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**Methodological analysis of the incompatible EBITDA disclosed by companies listed on B3: identification of divergent variables in the conciliations**

**Análisis metodológico de los EBITDA incompatibles divulgados por las compañías cotizadas en la B3: identificación de las variables divergentes en las conciliaciones**

**Análise metodológica dos EBITDA incompatíveis divulgados pelas companhias listadas na B3: identificação das variáveis divergentes nas conciliações**

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### Abstract

**Purpose:** To identify the variables responsible for the methodological divergences causing incompatibilities in the EBITDA disclosed by the companies listed on B3, related to errors in data collection and undue changes in the formula by the conciliation issuers.

**Methodology:** Application of descriptive statistics on a sample of 35 entities that disclosed the incompatible EBITDA for 2018, observing the behavior of the indicator's variables in the years 2018, 2019 and 2020.

**Results:** The most common cause of incompatibilities in EBITDA occurred when collecting data from the financial statements. The variable that most impacted erroneously calculated values was related to Depreciation, Depletion, and Amortization. It is concluded that, even with the standardization of the disclosure of EBITDA by the Securities and Exchange Commission of Brazil since 2012, errors in the calculation of this indicator are still common, which reinforces the need for practical studies that verify the conformity of these companies' non-GAAP disclosures.

**Contributions of the Study:** Considering that non-GAAP performance measures, such as EBITDA, are disseminated worldwide among investors and analysts to analyze companies results, such measures are at risk of error and manipulation by the issuers' managers. In this sense, the study contributed to the practical sphere because it demonstrated which errors companies effectively made when calculating and demonstrating their EBITDA conciliations. In addition, it bridges an academic gap concerning the methodology for calculating EBITDA, since even with the growing literature related to non-GAAP disclosures, the method of calculating the indicator has received low attention.

**Keywords:** EBITDA; Methodological errors; Non-GAAP measures.

### Resumen

**Objetivo:** Identificar las variables responsables de las diferencias metodológicas que provocan incompatibilidades en los EBITDA divulgados por las compañías listadas en la B3, relacionadas a errores en la coleta de datos y a alteraciones indebidas en la fórmula por parte de las entidades emittentes de la conciliación.

**Metodología:** Aplicación de estadística descriptiva sobre una muestra de 35 entidades que divulgaron el EBITDA incompatible referente a 2018, observando el comportamiento de las variables del indicador en los años de 2018, 2019 y 2020.

**Resultados:** Los errores de apuración más comunes ocurrieron en la coleta de datos juntamente a las demostraciones contables. La variable que más impactó los valores apurados equivocadamente fue relativa a la depreciación, amortización y agotamiento. Concluyese que, mismo con la normalización de la evidencia del EBITDA por la Comisión de Valores Mobiliarios a partir de 2012, todavía singuen comunes los errores de apuración de ese indicador, reforzando la necesidad de estudios prácticos que verifiquen la conformidad de esas divulgaciones no GAAP de las compañías.

**Contribuciones del Estudio:** Considerándose que medidas de desempeño no GAAP, como el EBITDA, son difundidos mundialmente juntamente a inversionistas y analistas para el análisis de los resultados de las compañías, tales medidas esas guardan el riesgo de sufrir con errores y manipulaciones por parte de los gestores de las entidades emittentes. En este sentido, el estudio contribuyó en el ámbito práctico pues demostró cuales errores las compañías efectivamente cometieron a apurar y demostrar sus conciliaciones de EBITDA. Aún más, suple el vacío académico referente a la metodología para calcular el EBITDA, ya que mismo con la literatura

creciente relacionada a las divulgaciones no GAAP, la forma de cálculo del indicador tiene recibido poca atención.

**Palabras clave:** EBITDA; Errores metodológicos; Medida no GAAP.

### Resumo

**Objetivo:** Identificar as variáveis responsáveis pelas divergências metodológicas causadoras de incompatibilidades nos EBITDA divulgados pelas companhias listadas na B3, relacionadas a erros na coleta de dados e a alterações indevidas na fórmula por parte das entidades emittentes da conciliação.

**Metodologia:** Aplicação de estatística descritiva sobre uma amostra de 35 entidades que divulgaram o EBITDA incompatível referente a 2018, observando o comportamento das variáveis do indicador nos anos de 2018, 2019 e 2020.

**Resultados:** Os erros de apuração mais comuns se deram na coleta de dados junto às demonstrações contábeis. A variável que mais impactou nos valores apurados erroneamente foi relativa à depreciação, amortização e exaustão. Conclui-se que, mesmo com a normatização da evidenciação do EBITDA pela Comissão de Valores Mobiliários a partir de 2012, ainda são comuns erros de apuração desse indicador, o que reforça a necessidade de estudos práticos que verifiquem a conformidade dessas divulgações não GAAP das companhias.

**Contribuições do Estudo:** Considerando que medidas de desempenho não GAAP, como o EBITDA, são difundidos mundialmente junto a investidores e analistas para a análise dos resultados das empresas, tais medidas guardam o risco de sofrer com erros e manipulações por parte dos gestores das entidades emittentes. Neste sentido, o estudo contribuiu no âmbito prático pois demonstrou quais erros as companhias efetivamente cometeram ao apurar e demonstrar suas conciliações de EBITDA. Ainda, supre lacuna acadêmica referente à metodologia de apuração do EBITDA, já que mesmo com a literatura crescente relacionada às divulgações não GAAP, a forma de cálculo do indicador tem recebido pouca atenção.

**Palavras-chave:** EBITDA; Erros metodológicos; Medida não GAAP.

## 1 Introduction

The study of non-GAAP performance measures is promising and current, mainly because they are commonly used by investors as an informative summary of the entity (Black, 2016; Bradshaw, Christensen, Gee, & Whipple, 2018; Andrade, & Murcia, 2019). Non-GAAP performance measures refer to a method of disclosure of information that receives manual interference in the accounting numbers, in other words, they are performance measures based on non-accounting, or adjusted accounting data (Nichols, Gray, & Street, 2005; Isidro, & Marques, 2020). Therefore, they are metrics that do not meet the Generally Accepted Accounting Principles (GAAP) (Nichols et al., 2005). Such changes, most often, are associated with earnings or adjusted results (Andrade, & Murcia, 2019).

