

Adherence to the compliance program of Brazil's anti-corruption law and internal controls implementation

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ABSTRACT

The aim of this study is to investigate the adherence of Brazilian publicly listed companies to the parameters of the anti-corruption law compliance program as well as its association with internal controls implementation. In light of the accounting scandals and corporate frauds reported in several countries, including Brazil, Law n. 12,846, known as the anti-corruption law, was approved on August 1st, 2013, and Decree n. 8,420, approved on March 18, 2013, regulated this law and defined criteria for the functioning of compliance programs. Considering that compliance programs can affect internal controls, it is important to understand the adherence of companies to their parameters as well as identifying the internal controls derived from them. The findings show a substantial degree of adherence among listed companies to the parameters of the compliance program. Additionally, the results revealed the existence of new internal controls, such as the emergence of the “compliance officer” function. A survey in the form of a questionnaire was adopted. The questionnaire was sent to companies associated with ABRASCA (Brazilian Association of Publicly Listed Companies). The final sample included 32 publicly listed companies. Paraconsistent logic was applied to analyze the data. This paper contributes by empirically showing that, in Brazil, publicly listed companies are adherent to the anti-corruption law. Furthermore, this paper reveals that higher levels of adherence to compliance programs are associated with greater implementation of internal controls.

Keywords: corporate fraud, internal controls, anti-corruption law, compliance program, business ethics.

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1. INTRODUCTION

Corporate fraud is a topic that raises concern among investors, both in relation to preserving invested assets and in relation to possible measures for protecting against fraudulent agents interested in getting rich on other people's money. It derives from flaws in internal controls and relates especially to the inappropriate use of accounting, corporate espionage, the manipulation of information, purchases for personal gain, the payment of bribes, and theft of assets (Wells, 2008).

The debate regarding the importance of internal controls and the need for standards for them is longstanding. However, it was only in 1977 in the United States that the first legal regulation related to maintaining a system for the internal control of transactions and assets was defined. This regulation became known as the Foreign Corrupt Practices Act (FCPA) and relates to the U.S. anti-corruption law (Ge & McVay, 2005).

In 1988, the FCPA was revised in light of the argument that U.S. companies were being adversely affected, especially in the international sphere, due to them meeting the requirements of an anti-corruption law that was not applicable to foreign competitors (Salbu, 1997). Alternations were made, but the essence of the law was kept, namely the prohibition of payments to third parties when the payer has knowledge that the main purpose of the payment is to illegally influence a public agent. Moreover, there began to emerge political pressure for other countries to combat corruption.

Brazil, specifically, made a commitment to the Organization for Economic Cooperation and Development (OECD) in June of 2002, during the global convention, to elaborate a law related to bribery within and outside the country. Eleven years after signing this agreement, Law n. 12,846, known as the anti-corruption law, was approved on August 1st of 2013.

However, whether in the United States, in Brazil, or in any other country, simply requiring a system of internal controls and the civil and criminal responsibility of senior management without any appropriate adjustments to monitoring practices could delay the main objective of the law: to curb the practice of corruption. The flaws in corporate governance, which were responsible for the series of scandals in the U.S. stock exchange in the 1980s, as well as the accounting scandals at the end of the 1990s, have shown this (Shapiro & Matson, 2008).

However, it is not enough to define laws and penalties for these behaviors. La Porta, Shleifer, Lopez-de-Silanes, and Vishny (1998) argue that more important than having rights is having the guarantee that those rights can be exercised. In other words, the guarantee that the laws will be applied, more than the existence of the laws, is what defines the effect of the legal arrangements. According to the authors, those countries that adopt French civil law (including Brazil) are the ones that present the poorest guarantee of the laws being applied.

Thus, this study aims to investigate the effect that the anti-corruption law has had in Brazil, and in order to do so seeks to answer the following research question: what is the relationship between the level of adherence to the parameters of the compliance program of the anti-corruption law (Law n. 12,846 of August 1st of 2013) and the implementation of new internal controls in publicly listed companies?

The objective that guides this study is to identify the perception of managers regarding the implementation of new internal controls resulting from adherence to the compliance program established in Brazil's anti-corruption law. After all, the fight against corruption is driven by controls that inhibit corrupt practices and not only by the mere existence of the law.

2. CONCEPTUAL STRUCTURE AND HYPOTHESIS

2.1 Corporate Fraud

The 1990s saw the emergence of studies on corporate ethics and fraud, especially in the North American academic environment. Verschuur (1998), for example, studied the relationship between the economic-financial performance of North American companies and their ethical commitment. The author identified that 27% of the

500 biggest publicly listed companies included compliance policies in their annual shareholder reports and also emphasized the observance of a code of conduct. The author also found that the economic-financial performance of these companies was superior to the performance of companies without any type of disclosure regarding the compliance practices they adopted. Subsequent studies, such as Arruñada (2004), Bierstaker, Brody, and Pacini

(2006), and Yallapragada, Roe, and Toma (2012), revealed that corporate frauds originated primarily from flaws in internal controls that featured the inappropriate use of accounting, based on complex techniques intended to deceive the market.

In Brazil, studies on corporate fraud are more recent, although as far back as the colonial period the institutional, political, and social characteristics already revealed the origins of and reasons for corrupt practices (Del Debbio, Maeda, & Ayres, 2013). Silva, Sancovschi, Cardozo, and Condé (2012), for example, compared the frauds reported in Brazil to those reported in the United States in the last 20 years. The authors found that, in the United States, 91% of the fraudulent financial statements were audited by the five biggest auditing firms at the time, the Big Five (PricewaterhouseCoopers, Deloitte Touche Tohmatsu, KPMG, Ernst & Young, and Arthur Andersen, the latter of which has since gone out of business), while in Brazil only 32% of the fraudulent financial statements were audited by them.

Subsequent studies have shown that the number of cases of corporate frauds submitted to the Brazilian criminal justice system and covered by the press is rising (Carvalho & Ferreira, 2014; Petry, 2014), highlighting the scandals involving large Brazilian companies such as Sadia, Aracruz, Banco Santos, Banco Panamericano, and more recently, Petrobras, Odebrecht, and J&F. The facts show that the existing internal controls have not been enough to safeguard assets, protect stakeholder interests, and above all, the image of these companies (Perera, Freitas, & Imoniana, 2014).

