef cattle breeding, dairy farming, production of fish, poultry, pigs, and fruit trees - are incompatible with the adoption of single accounting methods or procedures for measuring and reporting, which contrasts with IAS 41, when determining the fair value for biological assets, and cost as the exception (IASB, 2009; J. S. Oliveira *et al.*, 2015). Particularities could justify the different choices in measuring biological assets between entities and over time. However, even with the diversity of assets and businesses, the prediction of IAS 41 is to measure all biological assets at fair value (except for bearer plants), a generalization that may bring limitations in certain contexts, as is the case of the sugar and ethanol (standing cane)¹ and forestry segments (Cavalheiro & Binotto, 2018; Pereira *et al.*, 2020).

At the heart of the creation of international standards is the search for information comparability, between similar entities and over time, and between countries (Cairns *et al.*, 2011; Herbohn, 2009). According to Mates *et al.* (2015), the implementation of the international standard IAS 41 in the accounting of agricultural entities tends to contribute to the use of common language in financial markets; dispute of competing companies in the global market; improvement in the relationships with banks and financial markets. However, some biological assets have no active market, and must be priced with a high degree of discretion, through a specific technique that demands estimates of cash flows and discount rate for long periods; this allows a high number of accounting choices (Cavalheiro *et al.*, 2019), which could interfere with the comparability of statements.

The diversity of choices for biological assets is confirmed when we observe that companies from the same industry measure their assets by different methods (Ganassin *et al.*, 2016; Macedo *et al.*, 2015). Given this scenario, information users (investors, analysts) turn to explanatory notes for additional details (Nogueira & Pires, 2017). However, these companies may present disclosure choices and compliance levels that are also distinct (Monico *et al.*, 2020; Talaska & Oliveira, 2016).

Even when entities adopt one of the bases (cost or fair value), there are specific choices within these bases that can influence the decisions of information users in assessing the economic and financial situation of the entity, as happens with sugar and ethanol companies (standing cane) that adopt the fair value based on Discounted Cash Flow, but make different choices related to the assumptions adopted, approaches in

cash flow projection, methodologies for setting the discount rate (e. g. WACC/CAPM, sectoral rate), projection horizon, price projection techniques, and asset amount (Cavalheiro *et al.*, 2019).

Likewise, research with preparers and auditors of forest segment statements found that measuring these assets is complex, and it is difficult for external users to recalculate the reported values (forests' fair value and adjustment to fair value), since they do not know the sector or do not have access to information used in the valuation model (Pereira *et al.*, 2020). Given the multiple potential choices for the segment - which tend to reduce the comparability of statements - disclosure (in notes) would complement information on the asset, improving its relevance for external users (Gonçalves *et al.*, 2017). However, studies have found that companies fail to present information on accounting policies related to biological assets and agricultural products, or disclose superficial information (Monico *et al.*, 2020; Talaska & Oliveira, 2016).

2.2 Main accounting choices for forest assets

This section is based on a review of scientific production at four databases, between 2001 and 2020, to extract the main accounting choices, related to counting biological assets measured at the level 3 of the value hierarchy (e. g. forests). We found and reviewed 178 articles in the bases Scopus, Web of Science, Spell, and Scielo.br, from expressions in topics (title, abstract, and keywords) for the two first bases: `||"biologic* asset*"OR "agricultur* produce*" AND "fair value" OR "cost" OR "relevance" OR "IAS 41" OR "faithful representation" AND "measure*" OR "recognition*" OR "disclosure*"|`. For the bases in Portuguese (Spell and Scielo.br), we used equivalent expressions in that language. In addition to the articles, the main accounting standards linked to biological assets and to the measurement of fair value (IAS 41 and IFRS 13) were reviewed and used in defining the choices (See Appendix A).

Subsections 2.2.1 and 2.2.2 organize the accounting choices analyzed by two dimensions: i) choices in recognizing forests; and ii) choices in measuring forests.

2.2.1 Choices in recognition

Measurement of the biological asset at initial recognition. In some countries, entities use the exception of historical cost to measure biological assets in forests' first years; others measure them at fair value or cost, throughout the production cycle (Macedo *et al.*, 2015). For Budrionyte and Gaizauskas (2018), the use of fair value in forest accounting is complex, due to the need for annual valuation. However, different choices hamper the comparability of financial statements (J. S. Oliveira *et al.*, 2015) between entities, especially in the forest segment, as it is a possibility explicitly presented by IAS 41 (item 24b), when considering that cost can approach fair value when "[...] b) the impact of the biological asset transformation on the price is not expected to be material (for example, for the initial growth of pine plantation, whose production cycle is 30 years)".

Recognition of the agricultural product. IAS 41 establishes that the agricultural product is measured at the time of harvest, at fair value less selling expenses (IASB, 2009). Some industries have a vertical production (biological asset and processing), such as sugar cane mills and companies that process wood (pulp and paper, other wood products). The agricultural product, in these cases, must be recognized at the time of cutting, determining gains or losses with the harvest (items 28-29 of IAS 41). However, there are reports in the literature that both harvest results and the agricultural product are not included in entities' financial statements, because the agricultural product is harvested and immediately inserted in agribusiness (D. L. Oliveira, Scarmocim, & Silva, 2020).

2.2.2 Choices in measurement

Subsequent measurement. Studies in Brazil show that some companies in the pulp and paper segment measure forests initially at cost, and, after a few years, at fair value (Discounted Cash Flow) - eucalyptus at cost in the first three years, and at fair value from the fourth year on; pine at cost until the fifth year, and at fair value for the remaining useful life (Macedo *et al.*, 2015). As already mentioned, these firms use the exception of IAS 41 (item 24b), which enables measuring forests at cost in the early stages, when biological change is not significant and cost approaches fair value (IASB, 2009). Giertliová *et al.* (2017) also recommend a similar procedure, that is, cost for young forests and discounted cash flow for mature forests.

Nevertheless, there is no consensus on when the produced forest can be measured at fair value with reasonable reliability; that is, the point at which the measurement basis changes (from cost to fair value) is uncertain for species (Machado *et al.*, 2014). The adoption of multiple measurement bases in similar situations, as stated by Scott, Wingard, and Biljón (2016), compromises the goal of allowing information users to compare financial results across entities and sectors. In addition, it is difficult to evaluate forests commonly presented in the literature, especially the annual assessment in its various stages (Tzschupke, 2009), due to the long production cycle, affecting the reliability of cash flow estimates (Pereira *et al.*, 2020).

Fair value assessment technique. The absence of guidelines (interpretations, directions, etc.) on technique and procedures for fair value valuation of assets without market value contributes to the lack of

uniformity of the assessment and reports on biological assets among companies in the same segment (Scott *et al.*, 2016). A study in Latin America, covering several agribusiness sectors, showed that the revenue approach, through the application of discounted net cash flows, is prevalent in entities that measure assets without market value (Ganassin *et al.*, 2016).

Discount rate (method). Regarding the choices around the discount rate for fair value assessment at level 3, there is an extensive discussion among researchers and a lack of consensus in the literature (Ambrozini, 2014; He, 2020), and in the practice of agribusiness entities (Cavalheiro *et al.*, 2019; Figueira & Ribeiro, 2015). We noticed several choices related to the methodology (WACC/CAPM, APM, sectoral rate, etc.) and its components (risk measures, beta, risk-free rate, return...), even within the same segment (Cavalheiro & Binotto, 2018). There is still the understanding that the rate is not disclosed in the notes because it is a strategic information (Machado *et al.*, 2014).

Additionally, choices about the rate could be used by managers to manipulate opportunistically the fair value at the desired level, compromising information reliability (He *et al.*, 2021). Rate uncertainty imposes subjectivity on fair value, and interferes with statements' comparability (Stárová *et al.*, 2016). The disclosure of used rates, of the assumptions for estimating cash flows, as well as of the flow periods and sensitivity maps, is one of the factors to ensure information reliability and verifiability (Santos *et al.*, 2018).

Assumptions of biological assets' measurement. IAS 41 establishes that these assumptions must be disclosed in order to provide users with information on the evaluation process. According to Figueira and Ribeiro (2015), more than half of the analyzed entities used discounted cash flow (assets without market value), but without disclosing detailed assumptions on this measurement (source of prices, discount rate), which could reduce the comparability of statements and hinder the decisions of external users. In the forestry segment, there are also reports that disclosing information is not sufficient for understanding or checking fair value calculations (Pereira *et al.*, 2020). Disclosures of inputs for determining cash flows are important for statement reliability.