The elaboration of research on this topic is the focus of regulatory entities, as a way to assist managers in the elaboration and disclosure of non-accounting metrics (Financial Reporting Council, 2013; European Securities and Markets Authority, 2015; International Organization of Securities Commissions, 2016). However, there are not many researches

conducted in Brazil on such disclosures (Oliveira, 2018), with the majority being related to non-GAAP metrics, known as pro forma, or voluntary disclosure measures, conducted internationally (Black, 2016; Black, Christensen, Ciesielski, & Whipple, 2018), concentrated in the United States of America (USA) due to concerns about the misuse of these measures arising from the Sarbanes-Oxley Act (SOX) (Andrade, & Murcia, 2019).

As an example of non-GAAP measures, is possible cite one of the most widely used indicators worldwide for comparison and analysis of company performance, the EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization). EBITDA is used as a measure of the ability to generate operating cash, allowing its analysis in the comparison among companies and over time. This indicator is part of the non-accounting metrics demanded by the market, going beyond the boundaries of accounting standards (Andrade, & Murcia, 2019). The disclosure of EBITDA can be seen as an incentive for managers to reduce information asymmetry, which causes costs related to moral hazard and adverse selection (Verrechia, 1983; Isidro, & Marques, 2020).

For voluntary disclosure to be useful, it must be accurate and reliable (Black *et al.*, 2018). However, the occurrence of voluntary disclosure of information that is incompatible with reality can be caused by the fact that stakeholders reward entities that perform well (Isidro, & Marques, 2020). Considering that the disclosure of optional performance metrics, such as EBITDA, is a widespread practice (Black *et al.*, 2018), with relatively inexpensive information to measure and demonstrate, in addition to being timely (Isidro, & Marques, 2020), can be used to influence the investor's perception of the entity's performance (Guillamon-Saori, Isidro, & Marques, 2017).

Additionally, disclosure can evidence future profitability (Wiggins, & Ruefli, 2002), low probability of bankruptcy (Altman, 1968) and good corporate reputation (Deephouse, & Carter, 2005), encouraging managers to report good performance. Therefore, the entities may disclose EBITDA for opportunistic reasons, portraying the company with favorable values when the earnings from mandatory disclosures are not as favorable (Miller, 2009; Rozenbaum, 2017).

As for the facultative disclosure, Dye (2001) essay the theoretical test of voluntary disclosure with the premise that an entity will disclose voluntary information if it is favorable. Thus, when optional information is not disclosed, it would mean that the company does not report a good result, or a favorable result to the entity. However, Black, Christensen, Joo, and Schmardebeck (2017) state that when entities lose expectations in disclosing profits or good results in mandatory disclosures, they evidence more voluntary information and more aggressively to try to rebut the poor performance reported in mandatory disclosures.

Rozenbaum (2017) states that the investors' focus on EBITDA creates incentives for managers to overvalue and over leverage the entity. In addition, managers tend to take different actions to meet analysts' forecasts, such as earnings management (Bartov, Givoly, & Hayn, 2002; Matsumoto, 2002; Richardson, Teoh, & Wysocki, 2004). However, the use of the indicator has advantages, such as the fact that it is used worldwide by several companies from various segments of activities and size, which facilitates the comparison between them (Diniz, 2015). Still, EBITDA is a proxy of the operational cash generation capacity, and its calculation methodology does not consider circumstances such as favorable conditions for access to credit, which enables the analysis of the indicator in holding companies, for example, besides the simplicity and agility of calculation (Cornejo-Saavedra, & Diaz, 2006).

The research problem was formulated considering the findings of Kistner and Platt Neto (2020) that there was an incompatibility of EBITDA in entities listed on the B3 stock exchange (*Brasil, Bolsa, Balcão*) regarding the disclosures for the year of 2018, and that the main issue

regarding optional disclosures is whether they guarantee the quality of information for the decision-making process (Andrade, & Murcia, 2019). In view of this, the present research seeks to answer the following problem-question: **What are the methodological divergences that cause incompatibilities in the EBITDA disclosed by the companies?**

Therefore, the purpose of this article is to identify the variables responsible for the methodological divergences causing incompatibilities in EBITDA disclosed by companies listed on B3, related to errors in data collection and undue changes in the formula by the entities issuing the conciliation. The identification of errors or possible undue changes are pertinent as the premise of non-GAAP disclosures is that these measures have discretionary bias and the risk of providing misleading information to users (Andrade, & Murcia, 2019).

To this end, a three-year follow-up was carried out (referring to the years 2018 to 2020) of the companies that had disclosed EBITDA with values considered incompatible (overstated, if above 2% of the calculated value, or understated, if below -2%) referring to the year of 2018. This was done based on the analysis of the conciliations (calculation reports) issued by the companies in comparison with the calculation method (formula and variables) established by the Brazilian Securities and Exchange Commission (CVM) and the use of data extracted from financial statements originally issued by the companies themselves.

This research is justified because it allows to know which errors companies effectively commit when calculating and demonstrating their EBITDA conciliations. These may constitute points of attention for managers in their responsibility to provide information, as well as for information users and independent auditors. This is because inconsistencies in disclosures of performance indicators can cause unsatisfactory or wrong investment decisions, affecting the national or global economy because of market failures (International Accounting Standards Board, 2022).

Furthermore, the study bridges the gap concerning the methodology for calculating EBITDA, since even with the growing literature related to non-GAAP disclosures, the way the indicator is calculated has received low attention (Carvalho, 2014; Rozenbaum, 2017). Additionally, it fills the gap regarding the incompatibility of EBITDA, since there are no researches that investigated the specific reasons, in methodological terms, for the differences between the EBITDA disclosed by companies and those calculated according to a widely accepted methodology, such as that required by the CVM since 2012.

## 2 Literature Review

### 2.1 Method for calculating and disclosing EBITDA

The EBITDA refers to Earning Before Interests, Taxes, Depreciation and Amortization. This is a well-known indicator among company analysts, used to assess the business' operational cash generation capacity, making sense both in comparative analyses – between companies and over time – and isolated. Thus, it is common for entities to disclose the EBITDA in absolute values, as well as its evolution, demonstrating growth, as is done with the net income, as something favorable (Matarazzo, 2010).