According to Blanqué (2002) and Rockness and Rockness (2005), corporate fraud cannot be considered a recent phenomenon, although it has expanded to an international level with globalization. Petrobras, for example, which is now being investigated in Brazil, was placed under examination in November of 2014 by the U.S. Department of Justice and by the U.S. capital market regulator, the Securities and Exchange Commission (SEC), since it has American depositary receipts (ADRs) on the New York stock exchange. The aim of the U.S. authorities is to discover whether Petrobras or its employees, intermediaries, and service providers violated U.S. anti-corruption law by illicitly receiving bribes. In August of 2015, Reuters news agency published that the payment of bribes could mean US\$ 1.6 billion or more in fines for the company (Blount & Rosenberg, 2015).

In general, corporate frauds involve the ethical, legal, institutional, economic, and moral values aspects of a particular society (Blanqué, 2002; Rockness & Rockness, 2005). For Wells (2008), fraud can be typified as any crime practiced with the aim of obtaining an advantage through

deception or trickery. Specifically, Cressey (1950) argues that three elements must be present for an individual to commit fraud: pressure, opportunity, and rationalization. Over the years, this argument has become known as the fraud triangle (Wells, 2008).

According to Cressey (1950), the first factor for the occurrence of fraud is related to the pressure or motivation that justifies practicing the illicit act. The second factor is associated with the opportunity the fraudster is presented with to practice the fraud, that is, visualization of the possibility to commit the illicit act due to the existence of flaws in the system of controls established by the organization. The third factor, rationalization, refers to a necessary component for the occurrence of the crime. So, its emergence does not occur after the fraud is practiced, but rather before it; after all, the fraudster does not see themselves as a criminal. They use deception in order to justify their acts, via situations and reasons that lead them to maintain the concept of them being a person of trust, with an illegal behavior that seems to make sense to them.

Wolfe and Hermanson (2004) emphasize the possibility of updating the fraud triangle by adding a fourth element: the fraudster's capability. They argue that there are personal skills and characteristics that make a fraudster able to identify the opportunity to carry out the fraud. Dorminey, Fleming, Kranacher, and Riley (2010) support this argument and mention that it is a criminal mind that successfully creates mechanisms that are conducive to fraudulent actions. This success means fraudsters continue working normally, without raising suspicions, with them vehemently denying the fraud if they are questioned.

2.2 Categories of Corporate Fraud

In 1996, the Association of Certified Fraud Examiners (ACFE) presented its first report on corporate fraud (*ACFE Report to the Nation on Occupational Fraud and Abuse*), which provided an illustration called the fraud tree. This illustration schematically divided corporate fraud into three groups: corruption, asset misappropriation, and financial statement fraud. After being updated in each version of the report, the fraud tree currently lists 62 individual frauds for the three groups.

2.2.1 Corruption

Wells (2008) defines corruption as an act carried out by a person who uses their role or position to obtain personal advantage to the detriment of the organization they represent. Sá and Hoog (2010) clarify that the corrupt act almost always occurs via the practicing of shady deals, commissions, bribes, and the personal use of public property.

The Brazilian Penal Code (Decree-Law n. 2,848, of December 7th of 1940) details the criminal and penal accountability for corruption, as well as the legal definition for the term. In article 333, active corruption is conceived as the act of “offering or promising an undue advantage to a public servant, in order to persuade them to practice, omit, or delay an official act”. In article 337-B, active corruption in an international commercial transaction is defined as the act of “directly or indirectly promoting, offering, or giving an undue advantage to a foreign public servant, or to a third party, to persuade them to practice, omit, or delay an official act related to the international commercial transaction”.

In the study from the Association of Certified Fraud Examiners (ACFE, 2016), it is explained that four types of corruption can be found: (i) bribery, related to the receipt of bribes by an employee to facilitate an overbilling scheme or to win a bid; (ii) illegal gratuities, similar to bribery, but not always related with the aim of influencing the decision of a particular business; (iii) economic extortion, related to the demand for payment that an employee makes so that the other party can sell or buy what it wants; and (iv) conflict of interest, occurring when an employee with decision-making power has an unrevealed economic or personal interest in relation to a transaction that negatively affects the company (Wells, 2008).

2.2.2 Asset misappropriation

Wells (2008) explains that asset misappropriation can be characterized as a case in which the perpetrator uses deception with the intent of stealing or inappropriately using an organization's assets, whether these are financial (cash flow) or non-financial (stock or other assets).

The ACFE (2016) explains that asset misappropriation can be divided into (i) cash flow appropriations and (ii) appropriations of inventory and other assets, and reports that this type of fraud is more present among employees who are in financial difficulties and face personal problems.

2.2.3 Financial statement fraud

This type of fraud is characterized by the occurrence of deliberate distortions, omissions of facts, and/or releasing financial statements with the aim of misleading users, especially investors and creditors. In this category, the fraudster uses the accounting system to generate the expected results, considering, for example, rates of depreciation that do not correspond to reality; they manipulate the accounting system, inserting false entries to manage results; and they release information recorded outside the accounting system, inserting entries manually to achieve the desired result (Wells, 2008).

According to the ACFE (2016), in general, this fraud can be divided into the overstatements or understatements of net income and net worth. The most common methods involve the concealment of liabilities and expenses, the recording of fictitious revenues, and the reporting of inexistent assets.

Dantas, Zendersky, Santos, and Nyama (2005), Pereira and Nascimento (2005), and Murcia, Borba, and Schiehl (2008) exemplify the impact of this type of fraud when they report the closure of activities of what was up until then one of the most respected auditing firms in the world: Arthur Andersen. After 90 years in business, the company was closed after its reputation was ruined due to it providing auditing services in large North American corporations involved in accounting scandals, such as Enron.

2.3 Mechanisms and Internal Procedures of Anti-corruption Compliance

Of the three types of fraud, the ACFE (2016) explains that, in numbers of occurrence, asset misappropriation occupies first place. Of the cases investigated by the institution in 2016, 83.5% related to the misappropriation of assets, 35.4% to corruption, and 9.6% to financial statement fraud. In terms of the amounts the organizations lost, the order completely inverts: on average, financial statement fraud led to losses of US\$ 975 thousand, corruption led to losses of US\$ 200 thousand, and asset misappropriation caused US\$ 125 thousand in losses.