Responsibility for asset valuation. Given the particularities of biological assets, some companies use the services of third-party experts for their valuation, as reported by Macedo *et al.* (2015), in the meat and derivatives, and by Grege-Staltmane (2010), in the forest segment. Other companies use internal measurement, from managers' perspective - which would increase subjectivity in the evaluation process and enable managing profits (He *et al.*, 2021; R. L. M. Silva *et al.*, 2015). In the Australian forestry segment, there is also a diversity of procedures, where some firms use experts for valuating forests (Herbohn, 2009).

For Biljon and Scott (2019), it may be necessary, in several situations, to use independent expertise for the valuation of biological assets, considering that accountants are not trained farmers - which could also reduce the time for preparing reports.

3 Method

Literature indicates that the diversity of biological assets, the country scenario, the (in) existence of a national standard equivalent to IFRS, and the degree of maturity of the capital market could justify different accounting choices based on the same international standard (Cairns *et al.*, 2011; Ganassin *et al.*, 2016; Grege-Staltmane, 2010). Hence, focusing on specific segments, in a cross-country perspective, contributes to understanding entities' accounting policies and limitations in applying the standard.

This study focused on the forest segment (pulp and paper, wood, and other products with forest assets), aiming to advance knowledge on accounting choices in the recognition and measurement of biological assets under IFRS - considering that forest assets are among the most complex for valuation and disclosure (Acuña *et al.*, 2020; Machado *et al.*, 2014), in addition to questions regarding the relevance of measuring these assets at fair value, based on IAS 41 (Pereira *et al.*, 2020).

We defined Latin America as the research region, due to the need for considering certain institutional/legal and regional similarities that allow the comparability of accounting choices, considering that entities located in the same region tend to adopt similar accounting models (Loureço *et al.*, 2018), although not identical. Given that the Conceptual Framework predicts improved consistency of choices under IFRS (IASB, 2018), this trend is analyzed with empirical data from companies in each country.

The three countries chosen for the research (Brazil, Argentina, and Chile) are the largest in the region in planted forest areas - accounting for about 15.8 million hectares in 2020, according to the Food and Agriculture Organization (FAO, 2021) criteria. Additionally, the following requirements were used to define the countries in the sample: i) adopting IFRS for the forestry segment (IAS 41) in the period 2011 to 2020; ii) having listed companies in that segment; and iii) disclosing statements and explanatory notes periodically.

Therefore, we adopted a cross-country approach with Latin American countries, and analyzed reports of listed companies, in two start and end periods (2011 and 2020), for comparing accounting choices and analyzing uniformity and consistency between entities, between countries, and over time.

Based on scientific production, we found that a small number of studies (cited in the theoretical framework) address accounting choices for recognition and measurement of forests, since the issuance of IAS 41. Most of these studies used surveys or interviews with managers and preparers of statements, in order to learn their main accounting practices (Budrionyte & Gaizauskas, 2018; Pereira *et al.*, 2020).

Unlike these studies, we used archive data from the forestry segment (statements and explanatory notes) to analyze accounting choices in forest measurement, considering that these disclosed reports capture such choices and can influence the decisions of external users. Although survey information can complement knowledge on accounting choices, there are difficulties for accessing managers and statement preparers from a large number of companies (Cavalheiro & Binotto, 2018) - given their short available time. In addition, research on accounting choices of other IFRS topics has used archive data to investigate specific accounting phenomena (Botinha & Lemes, 2017; Salotti & Santos, 2015).

The identification of sample and data collection was distinct in each country, because of the differences in the level of information on the companies listed on each national stock exchange. For the sample of Brazilian companies listed on B3 (Bolsa, Brasil, Balcão), they were identified directly on the stock exchange's website, in the 'Listed Companies' menu (B3, 2021). Initially, we identified eight companies in the pulp and paper (6) and wood (2) segments. Then, we searched for other agribusiness companies that operate with forests (other segments), since our focus was on choices for measuring and recognizing these assets. We found nine more, totaling 17 Brazilian companies.

For the sample of Chilean entities, we started from the list of the 500 largest companies in 2019 (América Economía, 2019), identifying those listed on the stock exchange and operating in the pulp and paper sector (Bolsa de Santiago, 2021). We found seven companies that operate with forest assets and disclose their statements. The search for firms in other agribusiness segments with forest balances returned no result.

We formed the sample of Argentinean companies by reading the description of operations of each entity listed on the stock exchange (Investing.com, 2021), since there was no free information available on listed companies by segment on Buenos Aires stock exchange. We found three listed companies that operate in the pulp and paper segment and disclosed their statements for some years of the period under analysis. No companies from other agribusiness segments with forest balances were identified. Altogether, the sample resulting from these procedures comprised 27 listed companies that operate with forest assets - 17 in Brazil, seven in Chile, and three in Argentina.

After identifying the firms in the sample, accessing statements and explanatory notes, from 2011 to 2020, also occurred differently in the three countries. For Brazilian companies, the standardized statements were accessed directly on the B3 website ('listed companies/company/structured reports'). The statements of the firms from Argentina and Chile were accessed on their corporate websites.

The previous analysis of the statements allowed refining the sample, remaining only companies with forest balances in at least two periods (between 2011 and 2020). Thus, the final sample had 24 companies - 16 listed in Brazil, five in Chile, and three in Argentina.

Therefore, between 2011 and 2020, we chose two start and end periods based on the criteria: i) availability of financial statements; and ii) balance of forests in the balance sheet. For companies with no forest balance in 2011, we considered the subsequent period until the first period with a balance on this item. For companies with no forest balance in 2020, we analyzed the balance of the previous period with a balance on this item. The purpose of the two periods was to establish a comparative approach of the accounting choices over time, and the eventual evolution of compliance with IAS 41. Hence, we analyzed 48 accounting reports for each of the choices presented in subsection 2.2. The research design summarizes the procedures adopted, as well as the criteria for the sample and the analysis (Figure 1).

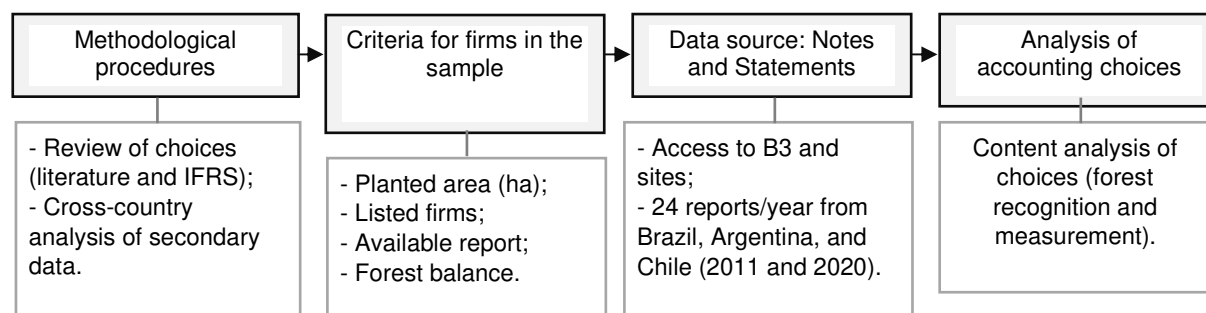


Figure 1. Research design: uniformity and consistency of accounting choices in the forestry segment

We defined two start and end years as the object of analysis (2011 and 2020), considering that the adoption of international standards in the sample countries started in the second decade (2010). Therefore, we excluded the first year (2010), considering that it represented a period of change and accounting adjustments, besides being a moment for learning to apply the standard. Additionally, we did a prior exploratory analysis of the periods immediately close to 2011 (2012-2014) and to 2020 (2017-2019), in order to include a longer period in the sample. However, we noted that disclosure choices on recognition and measurement of biological assets were fairly constant at the entity level, as mentioned in the papers by

Monico *et al.* (2020) and Talaska and Oliveira (2016). Hence, we chose to analyze two start and end years - 2011 and 2020.