In Brazil, EBITDA is not included in the list of publications that are mandatory for joint-stock corporations under Law no. 6404/1976 or the Brazilian Securities and Exchange Commission (CVM). Therefore, EBITDA is characterized as information of a non-accounting nature, although it is calculated based on accounting data. Thus, entities may disclose it to demonstrate their performance and meet the needs of specialized users - readers of corporate reports.

In the Brazilian capital market, EBITDA is regulated by CVM Instruction no. 527 (*Instrução CVM n. 527, 2012, art. 1*), of the CVM, which provides for the voluntary disclosure by listed companies of information of a non-accounting nature of EBITDA. Thus, the mentioned instruction regulates that the calculation of EBITDA must be based on the numbers presented in the general-purpose financial statements required in the Brazilian Technical Pronouncement CPC 26 (*Instrução CVM n. 527, 2012, art. 2º*). Therefore, amounts that are not included in these statements should not be part of EBITDA calculation.

The mentioned Technical Pronouncement (*Pronunciamento Técnico CPC 26, 2011, item 1*) is a standard of the Accounting Pronouncements Committee (CPC), whose purpose is to define the basis for the presentation of the financial statements, to ensure comparability both with the financial statements of previous periods of the same entity and with the financial statements of other entities. Additionally, the EBITDA disclosure must be carried out together with the conciliation of the values that are in the financial statements disclosed, i.e., the calculation memory of the indicator ascertainment, as of the Net Result of the Period, through the addition or deduction of values coming from accounts of the Accounting Statements, mainly from the Fiscal Year Result Statement (*Instrução CVM n. 527, 2012*).

The CVM's Instruction n. 527 (*Instrução CVM n. 527, 2012, art. 3, I*) establishes that the calculation of EBITDA cannot exclude any non-recurring, non-operating or discontinued operations items. The following methodological definition is proved by the same article: net result for the period, plus income taxes, net financial expenses of financial income and depreciation, amortization, and depletion.

In this study, EBITDA calculated according to the CVM method is called "Original EBITDA". Also, companies can disclose the "Adjusted EBITDA", that is, the one that excludes the net results linked to the discontinued operations and adjusted for other items that contribute to the information on the potential gross cash generation (*Instrução CVM n. 527, 2012, art. 4º*). However, if the entity chooses to disclose the Adjusted EBITDA, this can only be done together with the disclosure of the Original EBITDA, and must be named by the term "adjusted" (*Instrução CVM n. 527, 2012, art. 5º*).

The purpose of showing an Adjusted EBITDA is mainly because it includes additional adjustments to the result for the period in order to generate information regarding its potential for future gross cash generation (*Nota Explicativa, 2012*). This adjustment requires clarification from the company regarding the nature and motivation of the changes made, as well as proving the conciliation between the Adjusted EBITDA and the result for the period, allowing the comparison and understanding of the indicator (*Nota Explicativa, 2012*).

## 2.2 Voluntary disclosure and previous research

The increasing demand for information generates innovation by companies in presenting more complete reports that meet the informational needs of users (Oliveira, 2018). In the USA, for example, information users have turned their attention to non-standardized reports and non-GAAP information due to the increase of information made available in recent years (Black et al., 2018). Additionally, an increase in optional disclosures has been noted in several countries (Black et al., 2018; Oliveira, 2018).

In this topic, the voluntary evidence theory essay, proposed by Dye (2001), has the premise that an entity will disclose voluntary information if it is favorable, otherwise it will not disclose (Dye, 2001; Verrecchia, 2001). Still according to Dye (2001), the company optimizes the disclosure of optional information if its competitor does the same. Therefore, when

voluntary information is not disclosed, it means that it does not report a good result and is not favorable to the entity (Dye, 2001).

Isidro and Marques's findings (2020) corroborate that theoretical essay because, when studying the role of competition in the industry market, they concluded that this is one of the characteristics that most influences the probability of non-GAAP disclosures, as well as the magnitude of their exclusions. These authors concluded that competition encourages managers to disclose higher non-GAAP earnings, but entities that have low performance exclude such optional disclosure measures. Also, when companies are located in competitive environments, managers are more likely to disclose the conciliation of non-GAAP measures, and less likely to exclude, in the calculation, items that are commonly excluded by other entities in the sector (Isidro, & Marques, 2020).

However, Black *et al.* (2018), with the aim of identifying the state of the art in the topic of voluntary disclosure through a literature review, concluded that both sophisticated and unsophisticated investors direct their attention to non-GAAP metrics and, when looking for performance metrics, focus on voluntary disclosures. Additionally, these authors identified that the frequency of non-GAAP reports increased in all sectors from 2009 to 2014, the period of the entities' studied sample comprising the Standard & Poor's index 500 (S&P 500) – referring to five hundred assets listed on New York and NASDAQ stock exchanges.

Therefore, entities understand as a benefit to make voluntary disclosures that allow adjustments to accounting information, aiming to appear to meet or exceed the performance benchmark verified by investors, such as forecast earnings by analysts (Walker, & Louvari, 2003; Lougee, & Marquardt, 2004; Black, & Christensen, 2009; Isidro, & Marques, 2015).

On the other hand, Isidro and Marques (2020) state that the overvaluation of a value when the entity's performance is not high, can influence the entry of competitors in the market, further decreasing the actual performance of this company. However, previous studies have proved the existence of opportunism in the disclosure of voluntary information (Miller, 2009; Marques, 2010; Doyle, Jennings, & Soliman, 2013). Because of this, there are still concerns about the level of confidence of this information (Andrade, & Murcia, 2019). As an example, the study by Black and Christensen (2009), related to the investigation of the impact of earnings adjustments on the spread between non-GAAP and GAAP earnings, demonstrates that between 1998 and 2003 managers manipulated non-GAAP earnings to achieve the benchmarks established by analysts, a result identical to that suggested in the research by Marques (2010).