It is thus noted that corruption occupies an intermediate position according to the two prisms (number of occurrences and amount lost). However, it is the one that damages society the most. According to Araújo and Sanchez (2005), the impacts of corruption prevent economic development, reduce the ability of the State to provide essential services, discourage the population from seeking the common good, and negatively impact economic, social, and political factors. For this reason, besides recognizing the role of private enterprise in preventing corruption and in maintaining a corporate and competitive environment based on the principles of ethics and integrity, the State has elaborated laws to curb this type of fraud.

The FCPA, the U.S. anti-corruption law, was a precursor, but mention should also be given to the international conventions for combating corruption, especially the movement organized by the OECD, which culminated in the publication of *Good practice guidance on internal controls, ethics, and compliance* (OECD, 2010). This guide established 12 practices for guaranteeing that compliance

programs were implemented by companies with the aim of effectively preventing and detecting bribery practices.

In Brazil, awareness of the importance of anti-corruption compliance has significantly increased in recent years due to a series of factors, including the rising global relevance of the Brazilian economy, the increase in direct foreign investment in the country, and the recent scandals involving Brazilian companies and the country's political system. However, even with the speed that the changes are occurring, there is still a gap in the culture of anti-corruption compliance in the country compared to mature markets, especially when the Brazilian anti-corruption legislation is compared to the FCPA (Del Debbio et al., 2013). Standing out among the Brazilian government initiatives are the *Guide for compliance programs* from the Administrative Council for Economic Defense (CADE, 2016) and, especially, the publications of the anti-corruption law, Law n. 12,846 of August 1st of 2013 and Decree n. 420 of March 18th of 2015.

Law n. 12,846 of August 1st of 2013 “describes the administrative and civil accountability of legal entities for the practicing of acts against Brazilian or foreign public authorities, and makes other provisions”, aiming to curb harmful practices against the Brazilian treasury. The main novelty that the law introduced was the definition of punitive measures, which were until then inexistent or palliative, with few financial and criminal measures against the practice of corruption. For example, fines of up to 20% of turnover could now be applied to companies that were considered responsible for acts of corruption.

After all, despite the typification of crime of corruption already featuring in the Brazilian penal system, Brazilian society still lacked a standard that covered the companies involved, since the punishment only related to the personal sphere. Up until the advent of the law, legal entities caught in situations of this nature were punished only with disqualification from participating in public tenders and from engaging in contracts with the government via suspension or being declared disreputable (Bittencourt, 2014).

As for Decree n. 8,420 of March 18th of 2015, this aimed to regulate the accountability for practicing acts against the public authorities addressed in the anti-corruption law. Specifically, this decree introduced five measures (i) administrative accountability; (ii) administrative sanctions and judicial procedures; (iii) leniency agreement; (iv) compliance program; and (v) national register of disreputable and suspended companies and national register of penalized companies.

The compliance program is the only one among the five measures established that aims to detect and tackle deviations, frauds, irregularities, and illicit acts practiced against the public authorities. The other four measures relate to acts carried out after corrupt practices have been executed.

The compliance program relates to the set of internal mechanisms and procedures for the effective application of guidelines that detect and mitigate deviations, frauds, irregularities, and illicit acts practiced against the public authorities. Sixteen parameters are established in the decree for evaluating compliance programs. It is worth mentioning that these parameters are similar to the 12 guidelines for good internal controls, ethical, and compliance practices published by the OECD. It therefore remains to be investigated whether these parameters are, in fact, adopted by Brazilian companies and, moreover, whether adherence to them is related with the companies' internal controls.

2.4 Research Hypothesis

When they adhere to the compliance program, companies are treated differently in cases of possible irregularities, as occurs in the United States. Specifically, Decree n. 8,420 of March 18th of 2015 establishes that if in its defense a legal entity presents information and documents relating to the existence and functioning of a compliance program, the prosecuting commission must examine it according to the parameters for determining the sanctions applied. A fine, for example, can be reduced by 1 to 4% if the existence and application of a compliance program is proven.

The compliance program established the need to implement internal controls capable of ensuring the swift elaboration and reliability of financial reports and statements. Therefore, companies that adhere to the program tend to introduce or improve their internal control mechanisms.

Even if there is no adherence to the compliance program, the anti-corruption law in itself values internal controls, since by establishing heavy fines for corrupt acts, it encourages the creation of areas in companies for internal controls and combating corruption (Cunha, 2013). Therefore, the following hypothesis is formulated:

H₁: the level of adherence to the anti-corruption law is positively related with the level of implementation of new internal controls in the companies established in Brazil.

3. RESEARCH METHOD

3.1 Data Collection

The data for this study were collected via a survey in which a questionnaire was sent to the managers of the companies via the electronic form commercialized by the company Vroman Systems, Inc. (*Formsite*). The data collection period lasted 11 weeks, from September 24th to December 10th of 2015.

Considering the reminder from Martins and Theóphilo (2009) that it is necessary to pay attention to the meaning and precision criteria of the measurement instruments when evaluating and quantifying data, it is worth mentioning the main care taken with relation to the validity of the questionnaire.

To safeguard the validity of the content, in relation to the breadth of the specific domain whose measurement is sought (Martins & Theóphilo, 2009), care was taken to directly or indirectly base the elaboration of the questions on the 16 parameters defined for the compliance program of the anti-corruption law. A Likert-type scale was used, which does not contain “questions” but rather “propositions”, that is, affirmations for which the respondent gives their level of agreement, depending on the semantic differential used (Likert, 1932).

To preserve the validity of the criterion, which relates to the ability of the research instrument to diagnose the situation and distinguish individuals who are known to be different (Martins & Theóphilo, 2009), a pre-test was carried out. This pre-test included the participation of five professionals and aimed to evaluate the understanding of the questions and the time needed to answer them, revealing the need for adjustments to the questions relating to the effects of the anti-corruption law on the internal controls. The answers obtained in this stage were discarded and do not compose the study sample.

3.2 Population and Sample

The population of the study was formed of professionals from finance, controlling, investor relations, and other related areas who worked in 129 companies associated with the Brazilian Association of Publicly Listed Companies (ABRASCA). The final sample covered 32 firms, representing a 25% response rate for the study.