Data were analyzed through content analysis of companies' statements and explanatory notes, according to Bardin (2016), based on the choices presented in subsections 2.2.1 and 2.2.2 (*a priori* categories and subcategories - see Appendix A). In particular, we analyzed notes on 'Inventories', 'Biological Assets', 'Noncurrent receivables' and 'Fixed Asset'. Companies were coded (letters) for analysis, since the association between name and accounting choices was not the research target (Appendix B). Appendix C shows the representation of biological and forest assets in total assets, for the second period of analysis (2020).

Entities classified in the forest segment (Appendix C) operate specifically with pulp and paper and wood, in diversified activities such as production of panels, paper and other wood derivatives, laminates, sale of raw wood, and production of matches, among others. The main species cultivated are pine and eucalyptus, and to a lesser extent, poplar (light wood for the production of toys, matches, etc.). The nine companies from other segments operate in subsectors such as meat and derivatives, textiles, clothing and footwear, steel, water transportation, banks, and machinery and equipment for agricultural construction.

The total sample of companies (forest segment and others) has 11.37% of total assets in biological assets, mostly represented by forests (10.13% of the assets). Considering only the forestry segment, companies have significant forest assets (higher than the sample average), which represented 16.22% of their total assets in 2020 (except for companies V and W, with last records of forests in 2019 and 2018, respectively). The 15 companies in the segment only present forests as biological assets in the balance sheet (except G). This representation of forests in entities' assets supports the relevance of analyzing the main accounting choices.

As mentioned, the sample includes companies from the pulp and paper, wood and other segments with forests. IAS 41 establishes that biological assets should be measured at fair value, less selling expenses (item 12), allowing the use of cost for long-term maturation assets in the initial phase of the asset (item 24b), and in cases where fair value cannot be reliably determined (item 30). Therefore, the accounting standard does not consider the business model in recognizing and measuring biological assets, requiring all entities to follow the same procedures for recognition and measurement.

However, we understand that the disclosure of information on forests could involve different choices, depending on the entity's economic segment, especially, when considering aspects of relevance and materiality of the information to be disclosed, as stated in the Technical Guidance OCPC 07 in Brazil (OCPC 07 - Evidence in the Disclosure of General Purpose Financial-Accounting Reports, 2014), which provides that only relevant information should be disclosed, regardless of the minimum disclosure requirement of specific accounting standards. Therefore, the sample was fully analyzed (24 companies), and then only the sample of companies in the pulp and paper segment was analyzed, to identify differences between the full sample and the sample of companies with similar business models. This procedure is also understood as a robustness test of the results of the full sample, and complements the analysis of the accounting choices on the biological asset concerned.

The Technical Guidance OCPC 07, approved in Brazil in September 2014, anticipated the internationally approved text, arising from the Exposure Draft Disclosure Initiative - a proposal to amend IAS 1 - Presentation of Financial Statement. The planned changes in the Exposure Draft included the materiality of information as a requirement for entities' disclosure, previewing that only material information to users should be published in the statements and notes, not obscuring it with other irrelevant information. The amendments were approved for application as of January 1, 2016 (Deloitte, 2014; IFRS, 2022). Therefore, as signatories of international accounting standards, entities in Brazil, Argentina, and Chile were subject to the application of materiality as a disclosure principle from 2016 on, which was captured in the second period of analysis of this study (2020).

Here, we analyzed uniformity and consistency in order to conclude on the comparability of accounting choices. For the Conceptual Framework (IASB, 2018), consistency refers to the adoption of equal methods for the same items, from one period to the next, in a reporting entity, or in a single period across entities. Comparability helps users of information understand differences and similarities between items. Thus, comparability is the goal, and consistency helps achieving it. To improve the faithful representation of information, uniformity relates to the use of similar procedures and methods for similar items, supporting the achievement of information comparability.

In the results section (4), we analyzed uniformity between entities that operate with forest assets, under the assumption that they operate similar assets, for similar purposes, within the scope of the same international standard (IAS 41); therefore, procedures and methods adopted with reasonable uniformity are expected, because they all seek to faithfully represent the future benefits of the asset. It is important to remember that different choices could be adopted if each one resulted in a better representation of its particular reality. However, this does not seem to be the case for these forest assets. In addition, we analyzed consistency from one period to the next, given that forest biological assets are identical over time

and were under the scope of the same international standard in both periods. In this case, it is expected that a company adopts similar procedures and methods over the periods.

Based on the previous criteria, we can see that consistency and uniformity will not always be based on the best practices of the accounting standard. In this case, the results section (4.3) presents the evolution percentage of the best and worst practices, based on the IAS 41 standard.

The International Accounting Standard (IAS) 41 was amended in 2014, effective from January 1, 2016. Among the changes, we highlight the introduction of the concept of bearer plants, namely those that are: (a) used in the production or supply of agricultural products; (b) cultivated to produce fruit for more than one period; and (c) have a remote likelihood of being sold as an agricultural product, except for eventual sales as scrap.

These plants are now measured within the scope of IAS 16 - Property, Plant and Equipment, and treated as fixed asset. Therefore, measured at cost less accumulated depreciation and any accumulated impairment loss.

Considering that the forests of the pulp and paper segment are generally harvested as wood and replanted, not fulfilling the concept of bearer plants, companies in these segments inform in their reports that they were not affected by the standard change. This is what we concluded from information disclosed in explanatory notes on the change in the measurement of bearer plants introduced in 2016, cited below:

The Company and its subsidiaries assessed the changes introduced and concluded that its biological assets do not fall within the concept of productive plants; therefore, these changes will not produce an impact on its financial statements (Suzano Holding S.A. Report, 2015).

The Company's forests are harvested and replanted, so, there is no second cutting. Therefore, The Administration concluded that the adoption of this revised standard has no impact on the current accounting practice, nor on the calculation of the fair value of its forests (Klabir S.A. Report, 2015).

Revisions of accounting standards and interpretations came into effect in 2016 and had no relevant impact on the Company's financial statements, including the revision of IAS 41/CPC 29, which introduced the distinction between production plants and other biological assets. This revision does not affect the Company, as its forests are harvested and replanted, there is no second cutting (Klabir S.A. Report, 2016).

Therefore, the biological assets (forests) included in the sample data analysis in section 4 are not covered by the standard's revision, being fully within the scope of IAS 41, which establishes their measurement at fair value.

4 Results and Discussion

This section shows the results of the choices in recognition (4.1) and forest measurement (4.2), and the discussion on consistency and comparability of each choice (4.3).

4.1 Choices for recognizing forestry assets

Measurement of the biological asset at initial recognition. Based on the analysis of the full sample (24 companies), in the first period (2011), more than 40% of the entities measured forests at initial recognition based on historical cost, and 12% did not present information on the measurement basis (Figure 2). Another 46% measured forests initially at fair value (11 entities).

In the second period (2020), two companies that did not inform the basis for measuring forests at initial recognition began to inform it (one at cost; the other at fair value). We emphasize that all entities operate by adopting IAS 41, which provides for the measurement of biological assets at fair value, less selling expenses (item 12).

Among the Argentinean companies, two recognized forests at cost in the first years of cultivation, and another informed that forests were 'evaluated according to IAS 41', in both periods. In Brazilian companies, seven out of the 16 initially recognized forests at cost in both periods, with fair value being adopted by other seven companies in the first period, and by nine in the second. Hence, two firms that did not inform the method at the initial recognition, informed that they measured at fair value or at cost in 2020. As for Chilean companies, four measured forests at fair value at the initial recognition in the first period (three companies in the second period).

The analysis of the sample with companies of the pulp and paper segment reveals similarities in the list and percentage of accounting choices, compared to the full sample of companies that declared forests in their balance sheets. We highlight one small difference: a higher percentage of pulp and paper companies use cost at the initial recognition of forests (first years of measurement), in contrast to the full sample.

The adoption of cost at the initial recognition of forests was also found by Macedo *et al.* (2015), with a sample of Brazilian companies in 2013, although they did not address the consistency of accounting choices over time, as is the scope of our research. With the mentioned caveat, our study confirms their

findings and the forecast of IAS 41, by excepting the use of cost for long-maturing assets, where biological change in the first years is small (IASB, 2009).