Bhattacharya, Black, Christensen and Larson (2003) state that voluntary information is considered more efficient and informative by the market, which understands pro forma operating gains as more relevant in comparison with those calculated according to GAAP. However, entities that report losses tend to emphasize optional information, presenting better results (Lougee, & Marquardt, 2004). Miller (2009), Guillamon-Saorin *et al.* (2017) and Marques (2017) state that voluntary information has the potential to deceive information users, even though it is useful to the capital market.

Therefore, when considering the several pieces of evidence of manipulation of non-GAAP measures, it is important to verify the veracity of the voluntary information disclosed by companies. This is because non-sophisticated investors, or those with less knowledge about the calculation of these indicators, tend to rely more on non-GAAP performance or profitability measures (Johnson, Percy, Clarke, & Cameron, 2014; Bhattacharya, Black, Christensen, & Mergenthaler, 2007).

It is noticed that the use of voluntary performance measures may have the intention of diverting users' attention from the entity's actual performance (Andrade, & Murcia, 2019). As an example, by Entwistle, Feltham and Mbagwu's study (2006) with the companies of the S&P

500 from 2001 to 2003, concluded that of the 380 companies that disclosed pro forma earnings in the press release, 14% disclosed it in a potentially misleading way.

Along the same lines, Miller (2009), in order to discuss academic studies in accounting related to voluntary disclosures of earnings forecasts and non-GAAP earnings measures, identified that some managers often use opportunistic disclosures with the intention of overestimating the value of the company. Additionally, this author concluded that between 70% and 85% of the sample of studies analyzed demonstrate that entities disclose non-GAAP measures that are superior to GAAP measures.

Regarding the incompatibility of voluntary disclosures, Walker and Louvari (2003), in order to explain the variety of voluntary disclosure practices of companies in the United Kingdom, observed that entities in a loss situation may try to divert the investors' attention by reporting favorable information. Likewise, when the entity presents positive values in its mandatory disclosures, it may omit the optional information if it presents negative results.

Webber, Nichols and Street (2013) concluded, by analyzing 303 press releases from USA entities from 2005 to 2010, that when net income decreases, companies are more likely to show higher non-GAAP earnings. Similarly, Malone, Tarca and Wee (2016), by studying adjustments to earnings in voluntary disclosures of 576 Australian entities between 2008 and 2010, observed that entities and analysts tend to adjust losses and expenses to increase non-GAAP earnings, reflecting a higher incidence of negative adjustments compared to positive ones.

Andrade and Murcia (2019) understood that the regulation of non-GAAP measures that are more widespread worldwide, such as EBITDA, would be a solution to mitigate or inhibit the inappropriate use of optional disclosures. In Brazil, its disclosure is regulated, as explained in the previous section. However, voluntary disclosure measures are auditable, but are not necessarily being audited, which allows managers a certain "freedom" in calculating and disclosure of numbers (Andrade, & Murcia, 2019). Therefore, it is important for researchers to verify the correct application of the calculation methodology set up in EBITDA instruction.

Thus, Maragno, Borba and Fey (2014) exemplify the benefit of regulating EBITDA in Brazil. These authors researched if the EBITDA disclosed for the years 2010 to 2012 were compatible with the method of CVM Instruction no. 527, concluding that before such Instruction came into force and established aspects of calculating and disclosing EBITDA, less than half of the entities listed on IBrX 100 calculated the indicator according to the method established later. After the Instruction started, 60% of the companies became compatible with the mentioned methodology, which indicated an increase in the reliability of the disclosed EBITDA.

In the US, Heflin and Hsu (2008) verified that after 2003, after the Securities and Exchange Commission (SEC) implemented regulation of non-GAAP measures, entities reduced the magnitude and frequency of adjustments made to these voluntary disclosure metrics. After this regulation, these authors verified that there was a decline in the probability of disclosing entities' non-GAAP earnings reaching or exceeding analysts' forecasts, which suggests that the interference of regulation in the capital market has positive impacts, protecting it from misleading information.

Regarding the methodological deductions of EBITDA, Rozenbaum (2017) studied the indicator with an approach to verify the influence on managers' investment choices and leverage. Among the findings, this author concluded that the lower operating performance is attributed to large expenses with depreciation, amortization, and depletion, which is the most significant expense added in the calculation of EBITDA.



On this topic, Andrade and Murcia (2019) studied EBITDA with the aim of identifying the types of adjustments of greater magnitude carried out in the EBITDA Adjusted, a non-GAAP measure, of the largest entities listed on B3. These authors concluded that the most significant adjustments made to the indicator are: error corrections; equity; impairment; and provisions and dividends received.

Regarding the quality of disclosure and conciliation of EBITDA, Mey (2019) observed, from 2014 to 2016, the publicly traded companies on Johannesburg Stock Exchange. The results indicated a lack of quality in the conciliation of EBITDA, in addition to identifying that the improvement in the quality of the conciliation is negatively related to the positive indicator disclosed when the results were negative. That is, this author found the opportunistic use of EBITDA through manipulations to obtain positive results even when these were negative.

Mey and Lamprecht (2020) observed, between 2014 and 2016, the usefulness of disclosing EBITDA by publicly traded companies on the Johannesburg Stock Exchange. The findings indicate that the lack of explicit requirements and the generic definition in accounting standards result in inconsistencies in the indicator calculation. Therefore, the entity is responsible for the quality of EBITDA evidenced, which can lead to useless information for decision-making. Additionally, these authors detected the existence of companies that calculated the indicator in an adjusted manner, however, without informing this, giving users the impression that it was Original EBITDA.

Furthermore, Verriest, Bouwens and Kok (2018) concluded, by observing a sample of 15,895 annual reports and 51,758 earnings releases of S&P 1500 companies between 2005 and 2016, that the entities that most disclose EBITDA had higher forecast errors and more likely to miss the analyst forecast benchmark.

Therefore, based on the literature presented, it became clear that there is a gap in studies related to the methodological analysis of the calculation and conciliation of EBITDA disclosed by publicly traded companies, especially in Brazil. On the other hand, the studies addressed make clear the existence of manipulation, by managers, of voluntary indicators such as EBITDA. In this way, it becomes relevant to verify the compliance of the conciliations of EBITDA disclosed in relation to the methodology established in CVM Instruction no. 527 (2012).