3.3 Paraconsistent Logic

To identify the level of adherence to the compliance program of the anti-corruption law, paraconsistent logic was used. This method was chosen because it makes the isolation of the most influential factors in the decisions viable, based on the valuations given by the respondents to the proposed questions (Carvalho, 2002). That is, paraconsistent logic enables it to be coherently identified whether there is adherence or not among the publicly listed companies to the compliance program of Brazil's anti-corruption law.

According to Da Costa, Abe, Murolo, Silva, & Leite (1999), paraconsistent logic is indicated when there is a desire to obtain results that resemble human reasoning. Paraconsistent logic can model human behavior and thus be applied in control systems. It is presented as being more complete and more suitable for handling real situations, with possibilities for addressing inconsistencies and contemplating uncertainty.

The definition of factors that, according to Da Costa et al. (1999), are coherent sets of propositions regarding the subject constitutes the starting point for applying paraconsistent logic. Table 1 shows that four factors were defined based on 23 propositions.

Table 1

Factors and propositions of the study

Factors and propositions	Question number	Parameter number
Factor A – Company (standards of conduct, policies, tone at the top, training)		
The standards of conduct, policies, and compliance procedures are applicable to all employees.	1	2
The standards of conduct and compliance policies extend to third parties (suppliers, service providers, and intermediary agents).	2	3
The training on the compliance program is periodically revised.	3	4
The company's senior management, including the boards, shows its support for the compliance program.	4	1
The employees' commitment to the compliance program is documented and periodically updated.	5	4

Table 1*Cont.*

Periodical risk analyses are carried out to ensure the effectiveness and updating of the compliance program.	6	5
The internal auditing structure is independent and has the authority to inspect the compliance program.	7	9
Factor B – Evaluation of irregularities (complaints channels, retaliation, guidelines)		
There are complaints channels for reporting irregularities.	8	10
The complaints channels are widely disclosed to the employees and third parties, as well as the mechanisms geared toward protecting complainants.	9	10
There is an adequate forum for defining and approving the guidelines, clearing up doubts, handling occurrences, and monitoring adherence to the compliance program.	10	15
The employees are NOT afraid of retaliation.	11	
There are disciplinary measures for cases in which the compliance program is violated.	12	11
Factor C – Effects on the internal controls (new controls, adequacy of the existing controls, transparency with payments)		
The anti-corruption law created the need for new internal controls.	13	14
The internal controls derived from the compliance program of the anti-corruption law contribute to minimizing errors and fraud.	14	13
Adjustments have been made to the internal controls to meet the demands of the compliance program of the anti-corruption law.	15	6
The internal controls prior to the anti-corruption law were sufficient for guaranteeing the reliability of the company's processes and the precision of its financial statements.	16	7
Controls to prevent fraud in bids or in any interaction with the public sector were created only after the establishment of the anti-corruption law.	17	8
Controls to ensure the immediate interruption of detected irregularities or infractions were created only after the establishment of the anti-corruption law.	18	12
There is transparency and there are controls to validate and approve donations to candidates and political parties.	19	16
Factor D – New resources and costs to meet the demands of the law (compliance officer and internal auditor functions, other resources)		
The compliance officer function already existed before the establishment of Brazil's anti-corruption law.	20	
The internal auditor function was created after the establishment of Brazil's anti-corruption law.	21	
New resources were allocated to the compliance and/or controlling area to meet the demands of the compliance program of the anti-corruption law.	22	
The benefits of the anti-corruption law have exceeded the costs of implementing, updating, and executing the internal controls associated with this law.	23	

Source: *Elaborated by the authors.*

For factors A, B, and C, the main foundation for the propositions is the anti-corruption law itself, specifically the parameters defined in article 42 of Decree n. 8,420 of March 18th of 2015, as the “Parameter number” column shows.

The text of the decree was converted into assertions for which the respondents should express their disagreement or agreement via the following semantic differentials: totally disagree (TD), disagree (D), indifferent (I), agree (A), and totally agree (TA). With the exclusive aim of calculating the level of adherence, propositions 17 and 18 had their scales inverted, considering that disagreement already indicated adherence to the anti-corruption controls even before the relevant regulation.

It is worth mentioning that the previous evaluations from the questionnaire suggested modifications of the

rigid text of the legislation to facilitate the respondents' understanding. They indicated, for example, the need to divide some parameters (4 and 10) into two propositions (3 and 5; 8 and 9), as well as the inclusion or suppression of specific terms in propositions 7, 13, 14, and 15 (parameters 9, 14, 13, and 6).

For example, proposition 7 specified for parameter 9 that internal auditing would be the internal element responsible for applying the compliance program and monitoring adherence to it. The proposition maintained the assumption of independence described in the parameter, even though this independence is debatable, since the auditing committee, responsible for supervising the internal auditing, is formed preferentially of independent members of the board of directors, but it does not cease to

be subordinate to this board (Baioco & Almeida, 2017).

For factor D, the main foundation for the propositions is the literature regarding the procedures usually implemented to detect fraud (Bierstaker et al. 2006; Moyes & Baker, 2003).

Having defined the factors, we can now move on to the five basic stages of the paraconsistent logic. The first is based on the collection of information about the object or event considering multiple aspects (factors), via the use of sensors, judges, or experts. For this reason, the quantities of respondents for each semantic differential were calculated.

The proposal from MacNaughton (1996) was adopted to calculate the agreements (A_p) for each proposition. The value of the total agreement (TA) and agreement (A) columns was summed up and 50% of the value for indifferent (I) was added. The disagreements (D_p) for the

proposition were likewise calculated. A similar procedure was used to calculate the quantity of agreeing (A_f) and disagreeing (D_f) respondents for the factor, that is, for all the propositions related to that factor.

Stage 2 converts this information about the multiple aspects into degrees of belief (μ_1) and disbelief (μ_2). These degrees correspond to the proportions of agreeing and disagreeing answers for the factor (Sanches, Meirelles, & Sordi, 2010).

Sanches et al. (2010) explain that for each proposition it is possible to establish a level of agreement indicator, as well as the quantity of disagreeing and agreeing answers. The level of agreement for each proposition (LA_p) is calculated by using the stochastic oscillator from Wilder (1978), also known as the relative strength index. Table 2 lists the formulas used in these two stages.