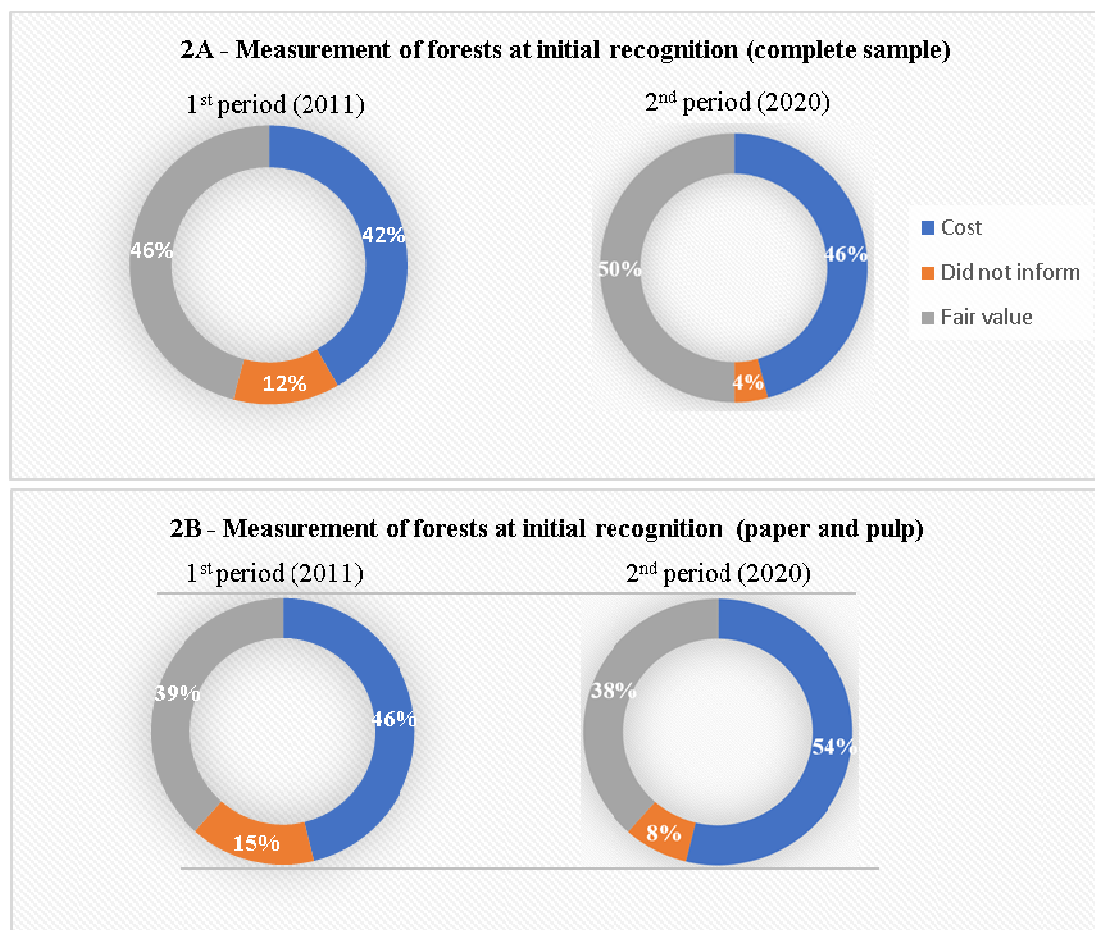


Figure 2. Measurement basis at initial recognition

Recognition of the agricultural product. Analysis of the full sample revealed that in the first period of statements and notes, 15 of the 24 companies (63%) did not recognize (2) or did not inform (13) the recognition of agricultural product in the balance sheet, at the time of harvest. In the second period (2020), three companies reported recognition of the agricultural product in the balance sheet, totaling 12 firms (50%) that recognized and other 12 that did not recognize (2) or did not inform (10) recognition.

Considering the sample of the pulp and paper segment, results are distinct. About 46% of the companies in this segment did not recognize or inform the recognition of the agricultural product in the first period (23% in the second period). Therefore, the practice of around 77% of the pulp and paper companies is to recognize the agricultural product (chopped tree) and inform this choice in notes.

Companies without information on the recognition of agricultural products do not necessarily fail to recognize them, since some of them present items of 'raw materials' in the subgroup 'Inventories' that could include the agricultural product (chopped tree). However, there is evidence that these companies do not recognize the agricultural product, as they assign the cost of the harvested product directly to the agribusiness phase (entry in the industrial production process), indicating that this product does not go through the stocks or other subgroup of the assets at the time of harvest. Additionally, in the Income Statement and explanatory notes, there is no result of the initial recognition of the agricultural product at the point of harvest, as provided in item 29 of IAS 41: "The gain or loss may arise from the initial recognition of the agricultural product as a result of the harvest".

In the analysis by country, we found that only one Argentinean company recognized the agricultural product (chopped tree) during harvest, in the second period. The three entities in the first period and two others in the second period did not recognize or present any evidence of recognizing the agricultural product (no gains/losses from recognition, no inventory items that indicate agricultural product). The analysis of Brazilian companies revealed that in the first period five firms reported recognizing agricultural products when harvesting (cutting) forests (six in the second period), compared to other eleven that did not recognize or present evidence of recognition of these products (ten in the second period). The five Chilean companies analyzed recognized agricultural products in their balance sheets, except for one firm in the first period that did not inform it explicitly.

Although IAS 41 recognizes the agricultural product (IASB, 2009, item 13), the analysis of the full sample shows that most companies, in the first period, and half of them, in the second, did not do it. Besides stipulating that it must go through the special item in the asset (even temporarily), the norm also predicts recognition of gains and losses in measuring the agricultural product, which could affect the result. For the pulp and paper sample, we also found non-recognition, although to a lesser extent.

Therefore, in addition to not recognizing the agricultural product in the balance sheet, there is evidence that it is not measured at the time of forest harvest (cutting), since we found no items for gains/losses from its measurement. This practice of not recognizing it is consistent with that observed in the sugar and ethanol segment (D. L. Oliveira *et al.*, 2020), especially in integrated industries (cane production and agribusiness). The lack of uniformity in this case (recognition versus non-recognition) tends to compromise the comparability of information accessed by external users.

4.2 Choices for measuring forestry assets

Subsequent measurement. Based on the full sample of companies, for the first period the 11 entities that measure forests at fair value at the initial recognition (first years of the forest) showed no change in measurement basis over the production cycle of the forests (Table 1). Four companies measured forests at cost and did not present information on the change of basis over time. Other three entities did not inform their measurement basis.

Table 1

Measurement of forests at the initial recognition and subsequent measurement

Initial recognition	Does the base change?	Subsequent measurement	Full sample		Paper and pulp	
			1 st Period	2 nd Period	1 st Period	2 nd Period
Fair value	No	Fair value	11 (46%)	12 (50%)	05 (38%)	05 (38%)
Historical cost	No	Historical cost	04 (17%)	04 (17%)	02 (15%)	01 (8%)
Historical cost	Yes	Fair value	05 (21%)	06 (25%)	03 (23%)	05 (38%)
Historical cost	Yes	Fair value and net realizable value (NRV)*	01 (4%)	01 (4%)	01 (8%)	01 (8%)
Did not inform the base	-	Did not inform the base	03 (13%)	01 (4%)	02 (15%)	01 (8%)
Total firms	-	-	24 (100%)	24 (100%)	13 (100%)	13 (100%)

Note: * Fair value for developing forests and NRV for mature forests.

Also, with regard to the first period of the full sample, six other companies that initially recognized forests at cost measured these assets in the early years on this basis, and then moved on to measure them at fair value (except for one firm that claimed to subsequently measure the asset by the net realizable value). The term for measuring forests at cost at the initial recognition varies between 1 and 5 years, depending on the species. In the case of eucalyptus, which has a cycle between 6 and 7 years, the initial measurement period at cost is shorter (1 to 3 years); for pine, which has a cycle of more than 20 years, this term is between 2 and 5 years.

In the second period, among the 11 entities that initially measured forests at cost, six changed the basis of measurement after a few years to fair value (1 to 5 years, depending on the species), four companies did not mention a change in the basis, thus continued to subsequently measure forests at cost. Another entity measured 'young' plantations (2 years) at cost, developing plantations (more than 2 years) at fair value, and mature plantations at net realizable value. Twelve companies adopted fair value at initial recognition, with no change of basis throughout the forest cycle. One of these companies only reported that "the forest was valued according to IAS 41", making it impossible to know details of the initial recognition and subsequent measurements.

