

Governance and sustainability in brazilian electricity companies

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RESUMO

O contexto econômico atual demanda políticas de responsabilidade socioambiental e governança corporativa a fim de alinhar os interesses entre os diversos atores sociais das grandes corporações. Sendo assim, partindo da hipótese de que a criação de valor corporativo está associada positivamente a boas práticas de governança e sustentabilidade empresarial, o presente estudo tem como objetivo analisar a relação entre desempenho e práticas de governança e responsabilidade social sob a ótica da Teoria da Agência e da Teoria dos *Stakeholders*. A pesquisa foi executada em companhias listadas na Bolsa de Valores de São Paulo da área de Energia Elétrica, que consiste em um setor de alto impacto ambiental e social. Para análise dos dados foram estimados modelos de regressão linear com dados em painel por Efeitos Aleatórios e pelo Método dos Momentos Generalizado Sistemático (GMM-Sys). Os resultados da pesquisa sugerem que empresas com práticas adequadas de governança e responsabilidade social possuem um melhor valor de mercado. Conclui-se que a adoção de tais práticas além de atender preceitos éticos, legais e societários contribui para a criação de valor corporativo.

PALAVRAS CHAVE. Governança Corporativa, Responsabilidade Social, Energia.

Tópicos (GF - Gestão Financeira; PO na Área de Energia PO na Agricultura e Meio Ambiente)

ABSTRACT

The current economic context calls for socio-environmental responsibility and corporate governance policies in order to align the interests among the different social participants in great corporations. Therefore and based on the hypothesis that the creation of corporate value is positively associated with good governance and entrepreneurial sustainability practices, this study seeks to analyze the relationship between performance and governance and social responsibility in light of the Agency Theory and the *Stakeholders Theory*. The investigation was carried out in companies listed in the São Paulo Stock Exchange for the electric energy which consists of a sector of high environmental and social impact. For the data analysis linear regression models with panel data by Random Effects and by Generalized Systemic Moments method (GMM-Sys) were used. The results of the investigation suggest that companies with adequate governance and social responsibility practices have a higher market value. It can be concluded that said practices, besides meeting ethical, legal and society precepts, contribute to the creation of corporate value.

KEYWORDS. Corporate governance, Social responsibility, Energy.

Paper topics (GF - Financial Management; OR in Energy; OR in Agriculture and Environment)

1. Introduction

In recent years, one of the most discussed matters in the academic and international environments has been the importance of adequate sustainability and corporate governance by companies. This field of investigation arises from the growing movement for sustainable development and the demand for the meeting of the needs of several users of the company.

With this perspective in mind, it can be observed that great corporations have revenues that are higher than the gross domestic product of many countries, hence said companies provide a strong impact in the realities in which they are embedded and as a result of globalization have influence in the entire world.

It is well known that the companies of the electric energy sector are relevant for the development of the economy taking into account that they are responsible for the creation of value for different sectors of the economy which in turn require energy to develop their production processes [Gomes et al, 2006].

Besides their economic importance, the electric energy sector has a broad visibility due to it being a public utility sector and being immersed in a context of regulation in order to guarantee transparency, legality and uniformity in the services provided. Furthermore, being it in an area of intensive consumption of natural resources and territorial interference, the energy sector has a high environmental impact.

For Ferreira [2014], after several decades with their competitive advantages outstanding the environmental imbalances, comes the demand for the maintenance of the environment by means of new production processes, energetic efficiency and other instruments that favor the economic, social and sustainable balance.

From a social responsibility stand point, it is necessary to initially not only consider the economic objective of the companies, but also their social objectives. Hence, Carroll [1979] stresses that the performance of a company must consider the returns that perfect the results of all the *stakeholders* involved and not only the results of the owners or shareholders.

Freeman [2000] highlights that the *stakeholder's* theory states that the actions of the company must be planned and directed towards the different groups that are involved both directly and indirectly in the business since its maintenance and long term success depend on said interactions with the interested parties.

In this sense it is worth noting that the management of corporations is carried out, mainly, by Market professional and not by the owners themselves and that as the organizations grow, there is an increase in the complexity that arises from the gap between property and control [Fama, 1980].