Table 2

Formulas related to disagreement and agreement

Position	Disagreement and agreement for the proposition	Disagreement and agreement for the factor	Levels of disbelief and belief	Level of agreement
Agreement	$A_p = A + TA + \frac{I}{2}$	$A_f = \sum A + \sum TA + \frac{\sum I}{2}$	$\mu_1 = \frac{A_f}{n_f} = \frac{\sum A + \sum TA + \frac{\sum I}{2}}{n_f}$	$LA_p = 100 - \left[\frac{100}{\frac{A_p}{D_p} + 1} \right]$
Disagreement	$D_p = TD + D + \frac{I}{2}$	$D_f = \sum TD + \sum D + \frac{\sum I}{2}$	$\mu_2 = \frac{D_f}{n_f} = \frac{\sum TD + \sum D + \frac{\sum I}{2}}{n_f}$	

Source: Sanches et al. (2010, p. 6, 10).

According to Wilder (1978), the values of the level of agreement (whether for the proposition or for the factor) lie within the interval [0; 100]. The interpretation of the results for the level of agreement is based on Table 3, using the interpretation by Davis (1976).

Table 3

Interpretation of level of agreement values (LA)

LA Values	Classification
90 or more	Very strong agreement
80 to + 89.99	Substantial agreement
70 to + 79.99	Moderate agreement
60 to + 69.99	Low agreement
50 to + 59.99	Negligible agreement
40 to + 49.99	Negligible disagreement
30 to + 39.99	Low disagreement
20 to + 29.99	Moderate disagreement
10 to + 19.99	Substantial disagreement
9.99 or less	Very strong disagreement

Source: Adapted from Davis (1976, p. 70).

In the third stage, using an appropriate logical network according to the number of factors and the levels of belief (μ_1) and disbelief (μ_2) for each factor, the level of certainty and level of contradiction (L_1, L_2) are obtained in relation to the object as a whole. This pair of values (L_1, L_2) relates to the unit square of the Cartesian plane (USCP) (Sanches et al., 2010). Logical networks are used in this stage and carry out the conversion of belief (μ_1) and disbelief (μ_2) into a particular level of certainty and into a particular level of contradiction. The method used for interpreting the result implies the application of maximization (OR) and minimization (AND) techniques of paraconsistent logic in order to achieve a final value.

The fourth stage contemplates the interpretation of the result in the USCP. Finally, the fifth and last stage includes the normalization and interpretation of the final result. The formulas used in these last stages are listed in Table 4.

Table 4*Formulas related to the levels of contradiction and certainty*

Position	Levels of contradiction and certainty	Normalized levels of contradiction and certainty
Certainty	$L_1 = \mu_{1R} - \mu_{2R}$	$L_{1n} = \frac{L_1 - (-1)}{1 - (-1)} = \frac{L_1 + 1}{2}$
Contradiction	$L_2 = \mu_{1R} + \mu_{2R} - 1$	$L_{2n} = \frac{L_2 - (-1)}{1 - (-1)} = \frac{L_2 + 1}{2}$

Source: *Sanches et al. (2010, p. 9, 11).*

The values of the normalized level of certainty L_{1n} and of the normalized level of contraction L_{2n} can be located at any point between 0 and 1, therefore it is useful for there to be agreement in relation to them

being strong and weak values. The results for L_{1n} and L_{2n} can be interpreted using the convention proposed by Davis (1976), which was adapted by Sanches et al. (2010), as Table 5 shows.

Table 5*Convention for interpreting the levels of certainty and contradiction*

Normalized level of certainty (L_{1n})		Normalized level of contradiction (L_{2n})	
Expresses how much the respondents adhere to the propositions of the factor (horizontal axis in the USCP)		Expresses the quality of the data used (vertical axis in the USCP)	
Observed value	Recommended interpretation regarding adherence	Observed value	Recommended interpretation regarding the data
0.900 or more	Broad	0.900 or more	Very conflicting
0.700 to 0.899	Substantial	0.700 to 0.899	Conflicting
0.300 to 0.699	Moderate	0.300 to 0.699	Consistent
0.100 to 0.299	Low	0.100 to 0.299	Incomplete
0.000 to 0.099	Negligible	0.000 to 0.099	Ignored

*USCP = Unit squared of the Cartesian plane.***Source:** *Sanches et al. (2010, p. 11).*

4. PRESENTATION AND ANALYSIS OF THE RESULTS

4.1 Analysis of the Respondents' Profile

According to the criterion laid out by the Brazilian Service for Supporting Micro and Small Enterprises in São Paulo (SEBRAE-SP, 2015), which classifies organizations according to number of employees, 84% are large companies and 16% are medium-sized companies.

In relation to the sector in which the participants operate, based on the sector classification of the São Paulo Stock, Commodities, and Futures Exchange (BM&FBOVESPA) (2017), it should be noted that: six belong to the Finance and Others sector; six are from the Basic Materials sector (Mining, Steel, Chemicals, and Paper); six are from the Public Utility sector (Electric Energy, Water and Sewage, and Gas); three are from the

Construction and Transport sector; three are from the Cyclical Consumption sector; three are from the Industrial Goods sector (Transport Material and Machinery and Equipment); two are from the Non-Cyclical Consumption sector; and one is from the Oil and Gas sector. It was not possible to identify the sector of three companies.

The respondent companies from all these sectors normally attribute a high degree of importance to government authorizations, such as licenses and permits. Specifically, 72% of the participants informed that these authorizations have a high degree of importance in their operations. Mention should be given to companies that operate in the Public Utility, Non-Cyclical Consumption, and Oil and Gas sectors, which all attribute high importance to government licenses and permits.

It is also worth highlighting that 52% of the companies in the sample have little direct interaction with the public sector, since they present annual sales to government bodies within a threshold of less than R\$ 300 million. Nonetheless, 31% of the companies present annual sales to public bodies that are between R\$ 300 million and R\$ 5 billion. Sixteen per cent of the companies annually sell more than R\$ 5 billion to the public sector.

4.2 Adherence to the Parameters of the Compliance Program of the Anti-corruption Law

First, we present Table 6 to show the results obtained in the execution of the two initial stages of the paraconsistent logic.