In the comparison between countries, among the 16 Brazilian companies, 10 did not change the measurement basis throughout the production cycle (eight in the second period), and two did not inform the measurement basis, according to the statements and notes of the first period. Four other companies adopted cost at initial recognition, and fair value in the subsequent measurement. As for the Argentinean companies, two changed their measurement basis at a certain stage of the production cycle, turning to fair value, and another company did not inform the measurement basis, both in the first and second periods. The five Chilean companies did not change the basis of measurement for developing forests in the first period, with four measuring at fair value since initial recognition, and one measuring at cost throughout the production cycle. In the second period, one Chilean company initially measured forests at cost and changed the basis to fair value, when forests were developing (after one year of planting).

The analysis of the sample with pulp and paper companies enabled concluding that a lower percentage of companies used fair value during the entire production cycle of the forests (did not change the basis), and more companies used the cost exception in the initial measurement, switching to fair value in subsequent measurement.

The use of distinct methods of measuring forests at different stages of the production cycle was also found by Budrionyte and Gaizauskas (2018) in Lithuanian companies, where different procedures and methods of forest valuation were employed, compromising the comparability of financial information between entities.

Fair value assessment technique. In both periods, most companies used discounted cash flow (revenue approach) for valuing forests, both for the full sample and for the pulp and paper segment (Figure 3).

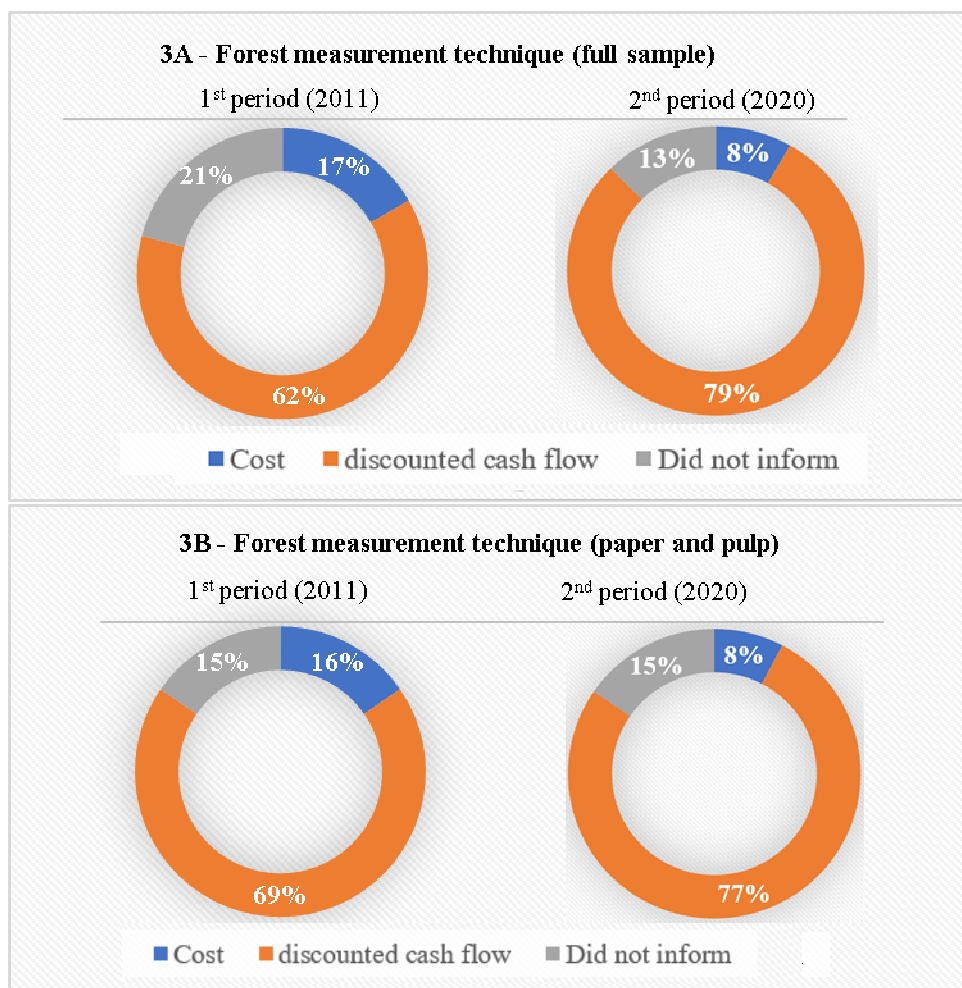


Figure 3. Forest measuring technique

This valuation technique requires estimates of revenues and expenses associated with the production of forest assets. Essentially, entities use the estimated incoming cash flows from trees at the point of harvest, less expenses in the periods following measurement (until harvest), and less harvesting expenses and selling expenses - brought to present value at a discount rate. According to Figure 3, in the second period fewer companies adopted the cost approach or did not inform the valuation technique, in both samples (full and pulp and paper).

Considering the full sample, only one Argentinean company reported the forest valuation technique (discounted cash flow) in both periods. Among the 16 Brazilian companies, 10 adopted discounted cash flow in the first period, and 14 in the second; three Brazilian entities adopted cost, and another three did not report the technique for measuring fair value. As for the Chilean companies, four (out of five) reported using this technique both in the first and second period; one company did not inform the technique used.

The pulp and paper sample has similarities in accounting choices with the full sample. Between 75% and 80% of the companies in both samples used the discounted cash flow. The remaining companies (20% to 25%) adopted the measurement at cost or did not inform the technique used. The use of discounted cash flow prevailed in companies that operate with biological assets, especially those that require level 3 information at the value hierarchy. This is confirmed by previous studies that found the choice of discounted cash flow for most agribusiness companies (Cavalheiro *et al.*, 2019), or which proposed calculation methodologies using the technique (Acuña *et al.*, 2020; Cavalheiro *et al.*, 2019; R. L. M. Silva *et al.*, 2022).

Discount rate. In the full sample, 10 companies reported the rate adopted to discount cash flows in measuring forests in the first period, and 16 in the second period (Figure 4 - Part B). However, only three companies disclosed the method of setting the rate in period one (WACC/CAPM), and eight entities in period two (Figure 4 - Part A).