### 3 Methodological Procedures

This research is classified as descriptive, with a qualitative and quantitative approach and with documentary procedures. The research universe consists of all companies listed on B3 that were active and able to disclose EBITDA for the years 2018, 2019 and 2020, understood as non-financial companies and whose assets or net results for the periods were not null.

The sample, in turn, is composed of all the companies in this universe that simultaneously meet the following criteria: (1) presented significant percentage differences (+/- 2%) between the EBITDA values disclosed and those calculated methodologically by the authors, referring to 2018; and (2) released their original EBITDA with conciliation for the years 2018, 2019 and 2020.

The temporal cutoff was defined considering Kistner and Platt Neto's findings (2020) referring to the year 2018, which detected that 22.5% of the companies listed on B3 disclosed EBITDA with values incompatible with those calculated according to CVM Instruction no. 527. Based on these findings for 2018, this research sought to understand what these companies employed in their conciliations that caused incompatibility in the indicator. To follow the companies and understand the evolution of these incompatibilities over time, the horizon was

expanded with the following two years (2019 and 2020), selected based on the data available at the time of data collection.

The universe resulting from these criteria is composed of 269 companies referring to 2018, while the sample holds 35 companies (13.01% of the universe) in the three years. Thus, based on confirmed incompatibilities referring to the first year of the series, there is a paired sample of three years, that is, the companies are followed in the series of disclosures.

Table 1 presents the variables used in the calculation of EBITDA, according to the methodology established by CVM Instruction no. 527 (*Instrução CVM n. 527, 2012*), including their descriptions and respective abbreviations.

**Table 1**

*Variables used in EBITDA conciliation model, according to CVM methodology*

Variable abbreviations	Names and descriptions of the variables contained in the financial statements
<b>NIP</b>	<b>Net Income for the Period:</b> indicates the value referring to the net profit or loss.
<b>IT</b>	<b>Income Taxes:</b> indicates the amount referring to taxes calculated on profit (Corporate Income Tax and Social Contribution on Net Income).
<b>NIE</b>	<b>Net Interest Expense:</b> indicates the difference between interest expenses (financial expenses) and interest income (financial income), both collected from the Income Statement.
<b>DD&amp;A</b>	<b>Depreciation, Depletion, and Amortization:</b> indicates the amount related to depreciation, amortization and/or depletion expenses.
<b>Others</b>	<b>Other unallowed variables:</b> indicate the total amounts erroneously computed (included) by the companies analyzed in calculating the Original EBITDA.

**Note.** All variables with reference to the fiscal years ended 2018, 2019 and 2020, with values expressed in units of Brazilian Real (BRL).

**Source:** *Adapted from Instrução CVM n. 527 (2012).*

The data was collected from Economatica and from the companies' financial statements. The compatibility verification was carried out by comparing the values methodologically decided by the research and the conciliations disclosed by the companies.

The data collection, treatment, and analysis procedures were organized in the following stages:

1) Collect the Original EBITDA for the year 2018 disclosed by all companies listed on B3 (Universe), through access to their annual reports, including Reference Forms, Management Reports and Explanatory Notes to the Financial Statements.

2) Calculate the EBITDA of these companies with data from Economatica, referring to the fourth financial statements after the previous fiscal year end of 2018.

3) Compare the EBITDA disclosed by the companies with those calculated using Economatica data to identify a preliminary sample of entities that possibly made mistakes in calculating their EBITDA.

4) From this preliminary sample, collect all the variables and data disclosed by the companies in their conciliations of Original EBITDA, referring to 2018.

5) Also, for the preliminary sample, collect in the financial statements – particularly the annual Income Statement – issued by the companies the data of the variables established by the CVM that should be used to calculate the Original EBITDA referring to 2018. In some cases, it was necessary resorting to the Cash Flows Statement, when there was an omission in the Income Statement regarding the DD&A.

6) Compare the Original EBITDA values disclosed by the companies with the EBITDA calculated from the Income Statement data, according to the CVM method, referring to 2018.

7) Define as a sample the companies in which significant differences ( $\pm 2\%$ ) were confirmed, as used by Kistner and Platt Neto (2020), with EBITDA disclosed and those calculated with financial statements data, referring to 2018. Companies with false diagnosis of incompatibility due to discrepancies in Economatica data in relation to those contained in the financial statements disclosed directly by the entities (considered Type 0 Error).

8) For this sample, collect and organize the variables and data disclosed by the entities in their Original EBITDA conciliations, referring to the years 2019 and 2020.

9) For the sample, collect and organize the variables and data disclosed by the companies in their financial statements, which should be used in the calculation of EBITDA, referring to the years from 2018 to 2020. The collection of conciliation variables was waived when there was no evidence of significant incompatibilities (differences  $\pm 2\%$ ) between EBITDA value calculated using Economatica and the Original EBITDA value disclosed.

10) Compare the variables and data from the two previous steps, aiming to identify all divergent variables and values with significant differences ( $\pm 2\%$ ) between the two sources.

11) Highlight the types of errors committed by companies in tables and/or figures, classifying them into two non-exclusive types: “Error in financial statements data collection by the company” (Error Type 1); and “Error in the conciliation variables by the company” (Type 2 Error).