Table 6
First stages of the application of paraconsistent logic

Factors	Question number	Parameter number	Likert Scale					Calculations				
			TD	D	I	A	TA	Quantity	Ordered median	Disagreeing with the proposition (D_p)	Agreeing with the proposition (A_p)	Level of Agreement (LA_p)
Factor A – Company (standards of conduct, policies, tone at the top, training)												
The standards of conduct, policies, and compliance procedures are applicable to all employees.	1	2	1	0	2	4	25	32	TA	2.0	30.0	93.8
The standards of conduct and compliance policies extend to third parties (suppliers, service providers, and intermediary agents).	2	3	1	0	7	8	16	32	TA	4.5	27.5	85.9
The training on the compliance program is periodically revised.	3	4	4	4	7	8	9	32	TA	11.5	20.5	64.1
The company’s senior management, including the boards, shows support for the compliance policy.	4	1	1	0	2	5	24	32	TA	2.0	30.0	93.8
The employees’ commitment to the compliance program is documented and periodically updated.	5	4	2	1	9	11	9	32	TA	7.5	24.5	76.6
Periodical risk analyses are carried out to ensure the effectiveness and updating of the compliance program.	6	5	3	0	8	12	9	32	TA	7.0	25.0	78.1
The internal auditing structure is independent and has the authority to inspect the compliance program.	7	9	3	1	5	1	22	32	TA	6.5	25.5	79.7
Summary of factor A			41		183		224			0.18	0.82	
			D_f		A_f					H_2	H_1	
Factor B –Evaluation of irregularities (complaints channels, retaliation, guidelines)												
There are complaints channels for reporting irregularities.	8	10	2	0	0	3	27	32	TA	2.0	30.0	93.8
The complaints channels are widely disclosed to the employees and third parties, as well as mechanisms geared toward protecting complainants.	9	10	2	1	0	8	21	32	TA	3.0	29.0	90.6
There is an adequate forum for defining and approving guidelines, clearing up doubts, handling occurrences, and monitoring adherence to the compliance program.	10	15	3	0	2	11	16	32	TA	4.0	28.0	87.5
The employees are NOT afraid of retaliation.	11		3	2	7	7	13	32	TA	8.5	23.5	73.4
There are disciplinary measures for cases in which the compliance program is violated.	12	11	2	0	2	7	21	32	TA	3.0	29.0	90.6
Summary of factor B			20.5		139.5		160			0.13	0.87	
			D_f		A_f					H_2	H_1	

Table 6

Cont.

Factors	Question number	Parameter number	Likert Scale					Calculations				
			TD	D	I	A	TA	Quantity	Ordered median	Disagreeing with the proposition (D_p)	Agreeing with the proposition (A_p)	Level of Agreement (LA_p)
Factor C – Effects on internal controls (new controls, adequacy of existing controls, transparency with payments)												
The anti-corruption law created the need for new internal controls.	13	14	6	2	4	7	13	32	TA	10.0	22.0	68.8
The internal controls derived from the compliance program of the anti-corruption law contribute to minimizing errors and fraud.	14	13	3	2	3	9	15	32	TA	6.5	25.5	79.7
There have been adjustments to the internal controls to meet the demands of the compliance program of the anti-corruption law.	15	6	4	4	7	9	8	32	TA	11.5	20.5	64.1
The internal controls prior to the anti-corruption law were sufficient for guaranteeing the reliability of the company's processes and the precision of its financial statements.	16	7	1	4	5	10	12	32	TA	7.5	24.5	76.6
Controls to prevent fraud in bids or in any interaction with the public sector were created only after the establishment of the anti-corruption law.	17	8	1	3	1	6	21	32	TA	4.5	27.5	85.9
Controls to ensure the immediate interruption of detected irregularities or infractions were created only after the establishment of the anti-corruption law.	18	12	1	1	2	7	21	32	TA	3.0	29.0	90.6
There is transparency and there are controls to validate and approve donations to candidates and political parties.	19	16	4	2	6	4	16	32	TA	9.0	23.0	71.9
Summary of factor C			52		172		224			0.23	0.77	
			D_f		A_f					H_2	H_1	
Factor D – New resources and costs to meet the demands of the law (compliance officer and internal auditor functions, other resources)												
The compliance officer function already existed before the establishment of Brazil's anti-corruption law.	20		13	2	5	3	9	32	TD	17.5	14.5	45.3
The internal auditor function was created after the establishment of Brazil's anti-corruption law.	21		26	2	1	2	1	32	TD	28.5	3.5	10.9
New resources have been allocated to the compliance and/or controlling area to meet the demands of the compliance program of the anti-corruption law.	22		9	5	7	4	7	32	TD	17.5	14.5	45.3
The benefits of the anti-corruption law exceed the costs of implementing, updating, and executing the internal controls associated with this law.	23		2	2	4	7	17	32	CT	6.0	26.0	81.3
Summary of factor D			69.5		58.5		128			0.54	0.46	
			D_f		A_f					H_2	H_1	

A = agree; TA = totally agree; D = disagree; TD = totally disagree; I = indifferent.

Source: Elaborated by the authors.

By analyzing the level of agreement for the propositions (Table 7), it is initially possible to interpret the concentrations of the strongest and weakest agreements in relation to the 16 precepts of the compliance program of the law.

Table 7
Matrix attributing the level of agreement

Questions	Parameters	Level of agreement (LA _p)	Interpretations of the LA _p according to Davis (1976)
1	2	93.8	Very strong
2	3	85.9	Substantial
3	4	70.3	Moderate
4	1	93.8	Very strong
6	5	78.1	Moderate
7	9	79.7	Moderate
8	10	92.2	Very strong
10	15	87.5	Substantial
12	11	90.6	Very strong
13	14	68.8	Low
14	13	79.7	Moderate
15	6	64.1	Low
16	7	76.6	Moderate
17	8	85.9	Substantial
18	12	90.6	Very strong
19	16	71.9	Moderate

Source: Elaborated by the authors.

It is perceived that parameters 1, 2, 10, 11, and 12, which, respectively, detail the senior management’s involvement with the compliance program, the ethical codes, the complaints channels, the protection of whistleblowers, and the procedures for evaluating irregularities, obtained the highest levels of agreement. The mean level of agreement for these five parameters was 92.2, which according to the convention established by Davis (1976) is very strong.