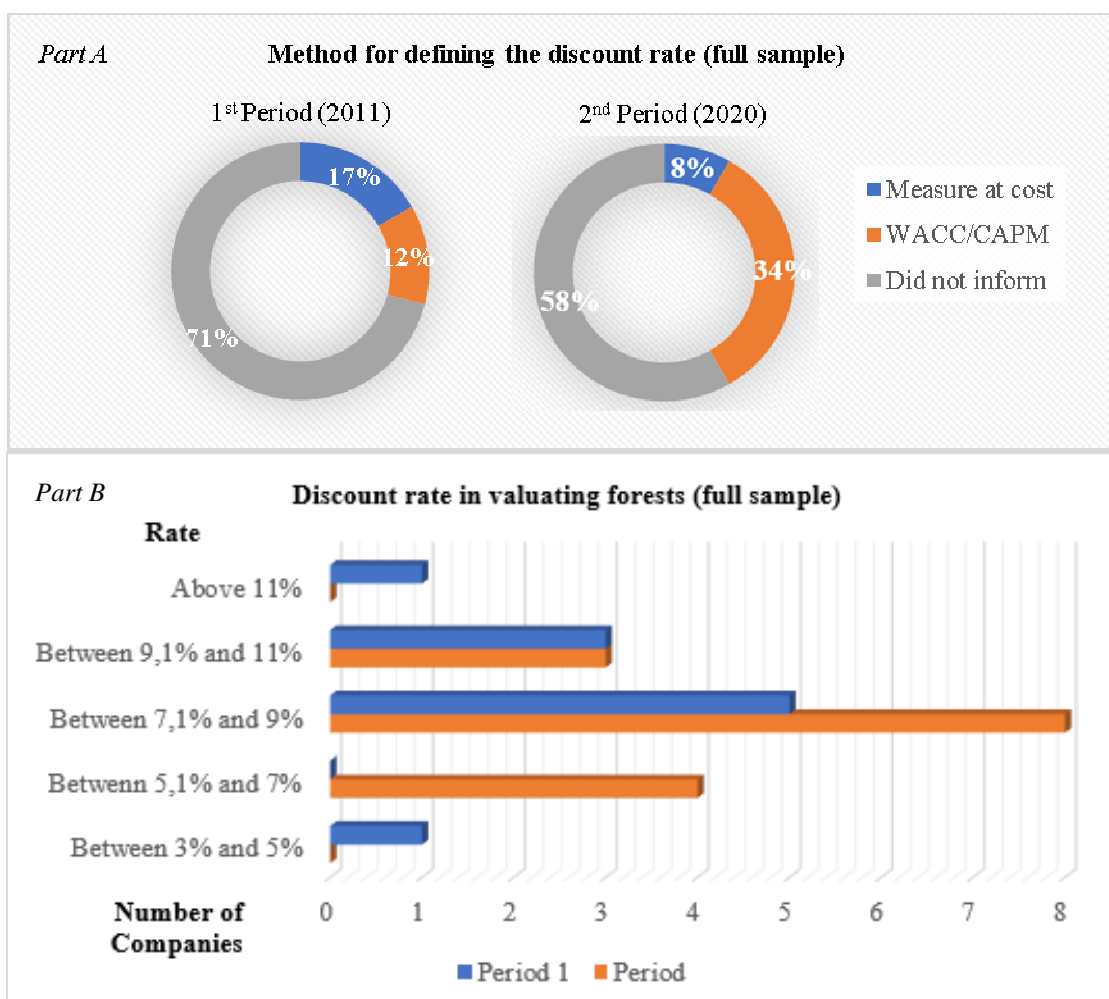


Figure 4. Discount rate in valuating forests: method for definition and measuring (full sample)

The three Argentinean companies did not present information on the method for defining the discount rate, and only one of them mentioned the rate used in the two periods. In Brazilian companies, seven showed the discount rate used in the first period and 11 in the second. There was also an increase in the disclosure of the method adopted for defining the rate (three in the first period and eight in the second) among Brazilian companies. Regarding the four Chilean companies that adopted fair value to measure forests, two informed the discount rate in the first period, and three in the second. As with Argentinean companies, the four Chilean companies did not report the method for defining the rate in both periods.

Based on the analysis of the complete sample, we observed the range of the discount rate used (Figure 4 - Part B). Companies that operate with forests adopt rates ranging from 3% to 11%, which could make it difficult to interpret or check the fair value assigned to the biological assets involved. In addition, different rates in close or similar markets could confuse investors' analysis and lead to unreliability of the information.

Considering the sample of the pulp and paper segment (Figure 5 - Part A), we observed that, as in the full sample, most companies did not report the discount rate method (69%) - which could compromise the analysis of the reliability of the fair value information (Machado *et al.*, 2014).

Most of pulp and paper companies adopt discount rates between 7.1% and 9% (Figure 5 - Part B). Although the range of rates is high for the first period (from 3% to 11%), in the second these companies adopted rates between 5.1% and 11%, which contributes to the reliability and comparability of information at fair value.

Literature shows that choices related to the discount rate could be used by managers to manipulate, through opportunistic behavior, the fair value at the desired level, compromising information reliability (He, 2020; He *et al.*, 2021). Hence, uncertainties in rate setting could compromise the reliability of fair value, and lead to a worst comparability of statements between companies (Stárová *et al.*, 2016). In this scenario, there is a consensus that disclosing the rates used, the assumptions for estimating cash flows, as well as the flow periods and sensitivity maps, are factors that ensure information reliability (Santos *et al.*, 2018).

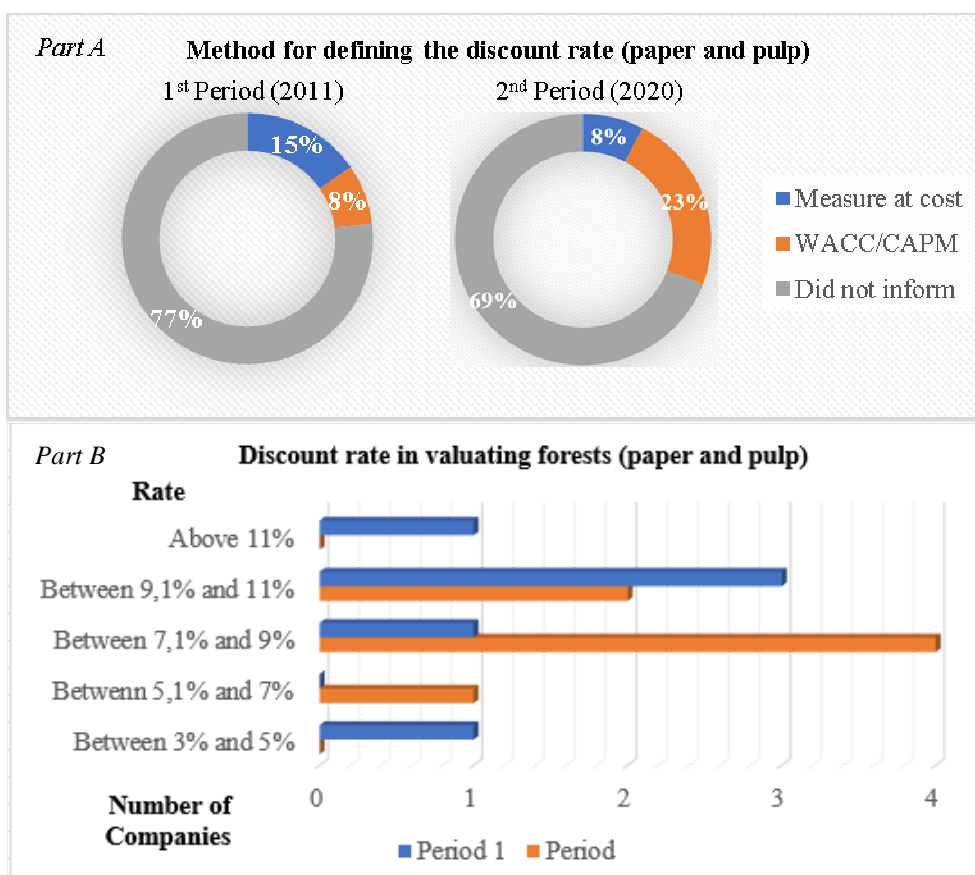


Figure 5. Discount rate in valuating forests: method for definition and measure (paper and pulp)

Assumptions of measurement (cash flow inputs). Based on the full sample and considering that IFRS 13 - Measurement Fair Value became effective in 2013, in the second period 13 companies explicitly reported measuring forests at level 3 of the value hierarchy (nine Brazilian companies and four Chilean). Nine other firms did not inform the level of measurement, although there are indications of adopting level 3, since they used some unobservable data (use of valuation technique, production estimates, tree growth indicator, etc.), and two others adopted cost. The main assumptions disclosed by the companies that measured forests at fair value (17 in the first period and 21 in the second), either at initial recognition or in subsequent measurements, are: discount rate (% p.a.), planted forest area (ha), wood price (\$/m³), Average Annual Increase (AAI: m³/ha x year). There was an increase in the disclosure of all mentioned assumptions, from the first to the second period (Figure 6).

Considering the five assumptions in Figure 6A, we see that Argentinean companies had a poor disclosure of the assumptions for measuring forests in the two periods, since only one firm reported the planted area, in both periods, and the discount rate in the second period, and all other assumptions were absent in the explanatory notes. Of the 16 Brazilian companies, eight in the first period and three in the second did not present any of the assumptions for measuring forests. The others presented one or more assumptions in both periods. Two Chilean companies in the first period, and one in the second, did not report any measurement assumption.

The choices made by companies in the pulp and paper segment, in the disclosure of fair value measurement assumptions (Figure 6B), are similar to the choices in the full sample, keeping the proportion of disclosed assumptions. In both samples, the main inputs disclosed were the planted area and the discount rate, although five companies in that segment still did not disclose these inputs in the second period. The literature has mentioned the lack of assumption disclosure in measuring biological assets (Cavalheiro *et al.*, 2019; Monico *et al.*, 2020).

In addition, previous studies have addressed the lack of information on the rate as a way of hiding companies' strategic information (Machado *et al.*, 2014), or as a potential mechanism of results management through fair value measurement at level 3 of value hierarchy, thus manipulating opportunistically the fair value at the desired level, and compromising information reliability (He *et al.*, 2021). The disclosure of assumptions for measuring assets that require a considerable degree of subjectivity (such as forests) is one of the factors to ensure reliability and verifiability of information (Santos *et al.*, 2018).