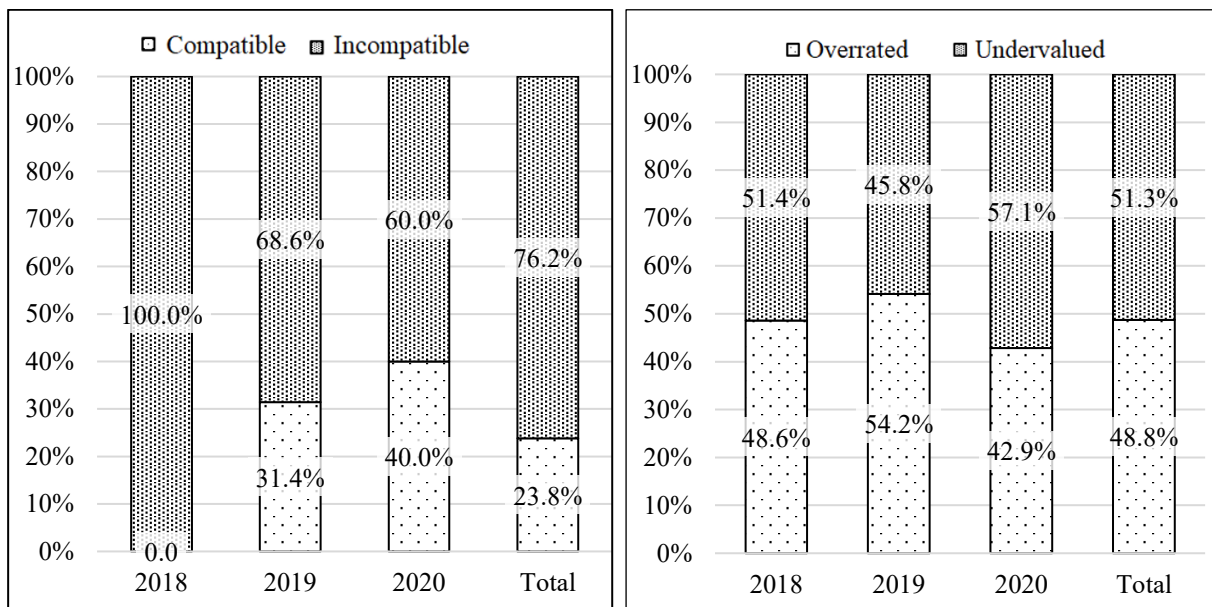
12) Highlight of the distribution of sample companies between compatible and incompatible EBITDA over the years, as well as distinguishing the incompatibilities between overvaluation and undervaluation.

## 4 Results and Analysis

### 4.1 Identification of incompatible EBITDA

According to the criteria established in the methodological procedures chapter, a sample of 35 companies was formed. It was found that for five companies initially analyzed there were divergences between the data obtained from Economatica and collected directly from the financial statements published by the entities. These divergences led to the false initial diagnosis of incompatibility of the EBITDA. After the analysis, these companies were excluded from the final sample – this situation is classified in the research as Error Type 0, as discussed in the methodological procedures. The variable in which these divergences occurred was only Depreciation, Depletion, and Amortization (DD&A), referring to the years 2019 and 2020.

Figure 1 summarizes the data on the classifications of EBITDA disclosed by the companies, in comparison with the values determined in this research, according to the CVM methodology.



**Figure 1** Distributions of compatibilities and types of incompatibilities in Original EBITDA disclosed by sample companies – 2018 to 2020

Source: Research data.

It was seen that among the companies in the sample, incompatibilities predominated in the Original EBITDA disclosed referring to all years. In reference to the first year (2018), all companies were incompatible, as this was one of the sample selection criteria. For the years 2019 and 2020, EBITDA mismatch rate dropped to 68.6% and 60.0%, respectively. This shows that part of the errors that caused incompatibilities were corrected in the following years, reducing incompatibilities by 40.0%.

As for the persistence of errors along the years, from the 35 companies in the sample, all with incompatible EBITDA referring to the first year: 19 (54.3%) remained incompatible in the following two years; 7 (20.0%) had incompatibility in only one of the following years; and 9 (25.7%) became compatible in the following two years.

Regarding the types of incompatibilities, it is observed that, in the range of 3 years, undervaluation of the Original EBITDA predominated, with 51.3% of the cases, with a minimum of 45.8% in 2019 and a maximum of 57.1% in 2020. Thus, most companies reported EBITDA with amounts supposedly lower than those due, except for 2019.

As for the persistence of the types of incompatibilities over the years, of the 35 companies in the sample, 18 (51.4%) were undervalued and 17 (48.6%) were overvalued referring to the first year: 6 (17.1%) remained with overstated EBITDA in the following two years; 7 (20.0%) remained with undervalued EBITDA in the following two years; and 22 (62.9%) had changes to another type of incompatibility or to EBITDA compatibility.

## 4.2 Identification of reasons for incompatibilities

Table 2 holds the frequency distribution of the causes of incompatibilities in EBITDA.

**Table 2**

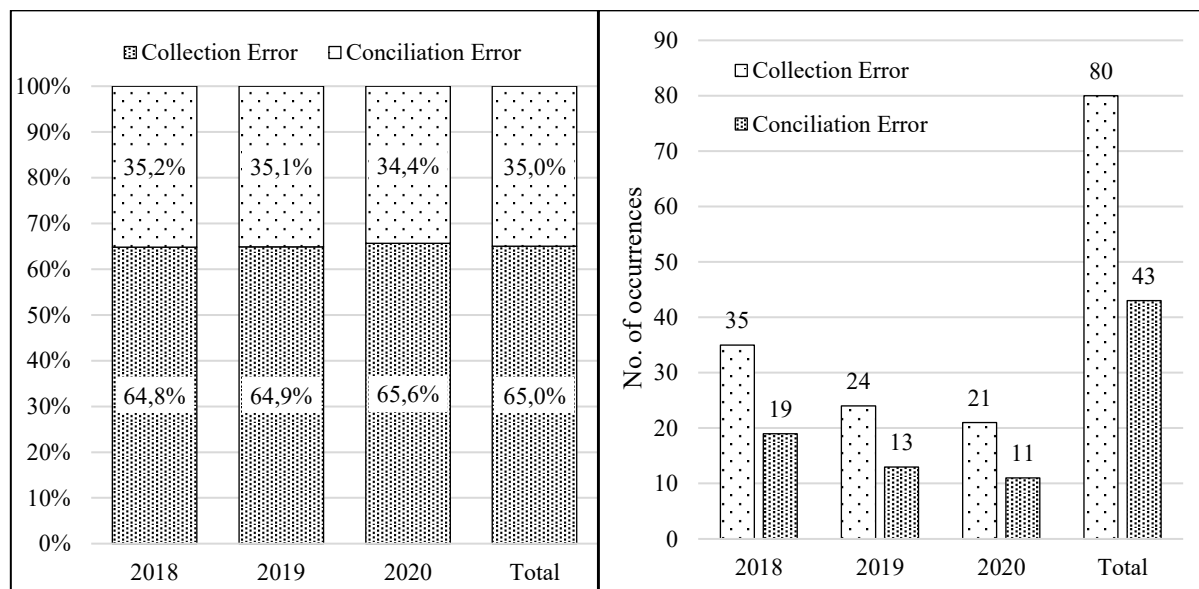
*Frequency distributions of the causes of incompatibilities in EBITDA disclosed by companies - 2018 to 2020*