In contrast, parameters 6 and 14, which report the importance of specific adjustments in the internal controls, obtained the lowest levels of agreement. This suggests that the companies studied are, at least, deficient with regard to the inclusion of specific controls, especially to ensure correct accounting records and regularity in mergers and acquisitions processes.

Having defined the levels of agreement and disagreement, we can proceed to the application of paraconsistent logic. For this, the maximization (OR) and minimization (AND) techniques are used, as illustrated in Figure 1.

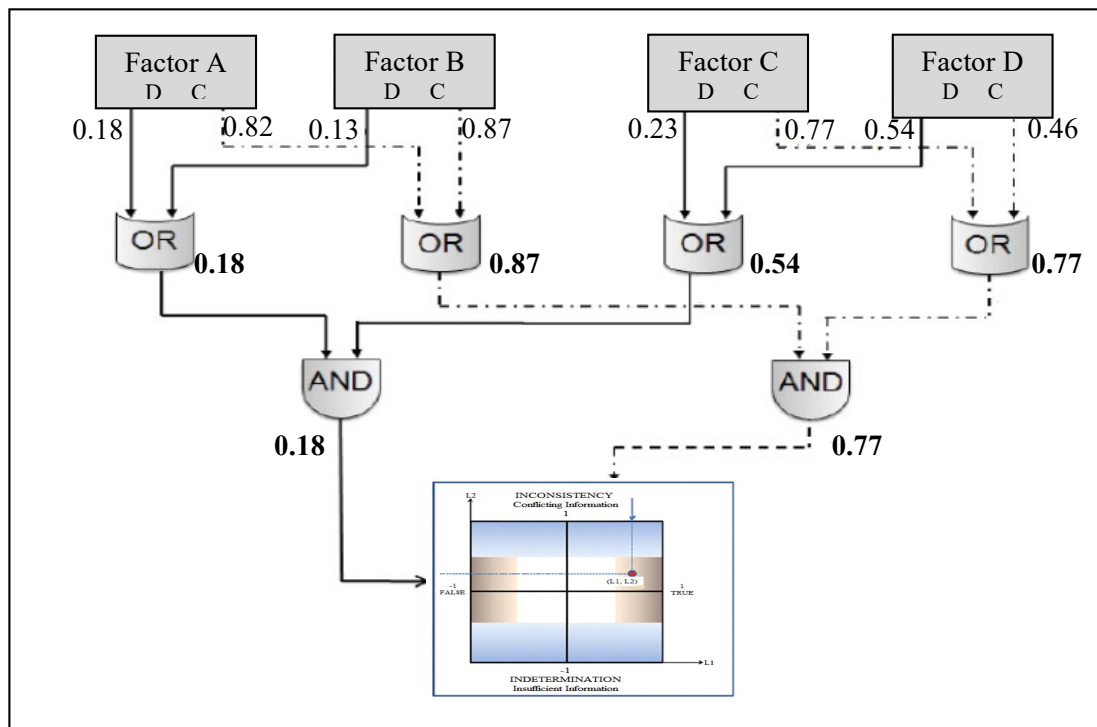


Figure 1 Logical network
Note: Factors A, B, C, and D according to Table 6.
AND = minimization technique; OR = maximization technique.
Source: Elaborated by the authors.

Having applied the paraconsistent logic techniques, it was identified that the calculations of the final values for the levels of certainty and contradiction should take 0.77 of μ_{1R} and 0.18 of μ_{2R} as a base. Employing the formulas laid out by Sanches et al. (2010), it was found that, before normalization, the level of certainty (L_1) corresponds to 0.58 and the level of contradiction (L_2) corresponds to -0.05. After normalization, the values become 0.79 (L_{1n}) and 0.48 (L_{2n}).

With these results, using the convention for interpreting values (Table 5) proposed by Davis (1976) and adapted by Sanches et al. (2010), it is noted that the data can be considered more consistent ($L_{2n} = 0.48$) and adherence to the compliance program of the anti-corruption law can be considered substantial ($L_{1n} = 0.79$).

In summary, according to the result of the analysis, there are indications that the level of adherence to the parameters of the compliance program of Brazil's anti-corruption law ($L_{1n} = 0.79$) can be considered substantial, according to the scale presented by Sanches et al. (2010). That is, the results suggest that the respondent companies are adherent to the parameters of the compliance program of the anti-corruption law.

4.3 Relationship between the Compliance Program and the New Internal Controls

To evaluate the relationship between the compliance program of the anti-corruption law and the new internal controls, we must expand on the analyses related to factors C and D. It is worth remembering that factor C included seven propositions (13 to 19) to measure the respondents' level of agreement in relation to the creation and/or adjustments of the internal controls. Factor D included four propositions (20 to 23) to identify resources and costs for implementing new controls in order to meet the demands of the law.

A correlation matrix was elaborated with the intention of obtaining indications regarding the direction of the relationships between the variables (relationship between degree of adherence and the new controls, resources, and costs) and, especially, identifying the presence of statistical significance. Thus, Table 8 is presented. The degree of adherence was measured by the total sum of the scores attributed to factors A and B.

Table 8
Correlation matrix

	Adherence	13	14	15	16	17	18	19	20	21	22	23
Adherence	1.000											
New controls	13	0.329*	1.000									
	14	0.241	0.602***	1.000								
	15	0.016	0.582***	0.744***	1.000							
	16	0.483***	0.025	0.168	(0.049)	1.000						
	17	0.562***	0.046	0.008	(0.181)	0.505***	1.000					
	18	0.526***	0.015	(0.064)	(0.311)*	0.476***	0.940***	1.000				
	19	0.477***	0.341*	0.202	0.140	0.332*	0.299*	0.241	1.000			
Resources and costs of the new controls	20	0.321*	(0.022)	0.026	(0.184)	0.310*	0.324*	0.365**	0.333*	1.000		
	21	(0.047)	0.154	(0.060)	(0.039)	(0.247)	(0.434)**	(0.318)*	(0.072)	(0.017)	1.000	
	22	0.216	0.466***	0.191	0.363**	(0.084)	(0.080)	(0.147)	0.059	(0.100)	0.287	1.000
	23	0.444**	0.413**	0.746***	0.545***	0.190	0.093	(0.035)	0.083	0.087	(0.284)	0.370**

***, **, * = significance at the level of 0.01, 0.05, and 0.10, respectively.

Source: Elaborated by the authors.