Said separation between property and control consists therefore of an intrinsic characteristic of modern organizations and has been studied for the last 100 years, being it the basis for the understanding of corporate governance. For Fama and Jensen [1983] said separation alters the structure of companies, generating conflicts of interest among shareholders (heads) and the company executives (agents). This conflict, called "agency problem" arises because each of the parties can seek their own personal interests. .

In this context, the adoption of good corporate governance practices is fundamental in order to harmonize the relationship between head and agency, reducing in this way the agency problem [Conyon; Leech, 1994]. Such mechanisms include corporate governance which seeks to guarantee long term sustainability thus creating value for the company and its different users and reducing the asymmetry of information and promoting organizational and social visibility.

Therefore, the dimensions of corporate governance and entrepreneurial sustainability should orient the modern company, providing the means to reach their economic, social and environmental. With this in mind, the companies of the electric energy sector participate in a market that demands, to an even higher extent, the integration of these three objectives.

Thus, the goal of this Project is to analyze the relationship between corporate value and the governance and social responsibility practices under the scope of the Agency Theory and the *Stakeholder's Theory*.

To this end, in addition to this introductory section, there is a theoretical platform which surveys the abovementioned theories and the practices of sustainability and governance in companies of the Brazilian electric sector. Subsequently are presented the materials and methods used in the investigation explaining the limits and analysis techniques used. The following section presents the results of the investigation and a brief discussion of the evidence. Finally, the conclusion highlights the contribution of the investigation and the suggestions for future investigations that explore the methodological limitations in the scope of this project.

2. Theoretical Fundamentals

For Blair [1995], corporate governance is a group of legal and cultural norms and institutional arrangements that determine the actions, the control and monitoring of listed companies. This group of

practices therefore determines what the listed companies can do, how their control is exercised and how their risks and returns are allocated.

Shareholders of listed companies hold the shares of a determined company and not the Corporation per se. The control of said companies is in the head of their presidents and executives, who, with the discretion they hold in the decision making process, may, on occasion, act in terms of their own interests [Densetz, 1967]. In indeed said divergence of interests can directly impact the financial and strategic decisions of corporations, resulting in the absence of maximization of the wealth of shareholders [Byrd; Parrino; Pritsh, 1998].

Hart [1995] stresses that corporate governance acts as a group of practices that presses to relieve the capital costs of the company. Therefore it is necessary to reduce the problems of information asymmetry between the head and the agent with the establishment of a contractual relationship.

Hence, corporate governance provides a system of mechanisms in order to harmonize the relationship between the head and the agent and thus reduce the agency costs in a separation of control and property [Silveira, 2015]. This dynamic has the purpose of boosting the decision making process of managers in order to maximize the wealth of shareholders. Indeed, corporate governance can be seen as a system for reducing the divergences in the agent-head relationship.

However, the population growth, the effects of globalization, the economic, social and environmental effects among regions and even the depletion of natural resources and of the capacity of the biosphere to absorb residue and pollutants gave rise to greater interest in the analysis of environmental matters by the society [Moura, 2000]. In face of the greater access to information and knowledge, people and societies put pressure on companies in search of greater socio-environmental responsibility since they have a strong impact on social and environmental demands.

Sustainable development, according to Brundtland et al [1991] is the meeting of present needs without compromising the needs of future generations. In this context, Harrington and Knight [2001] ascertain that corporations must consider the economic, social and environmental impact of their activities. The managerial practices of environmental demands are understood as corporate socio-environmental responsibility.

Therefore, it is stressed that companies do not only have the economic objective, but also the responsibility with the society to meet its social and environmental demands, thus committing to the different participants involved, either from the legal stand point or from that of ethics and morale.

It is known that from an economic point of view, companies are created with the purpose of providing financial gains to those who created it and took the risks inherent to the business. Hence, it is salutary to observe that every company functions as an open system promoting relationships with several participants in their internal and external environments [Friedman, 1970]. In this way, the organization must consider an effective management of all the relationships with the different participants and not only the relationship with the owners.

The performance of a company must take into consideration the returns that perfect the results of all the *stakeholders* involved and not only the results of the owners or shareholders [Carroll, 1979; Freeman, 1984]. Thus, the perspective of clients, suppliers, employees, government, and community of other participants in the business of the company must be considered.