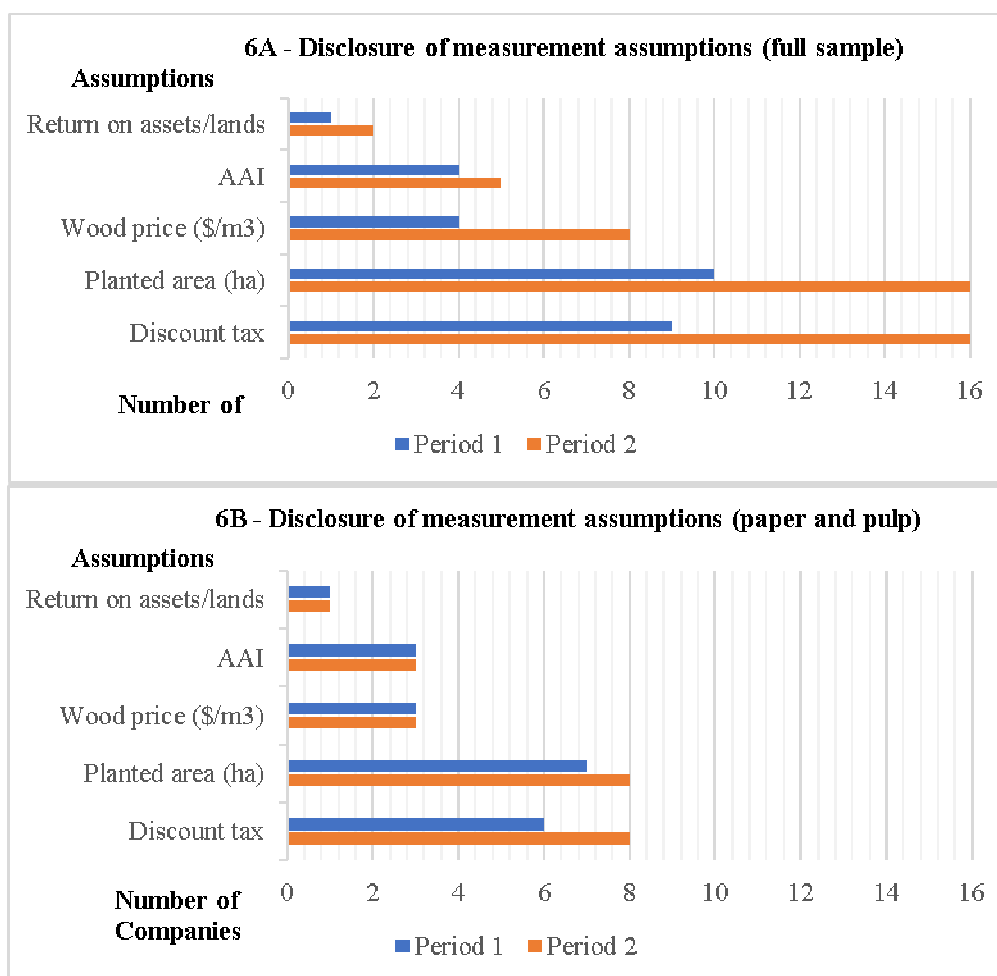


Figure 6 – Disclosure of assumptions for measuring forests at fair value.

Responsibility for asset valuation. He *et al.* (2021) showed that choosing external evaluators could raise the reliability of information, preventing management opportunism in asset valuation. Information on the responsibility of asset valuation (internal versus external/experts) can be found in firms' explanatory notes, especially when they use experts - since companies may emphasize the independence in asset valuation. This information may appear explicitly in the notes, as is the case of an Argentinean firm.

The Company's Board of Directors and Management have considered a number of factors established in IAS 41 for the purpose of determining the fair value of its biological assets (forestry), **based on the advice of internal and external experts** (...) (emphasis added).

Another company, in the Brazilian pulp and paper segment, explicitly presented in its notes the responsibility for the evaluation: "The Company reassesses the value of its biological assets biannually, or when there are indications of significant changes in the main assumptions".

However, information on valuation can also be obtained by the systematic analysis of explanatory notes on biological assets and through the entity's policies, especially when it comes to internal assessment. This is because large companies usually have professional structures that enable the internal measurement of assets, like engineers, field personnel, controllers, and the commercial area, among others (Cavalheiro & Binotto, 2018).

Considering the full sample of companies with forests, their valuations at fair value were mainly carried out by the companies (internal), from unobservable data gathered by financial, agricultural, and engineering managers (19 and 20 companies - in the first and second periods, respectively). External evaluations, through experts, were used by four companies in the first period, and three in the second. One company mentioned doing internal valuation by using information from specialists.

The Argentinean companies in the sample measured forests internally (managers), and one company received 'advice from external and internal experts' for the assessment. Among the Brazilian companies, four used external assessments for forests, in the first period, and three in the second. Chilean companies evaluated forests internally, without using expert services.

The analysis of the pulp and paper segment revealed that 12 of the 13 firms measured forests internally, without using external experts for valuating biological assets. One company did internal evaluation by using experts' information.

Biljon and Scott (2019) argue that the use of experts in valuating biological assets is based on the fact that statement preparers might not have the necessary expertise to evaluate biological change, especially of complex assets such as forests, which involve a long production cycle and a high number of estimated inputs. Although the use of experts reduces the time of evaluation, it could be costly - which would explain the primary choice for internal evaluation in the sample under analysis. However, internal valuation tends to increase discretion and subjectivity in the process, and contribute to managing results (He *et al.* (2021).

4.3 Discussion: consistency and comparability of choices

Table 2 summarizes elements of consistency and comparability of choices in the two periods analyzed. It presents the seven categories of accounting choices, in 2011 and 2020. The columns 'Kept' and 'NI' of 2020 indicate the consistency of choices between the periods, and the companies that kept the choice since 2011, considering the 24 firms. We also analyzed what is considered as "best practices", namely those that comply with the standard or represent an exception situation foreseen in the standard, and, by contrast, the "worst practices". We also carried out the analysis of "no information (NI)", which comprised the companies that did not inform their accounting choices.

In terms of choice range, in general we observed that, in all categories, there were at least two alternatives used and informed by managers. However, some choices were not able to produce better quality information, as they fell within the scope of non-compliance or were outside the exceptions provided in the standard. Since all companies analyzed were in the same activity, and some made better quality disclosures, we assumed that data were probably available, which would not justify the use of practices that did not comply with the accounting standard. These choices may compromise the reflection of the economic reality of these companies. Therefore, such a range of accounting choices should not be expected, unless if considering the assumption of results management (He *et al.*, 2021). We also observed that there was a slight decrease in the number of chosen alternatives, and companies began to report the assumptions (inputs) of fair value measurement. In the remaining categories, choice alternatives were kept.

Over time, and within companies, the average percentage of consistency was considered reasonable, although the uniformity among companies was reduced. However, the average consistency considered the 'no information' choices (which were kept in 2020), and there were significant changes in 'best practices', decrease of 'worst practices', and reduction of "no information". This agrees with the finding that international standards contribute to increasing the amount of information disclosed. Additionally, the learning curve would enable more disclosure in the segment (Scherch *et al.*, 2013).

We analyzed the consistency of these choices more specifically. Regarding the category of 'measurement of biological assets at initial recognition', IAS 41 presents, essentially, two exceptions for measuring forests at cost (IASB, 2009): when fair value cannot be reliably determined (item 30), and in the early years of the forest, when cost approaches fair value, and "... the impact of the transformation of the biological asset on the price is not expected to be material (e.g., for the initial growth of the pine plantation, whose production cycle is 30 years)" (item 24b). Almost half of the companies have used this exception, measuring forests on initial recognition at cost. Companies in the pulp and paper segment use this cost exception more, if compared to the full sample. In addition, companies adopting cost at this stage use different periods for applying fair value in subsequent periods. Some companies adopt cost for three years for pine, others use four or five years. In eucalyptus production, the period also varies - although cost is used in shorter periods (from one to three years). In the case of measurement at initial recognition, we considered the historical cost exception a best practice, because of activity specifics.