With regard to the new controls, based on the correlation matrix (propositions 13 to 19) it can be noted that there is indeed a positive relationship between them and the degree of adherence to the parameters of the compliance program of the anti-corruption law. The relationship is positive for all the controls, and statistically significant for the controls related to financial statements (16), bids (17), infractions (18), and donations to political parties (19). Also significant is the relationship between adherence and the need to create new controls as a whole (13).

These relationships indicate that adherence to the compliance program of the anti-corruption law is associated with the implementation of new controls; that is, greater levels of adhesion to the parameters go together with greater levels of inclusion of controls for bids, infractions, donations to political parties, and general controls. In contrast, lower levels of adhesion go together with lower levels of inclusion of these controls.

Also based on the correlation matrix, it can be perceived that adherence is also associated with the

allocation of resources and costs for implementing new controls. The coefficients of the correlation between the degree of adherence and the perception of a cost/benefit relationship (23) as well as between the degree of adherence and the hiring of compliance officers (20) significantly indicate that higher levels of adherence to the compliance program are related to more discernment of the benefits of the compliance program and with more hiring of compliance officers. In contrast, lower levels of adherence to the compliance program are associated with less perception of benefits and less hiring of compliance officers. It is worth highlighting that 62.5% of the companies (20 companies) did not agree that they already had compliance officers in their workforces before the anti-corruption law.

The only negative relationship between the degree of adherence to the compliance program and the resources and costs resulting from new controls, although not significant, was observed for proposition 21. This result may suggest that adherence to the anti-corruption law did not lead to the hiring of new auditors, since the function already existed in the companies and, moreover, instead of hiring new internal auditors, the companies chose to hire compliance officers. New studies that obtain statistical significance in

this aspect and in the other insignificant aspects need to be carried out in order to ratify this assumption or not.

These findings enable the non-rejection of H_1 , while they indicate the existence of significant positive relationships between adherence to the parameters of the compliance program and the implementation of internal controls. In these terms, as the fight against corruption is promoted not only by the existence of regulation, but also by controls that inhibit corrupt practices, it can be argued that the anti-corruption law has had an impact on the routine of Brazilian companies.

The result of this hypothesis, as well as the result for adherence to the anti-corruption law, contributes to the academic and professional discussions regarding corruption in Brazil, specifically with regard to internal controls. By addressing the relationship between the anti-corruption law and internal controls in Brazil in a pioneering manner, this research opens the way for new studies. Moreover, it could help professionals to understand why certain controls are found in their companies, regardless of the fact that for them their usefulness seems remote. The research is also useful for indicating to legislators the impacts of their regulations on the day-to-day activities of companies.

5. FINAL REMARKS

Since the U.S. anti-corruption law (FCPA) was created, political pressure has emerged for other countries to also combat corruption. Brazil, specifically, committed in the OECD global convention in 2002 to elaborating a law related to bribery and, after 11 years, Law n. 12,846, known as the anti-corruption law, was approved on August 1st of 2013. This law, supported by Decree n. 8,420 of March 18th of 2015, introduced the Compliance Program, evaluated in accordance with the application of 16 parameters.

Therefore, this paper has sought, in a pioneering way, to answer the following question: what is the relationship between the level of adherence to the parameters of the compliance program of the anti-corruption law (Law n. 12,846 of August 1st of 2013) and the implementation of new internal controls in publicly listed companies? The established objective was to identify the perception of managers regarding the implementation of new internal controls resulting from adherence to the compliance program established in the Brazilian anti-corruption law.

The results, calculated based on the answers from 32 companies associated with ABRASCA, suggested that (i) the companies are adherent to the parameters of the compliance program of the anti-corruption law and (ii) adherence to the parameters of the compliance program

is related to the implementation of new internal controls. The hypothesis was not rejected.

The new internal controls that are most related with adherence to the anti-corruption law are those related to financial statements, bids, infractions, and donations to public parties. Moreover, there is the perception of a relationship between the cost/benefit of adherence to the compliance program and the more marked emergence of the compliance officer function.

Thus, the main contribution of this research lies in proving, empirically, that legal entities, specifically publicly listed Brazilian and multinational companies, have sought to adapt to the compliance program established in the anti-corruption law.

On an individual basis, the study contributes by revealing that adherence is greater in certain parameters. Those that relate to the operationalization of the compliance program, such as the involvement of senior management, ethical codes, complaints channels, protection of whistleblowers, and the evaluation of irregularities, are the main objects of company adherence. As for the parameters related to the specific implications of the program, such as adjustments to the accounting records in mergers and acquisitions, there is still low adherence. This revelation indicates

that there is room for companies to improve their fight against corruption, since the mere existence of the law is not enough for this.

It is worth mentioning that this paper has limitations, due especially to the fact that not all legal entities established in Brazil were investigated. So, the results presented should not be generalized, since they reflect the reality that applies to the companies that compose the sample and that were actually studied. In light of this limitation, it is suggested that new studies broaden the research on this subject, covering other types of companies (closed, for example) and, in addition, that they analyze the relationship between company profiles (nationality, segment, size, etc.) and adherence to the compliance program.

There is also the limitation resulting from the research method selected. When a survey is chosen, the reality is reflected via the subjective perceptions of the selected respondents. So, in this study, the results reflect the professionals' discernment and judgment of the companies they work in. These findings could be widened if, together with an internal investigation of the degree of adherence of the firms to the compliance program, an objective

analysis was carried out by external members.

Another limitation relates to the composition of the sample. In this study, more than half of the participating companies (53%) have little direct interaction with the government. As the anti-corruption law describes the accountability for practicing acts against public authorities, companies with more direct relationships with the government are more exposed to the law being applied and may more expressively adhere to the parameters defined for the compliance program. Thus, the results may have been influenced, and both the level of adherence and the allocation of new resources to meet the requirements of the law might have been stronger if companies with more interaction with the government had participated in the study. On the other hand, if more companies that have little interaction with the government had participated in the study, the level of adherence to the compliance program and the allocation of new resources might have been lower. In light of this limitation, it is recommended that new studies compare adherence to the parameters of the compliance program for different levels of interaction with the government.

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