To that extent, the *stakeholders theory* advocates that the actions of the company must be planned and directed towards the meeting of the expectations of the different groups involved directly and indirectly in the entrepreneurial business since the maintenance and long term success depend on those interactions with the interested parties [Freeman; Mcvea, 2000]). Furthermore, companies with high socio-environmental development have good relationships with their different *stakeholders*, thus decreasing the risk and increasing the level of financial performance.

The number of studies that address the influence of sustainability and governance in organizational performance is growing. However, the analysis of this constructs is approached in a segregated manner.

On the perspective of entrepreneurial sustainability, Robinson, Kleffner and Bertels [2011] evidenced that the corporations included in the Dow Jones Sustainability Index (*Dow Jones Sustainability Index* - DJSI) achieved an increase in the value of their shares even with all the costs inherent to the entrepreneurial sustainability actions and inclusion in the index. On the same issue, Johnson [2011] found that the companies based on sustainability precepts tend to have better results in what respects the lower risk and the greater performance.

In Brazil, Orellano and Quiota [2011] who studied variables extracted from the social balances of 44 companies between the years 2001 and 2007 and evidenced a positive relationship between social investment and performance measured by ROA and ROE, however did not find evidences for the Tobin Q.

In the scope of corporate governance, Sonza and Kloeckner [2014] analyzed the influence of corporate governance in the efficiency of Brazilian companies who hold *American Depositary Receipts* (ADR), the authors concluded that the Brazilian capital market is incipient with low effectiveness administration councils, with roles of shareholders, of councils and of directorates not well defined in Family companies and that there is indication of conflicts of interest relativized by explicit and implicit incentives.

Thus, other projects in Brazil also analyzed the effects of internal mechanisms such as executive compensation and administration council in performance and the creation of corporate value. In this sense, Silva and Chien [2013] analyzed the influence of executive compensation on the performance of Brazilian companies found a positive relationship between compensation and corporate value, yet, they did not find significant evidence between compensation and financial performance. Furthermore, Alves and Krauter [2014] analyzed the contribution of executive compensation to organizational performance in companies of the Brazilian industrial sector and concluded that there is no relation between compensation and financial performance.

While investigating the construct of the administration council and the sensitivity of its composition with corporate value, Andrade et al [2009] found that the composition of the council has more influence on the value than on the performance of companies. The work of Gondrige, Clemente and Espejo [2009], demonstrated that the size of the council had a positive and significant relationship with the value of the company.

About sustainability and economic performance, Augustini et al. [2015] evaluated the impact of the economic scale in the environmental dimension of companies in the Corporate Sustainability Index (CSI) of BM&FBovespa, identifying companies that require greater attention from stakeholders. Silva et al. [2015] conducted a comparative analysis of indicators profitability among a group of participants in the CSI companies and a reference group, in order to check if the sustainable management generates business profitability and how they create value for shareholders. The authors found no significant differences between groups but concluded that the CSI group has other ways of creating shareholder value such as lower volatility or lower risk exposure.

For the case of the specific sector of electrical energy, no studies that dealt with the dimensions of sustainability and governance and their possible empirical relations with the value of the companies were found.

3. Investigation Method

3.1 Investigation Strategy

For this study, the quantitative approach based on the conceptual contributions structured for the formation of the hypotheses was used. According to Popper [2013], in this type of approach the gathering of data used numeric information which is modeled with the support of multivariate statistics evidencing or not the occurrence of the consequences lined out, which allows accepting or rejecting the hypotheses even if provisionally. For Richardson [2008]) the use of the quantitative approach is normally applied in descriptive studies that seek to identify and classify the relationship among variables.

On the epistemological side, the investigation sought an empirical-analytical focus in which operationalized variables are used as dependent and independent in order to determine functions and based on the treatment given to the data established relationships among the variables [Martins, 2002]. Moreover, the study seeks to explain the practice observed based on past data in order to understand the phenomena that occurred more deeply and foresee phenomena not observed [Watts; Zimmerman, 1986]. To sum up, this investigation is to be assumed as quantitative with descriptive purposes and an empirical-analytical approach.