Causes of incompatibilities in EBITDA (types of errors)	Occurrences per year <sup>c</sup>						Accumulated total of occurrences	
	2018		2019		2020			
	No.	%	No.	%	No.	%	No.	%
Financial statements data collection error by companies <sup>a</sup>	35	64.8%	24	64.9%	21	65.6%	80	65.0%
Error in the conciliation variables by companies <sup>b</sup>	19	35.2%	13	35.1%	11	34.4%	43	35.0%
<b>Totals</b>	<b>54</b>	<b>100.0%</b>	<b>37</b>	<b>100.0%</b>	<b>32</b>	<b>100.0%</b>	<b>123</b>	<b>100.0%</b>

**Note.** <sup>a</sup> Type 1 Error – The company used incorrect values in the conciliation: it changed data or made an error in the transcription of values contained in its financial statements, including signs. <sup>b</sup> Type 2 Error – The company made an error in the conciliation due to the improper inclusion or exclusion of variables (outside the CVM definition). <sup>c</sup> There may be more occurrences than the sample total, as each company may have committed one or both types of errors in each EBITDA conciliation.

**Source:** Research data.

Figure 2 presents the frequency distributions for these two errors.



**Figure 2** *Distributions of errors causing mismatches in EBITDA disclosed by sample companies – 2018 to 2020*

**Source:** Research data.

It is observed that there was a numerical decrease in the occurrences of all types of errors from 2018 to 2020, from 54 to 32, respectively.

It is noted that data collection errors predominated, being 65.0% of the total occurrences of errors in 3 years, 35.0% of errors resulting from the variables that the companies improperly used in the conciliation of the Original EBITDA.

### 4.3 Identification of the variables that affected the calculations

The research analyzed each variable that the companies used in their calculations of Original EBITDA through published conciliations. The following variables were confronted with those of the formula based on the CVM definition and the monetary values used with those collected directly in financial statements disclosed by the companies.

Based on this, how many variables each company incurred in some types of error were counted, which could be up to five for each conciliation, as established in the methodology chapter. In Table 3, these results are summarized.

**Table 3**

*Frequency distributions of the number of variables with significant differences in the values contained in the conciliations of EBITDA disclosed by the sample companies – 2018 to 2020*

Number of variables with error <sup>a</sup>	Occurrences per year						Accumulated total of occurrences	
	2018		2019		2020			
	No.	%	No.	%	No.	%	No.	%
1 variable	19	54.3%	12	50.0%	12	57.1%	43	53.8%
2 variables	5	14.3%	5	20.8%	two	9.5%	12	15.0%
3 variables	5	14.3%	4	16.7%	4	19.0%	13	16.3%
4 variables	4	11.4%	3	12.5%	3	14.3%	10	12.5%
5 variables	two	5.7%	0	0.0%	0	0.0%	two	2.5%
<b>Totals</b>	<b>35</b>	<b>100.0%</b>	<b>24</b>	<b>100.0%</b>	<b>21</b>	<b>100.0%</b>	<b>80</b>	<b>100.0%</b>

**Note.** <sup>a</sup>Number of variables with significant differences (>2% or <-2%) in financial statements data and those used by the companies in the conciliations of the Original EBITDA.

**Source:** *Research data.*

From Table 3, it was observed that errors predominated in only one variable in the conciliations of the companies. More than 50% of occurrences in all years had only one variable considered wrong, that is, with improper inclusion or exclusion and/or with significantly different values. This shows that the problems were, for the most part, occasional, linked to a few accounts with divergent data.

In order to better understand these variables with errors, the main variable causing the incompatibilities of the Original EBITDA disclosed was found, that is, the one whose divergent value had the most unduly impact on the overvaluation or undervaluation of the indicator in each disclosure. These results are summarized in Table 4.

**Table 4**

*Frequency distributions of the predominant variables in the significant differences in the values contained in the conciliations of EBITDA disclosed by the sample companies – 2018 to 2020*

Predominant variables <sup>a</sup>	Occurrences per year						Accumulated total of occurrences	
	2018		2019		2020			
	No.	%	No.	%	No.	%	No.	%
Net Income for the Period (NIP)	7	20.0%	4	16.7%	5	23.8%	16	20.0%
Income Taxes (IT)	1	2.9%	0	0.0%	0	0.0%	1	1.3%
Net Interest Expense (NIE)	6	17.1%	4	16.7%	4	19.0%	14	17.5%
Depreciation, Depletion, and Amortization (DD&A)	12	34.3%	10	41.7%	7	33.3%	29	36.3%
Other Unallowed Variables (Others)	9	25.7%	6	25.0%	5	23.8%	20	25.0%
<b>Totals</b>	<b>35</b>	<b>100.0%</b>	<b>24</b>	<b>100.0%</b>	<b>21</b>	<b>100.0%</b>	<b>80</b>	<b>100.0%</b>

**Note.** <sup>a</sup> Number of variables with significant differences (>2% or <-2%) in financial statements data and those used by the companies in the conciliations of the Original EBITDA disclosed.

**Source:** *Research data.*

From Table 4, it was verified that the variables with the greatest expressiveness in the EBITDA incompatibilities were: DD&A, in 36% of the total cases; Others, in 25% of cases; NIP, at 20%; and NIE, in 18% of cases. The IT variable had a single occurrence referring to 2018, standing for 3% in that year and 1% in all years.

About the “Other” variable, the accounts improperly considered in the original EBITDA conciliations were related to: hedge result; provision for losses; impairment; taxes, depreciation, amortization and financial results from discontinued operations; statutory, shareholder and employee participation; monetary variations and financial charges; and expenses proper to cost.