We highlight the lack of uniformity among companies in the segment, by sometimes adopting the cost or the fair value method for identical assets, both in the full sample and in the pulp and paper segment. This was also observed by Budrionyte and Gaizauskas (2018) for Lithuanian companies, where several procedures and methods of forest valuation were employed, compromising the comparability of financial information between entities.

Hence, when looking at the choices with a level of detail, due to the selection of a single complex activity, we saw that the range of choices was greater than expected, because managers used alternatives that should only be used in case of exception, and for not complying with what was required by the standard in some cases (disclosure of rate and assumptions). This is consistent with Reisch (2021), who predicted that accounting standard builders should reduce the implicit and explicit choices incorporated into IFRS - as comparability may be affected by reduced uniformity and consistency.

Table 2

Consistency of accounting choices in recognition and measurement of forests over the periods.

Categories of accounting choices	Reference (2011)		Situation until 2020 ³				% Consist. ⁵	Var. ⁶ 'Best Practices'	Var. ⁷ 'Worst Practices'	Var. ⁸ NI
	Choice ^{2,4}	NI	Changed the practice... ⁴		Kept... ⁴ (NI)					
Measuring forests at the initial recognition	HC (10); FV (11)	(3)	From HC to FV (3); from FV to HC (3); from 'no information' to FV (1); from 'no information' to HC (1)		HC (7); FV (8)	(1)	66.7%	9.5%	0.0%	-66.7%
Recognition of the agricultural product?	Yes (9); No (2)	(13)	From 'no information' to 'recognizes' (3)		Yes (9); No (2)	(10)	79.2%	33.3%	0.0%	-23.1%
Was there change of basis in the subsequent measurement, compared to the initial?	- Yes (HC to FV (6)); - No (Keeps HC (4) and keeps FV (11))	(3)	- 'NI' started to inform: keeps FV (1); HC to FV (1); - Changed the base: HC to FV (3); - Keeps FV (1) instead of changing from HC to FV		HC to FV (5); Kept HC (4); Kept FV (8)	(1)	75.0%	11.8%	0.0%	-66.7%
Valuation technique for fair value	Revenue approach DCF (15); Cost (4)	(5)	From 'no information' to DCF (2); from 'cost' to DCF (2)		DCF (15); Cost (2)	(3)	83.3%	26.7%	-50.0%	-40.0%
Discount tax (method)	Cost (4); WACC/CAPM (3)	(17)	From 'no information' to WACC (5); from 'cost' to 'no information' (2)		WACC/CAPM (3); Cost (2)	(12)	70.8%	166.7%	0.0%	-29.4%
Assumptions (inputs) for measuring at FV	AAI (4); Area (10); Tax (8); Price (4); Cost (3)	(8)	Began to inform the tax (8); began to inform the area (5); began to inform the price (3); failed to inform the price (2); failed to inform AAI (2); failed to inform AAI (1)		AAI (3); Area (10); Tax (8); Price (2); Cost (2)	-	-	-	-	-
Responsibility for measurement	Internal (19); Internal and external (1); External (4)	-	From external to internal (2); from internal to external (1)		Internal (18); External (2); Internal and external (1)	-	87.5%	-20.0%	5.3%	-
Summary of choices	Amount	%	Amount	%	Amount	%	%	%	%	%
Total "Best Practices"	70	48.6%	27	87.1%	58	51.3%				
Total "Worst Practices"	33	22.9%	4	12.9%	28	24.8%				
Total "Do not inform"	41	28.5%	0	0.0%	27	23.9%				
Total/Means	144	100.0%	31	100.0%	113	100.0%	77.1%	21.4%	-3.0%	-34.1%

Notes: Number of firms in brackets. ² HC: Historical cost; FV: Fair value; DCF: Discounted Cash Flow; NI: No information. ³ The sum of companies in the second and third columns, as well as the three columns under the title 'Situation until 2020', é 24 – except "Assumptions (inputs) for measuring at FV", since a firm could inform several assumptions. ⁴ In bold: choices that represent a practice or change of practice that could lead to better information quality ('best practices'), by being exceptions or conformities with IFRS standard. ⁵ Consistency: Number of firms that 'Kept...' the practices (even kept 'NI'), divided by 24 times 100. ⁶ Sum of column 'changed...' to best practices and of column 'kept...' best practices, divided by choices that represented best practices in 2011. Ex.: $((8 + 15) / 21) - 1 = 9.5\%$. ⁷ Sum of column 'changed...' to worst practices and of column 'kept...' worst practices, divided by choices that represented worst practices in 2011. Ex.: $((0 + 2) / 4) - 1 = -50.0\%$. ⁸ Variation of column NI from 2011 to 2020.

Although the lack of information on choices persists, there has been improvement in information quality. This finding confirms the idea of a learning curve and the evolution of the capital market, with investors being more demanding as a result of the practices of more transparent peer companies, but it also reveals that the initial choices may not be the best, and that the lack of consistency over time does not necessarily represent results management in exchange for accounting choices (companies that did not report choices began doing it).

5 Conclusions

This study analyzed empirically the comparability of information in terms of uniformity and consistency, by observing the key accounting choices of listed entities that operate with forests in Latin American countries and adopt IAS 41, in two start and end accounting periods, between 2011 and 2020, considering the dimensions of recognition and measurement of biological assets.

Although the entities that work with forests present a set of alternatives for each type of choice, they are under the same international standard (IAS 41) and work with similar assets (pine and eucalyptus crops). Therefore, in Brazil, Chile, and Argentina, choices on the recognition and measurement of forests in the two analyzed periods showed reasonable consistency over time; however, there is a low level of uniformity between companies and between countries - which could compromise the comparability of information in light of the Conceptual Framework and the cited studies.

The results also allow understanding the accounting specifics of the segment, reflected in the choices analyzed. The research indicates that different choices could have several explanations, such as the peculiarities of biological assets and their handling (species, cutting time), the purpose of biological assets, the business environment, the country's characteristics (institutional environment, national standards, auditing), (lack of) mastery in valuating complex assets - variables that should be investigated.

There was little uniformity in companies' choices and fair consistency (although supported by 'no information' practices), but also an improvement in practices during these 10 years, which showed that this does not necessarily imply worse informational quality, or that it necessarily derives from practices of results management. This applies both to the full sample of 24 companies and to the pulp and paper segment.

Additionally, the paper provides insights for builders of international accounting standards, particularly with regard to defining forest measurement methods that enable comparability of information throughout the production cycle; and guidelines for measuring complex biological assets, such as those adopting Level 3 information - which reduce IFRS implicit and explicit choices.

We adopted a sample of two start and end periods, between 2011 and 2020, considering companies from three forest producing countries in Latin America. Although limited, this procedure was considered sufficient to capture choices over time, given that the companies operated under the same international standard (IAS 41) during the interval analyzed, and there was no change in the standard that would interfere in the choices. We considered Latin American countries with outstanding forest production and published statements. Additionally, results should be carefully examined, and are restricted to the analyzed samples. Although it is possible to replicate the research (the sample of companies are in Appendix B), other approaches could be used to identify companies in the segments under analysis, such as the DataStream database (unavailable to us).

We suggest investigating the reasons for the initial accounting choices, which changed over time, especially through qualitative studies with those involved in the choices (questionnaires, interviews). The analysis of other choices is also timely in future studies, especially those related to companies' disclosure and financial statements. In addition, research opportunities include: analysis of the determinants of disclosure, considering the evidence of lack of compliance with IAS 41; measurement of the comparability of a segment's accounting choices; identification of the variables that explain the main accounting choices of entities that operate with forests; and research on accounting choices for handling bearer plants, measured at cost. Studies comparing accounting choices based on a legal/institutional system (common law versus code law), regional classifications (Latin America versus Europe versus Asia...), and other classifications are also relevant.

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ⁱ Regarding sugar cane, there are two biological assets addressed differently in accounting. The ratoon (sugarcane root) is a biological asset for production, considered a bearer plant, thus measured at cost under the scope of CPC 26 - Fixed Asset. The other biological asset is the standing cane (stem), understood as a consumable biological asset, and measured at fair value less selling expenses, under the scope of CPC 29 – Biological asset and Agricultural product (R. L. M. Silva, 2017; R. L. M. Silva *et al.*, 2022). The text refers to this second asset of the sugar and ethanol segment (standing cane), measured at fair value.