#### 4.5 Discussion of results

The inferences indicate that the type of undervaluation mismatch was more recurrent in 2018 and 2020, while overvaluation predominated in 2019. As a result of such findings, it was observed that, regardless of the type of mismatch, the most relevant cause was that of error in collecting data of the variables disclosed in the financial statements by the companies. This means that although the names of the variables used in the conciliation are in accordance with the established by the CVM, the values used were different from those contained in financial statements of the entities.

From the analysis of the number of variables with significant differences between the values used in the conciliation and those disclosed in financial statements, it was observed that errors predominated in only one variable in the companies' conciliations – less than half of the companies made mistakes in two or more variables in any of the years.

The variable with the highest number of errors was Depreciation, Depletion, and Amortization (DD&A), representing 34.3% of the differences found in 2018, 41.7% in 2019 and 33.3% in 2020. This finding corroborates the study de Rozenbaum (2017), who concluded that the increase in operational performance, in this case measured by EBITDA, is due to the attribution of large expenses with DD&A, being the most significant expense increased in the calculation of the indicator. Therefore, a good part of the undervaluations can be explained by the sum of DD&A variables in a value lower than the correct one, while the overvaluations can be explained by the value added by such variable being greater than the correct one.

It is inferred that EBITDA undervaluation may indicate a simple methodological error in calculating the indicator, as companies do not obtain apparent benefits from disclosing a lower performance than reality. This result differs from what was expected in cases of indicator

incompatibility, which can be analyzed in depth in future studies, aiming to identify the reasons for this difference. However, a possible justification is related to the practice of income smoothing, as a way of manipulating earnings to keep profits stable, increasing analysts' predictability, and achieving managers' hidden goals (Sousa, Feltes, Meurer, & Ribeiro, 2022). This reinforces the need for practical studies that demonstrate the correct form of calculation in a didactic way, which is the focus of organizations such as the Financial Reporting Council (2013), European Securities and Markets Authority, (2015) and International Organization of Securities Commissions (2016).

Regarding the cases of overvaluations verified in the three years, mainly referring to 2019, these can be explained by the incentive for the entity's management to disclose EBITDA in order to show better results than the competition. However, over time, this can attract new competitors to the market, as observed by Isidro and Marques (2020).

In addition, the overvaluation could be explained by managers' intention to meet or exceed the benchmark verified by analysts, as evidenced by Walker and Louvari (2003), Lougee and Marquadt (2004), Black and Christensen (2009) and Isidro and Marques (2015). This corroborates the statement by Miller (2009), Marques (2010) and Doyle *et al.* (2013), that there is opportunism in the disclosure of voluntary information, which worries about the level of confidence in these disclosures (Andrade, & Murcia, 2019).

About the calculation errors, Berger (2005), Bradshaw (2003) and Christensen (2007) state that confidence in inferences made in previous periods can be affected when methodological errors are identified in later periods. However, these authors do not fully understand the real influence on previous inferences. In addition, Beyer Cohen, Lys and Walther (2010) state that these errors make it impossible to clarify whether stakeholders are, in fact, better informed by non-GAAP measures.

Additionally, errors in non-GAAP performance metrics indicate a 37% measurement error in Bradshaw's *et al.* (2018) research, based on entities that had data from the Center for Research in Security Prices (CRSP) that calculated non-GAAP earnings from 2004 to 2015. This result is below that was found in the present research, which shows that there was 65% methodological error in the years analyzed. Even so, these authors concluded that investors still prefer non-GAAP measures, regardless of measurement errors.

## 5 Final Considerations

From the objective established at the beginning of this research, it was found that the type of non-compliance with CVM Instruction no. 527 (*Instrução* CVM n. 527, 2012) most recurrent in the sample was the error in data collection by the companies, which used divergent values in the conciliation of Original EBITDA from those disclosed in their own financial statements.

These findings were deepened with the identification of which variables led to greater errors in the conciliations of the Original EBITDA disclosed by the entities. The data showed that in the three years, the variable with the highest number of error occurrences was related to Depreciation, Depletion, and Amortization (DD&A) (36.3% of the total), which consisted of collection error (Type 1 Error). In addition to DD&A, significant differences were identified related to the use of other variables not allowed in the CVM method for calculating the Original EBITDA, representing 25.0% of the total, which consisted of errors in the conciliation variables.



It is noteworthy that 31.4% and 40.0% of the companies in the sample had a compatible EBITDA in 2019 and 2020, respectively, demonstrating an improvement in the calculation of the indicator, when compared to the first year of the sample, 2018 (100% incompatible).

Thus, non-GAAP performance measures, understood as those based on non-accounting data or adjusted accounting data, such as EBITDA, are disseminated worldwide among investors and analysts for the analysis of companies' results. Therefore, such measures carry the risk of suffering from errors and manipulations by the managers of issuing entities. In this sense, the study contributed to a practical context, as it demonstrated which mistakes companies actually made when calculating and demonstrating their EBITDA conciliations, referring to 2018, 2019 and 2020. Furthermore, it fills the academic gap regarding EBITDA itself, since even within the growing literature related to non-GAAP disclosures, the indicator has received little attention (Carvalho, 2014; Rozenbaum, 2017).

It should be noted that there were some differences between the data contained in the Economatica's database and those directly observed in the entities' financial statements. The affected companies were excluded from the sample because there was a false initial diagnosis of Original EBITDA incompatibilities. However, these cases were isolated and the Economatica's data were found to be substantially valid and useful for large samples.

As for the limitations of this research, the temporal aspect stands out, which restricts the results to the period of three years analyzed, 2018 to 2020, considered one of the reasons that prevents generalizations regarding the conclusions. Therefore, it is suggested for future research to expand the time horizon, through a greater number of years under observation, in order to verify any tendency of entities to report the indicator with incompatibility bias. This would also make it possible to check whether the most recurrent error continues to be the variable collection error (Type 1 Error), and whether the variable with the greatest impact continues to be DD&A and for what reason.

Associated with this, it is also suggested to analyze the historical evolution of the incompatibilities and the variables that most affected the divergences since the effectiveness of CVM Instruction no. 527. Finally, it is suggested the elaboration of a qualitative research, with an interview with market analysts about their perception about the divergences observed in the calculation and disclosure of EBITDA, in order to observe if this occurrence is known by the users of the information, and has an impact on the evaluation of the entities' performance.

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