3.2 Delimitation of the Investigation and Sample

The delimitation of the investigation consists of companies listed in the BM&FBovespa of the electrical energy sector. The selection of the sector arises from: **a-** it is a high environmental impact sector [Roberts, 1992]; **b-** in Brazil, until the 90's the sector was almost exclusively controlled by the government and after the privatization it demanded greater investment in the capital market in order to finance its activities as a result of high costs. Thus there is a greater demand for transparency and reliable information for investors and other stakeholders [Leme, 2010]; and **c-** the sector has companies with all the levels of governance of the BM&FBovespa, which is an essential condition to work the proposed object of investigation.

The years selected for the investigation were 2011, 2012 and 2013. The data was gathered by means of the *Economática* software, the BM&Fbovespa portal and reference forms available through CVM. The data management was carried out by means of the *Stata 12 software*.

The size of the population includes 66 companies. In face of the difficulty to find the data, the following was chosen as selection criterion: the companies that are listed among the 100 with greater liquidity in the BM&Fbovespa. The choice of the companies to make up the sample by means of the liquidity criterion was made given the assumption that companies with low liquidity have less probability of having adequate prices with respect to their real market value [Silveira, Barros & Famá 2003]. The liquidity indicator in the stock market is measured based in the following formula 01 [Terra; Lima, 2006]:

$$LQ_{it} = \sqrt{\frac{v_{it}}{V_t} \times \frac{n_{it}}{N_t} \times \frac{S_{it}}{S_t}} \times 100 \quad (01)$$

Where, LQ_{it} is the liquidity indicator of the share i for the period t ; S_{it} is the number of trades during the period t in which at least 1 activity with share i was evidenced; S_t is the total number of trades occurring in period t ; n_{it} is the number of activities with share i in the period t ; N_t is the number of activities registered in the BM&Fbovespa during period t ; v_{it} is the financial volume generated by the activities with share i in the period t and V_t is the total financial volume generated for period t .

The cut adopted in order to make up the sample was a minimum liquidity of 0,001 (for each year). Moreover, only one type of share was gathered per company, the type which evidenced the highest liquidity during the period. After the application of this criterion and of the process of elimination of the *outliers* and absent data, the sample had 48 observations (shares/year) of 16 companies of the electric energy sector listed in the BM&Fbovespa.

3.3 Statement of Hypotheses

Based on the Agency Theory, in which the company must develop mechanisms to provide the alignment of interests among the head, the agent and in theory the *stakeholders*, where the company must meet not only the interests of the shareholders, but also those of all parties involved and that there is a positive relationship between the social and environmental performance and the financial performance, the following investigation hypotheses were tested:

Hypothesis 01: There is a positive relationship between the good corporate governance practices and the creation of corporate market value of the Brazilian electric energy companies.

Hypothesis 1a: The size of the council and its degree of independence are positively related with the corporate value of the companies being analyzed [Silveira, 2003; Andrade et al, 2009; Gondrige, Clemente E Espejo, 2009].

Hypothesis 1b: The presence of the highest levels of governance of the BM&Fbovespa is positively related with the corporate value of the companies being analyzed [SILVEIRA, 2003; Gondrige, Clemente E Espejo, 2009; Camargos; Barbosa, 2010].

Hypothesis 1c: The share concentration is negatively related with the corporate value of the companies being analyzed [Shleifer; Vishny, 1997; Conyon; He, 2011; Pinto; Leal; Silva; chien, 2013; Oliveira, 2014].

Hypothesis 1d: The total executive compensation is positively related with the corporate value of the companies being analyzed [Bootsma, 2010; Alves; Krauter, 2014; Oliveira, 2014].

Hypothesis 1e: The use of stock options as a long term incentives plan is positively related with the corporate value of the companies being analyzed [Jensen; Murphy, 1990; Dias, 2010; Oliveira, 2014].

Hypothesis 02: There is a positive relationship between the good sustainability practices and the creation of corporate market value of the Brazilian electric energy companies.

Hypothesis 2a: The presence of the company in the BM&Fbovespa Sustainability Index is positively related with the corporate value of the companies being analyzed [Robinson; Kleffner; Bertels, 2011; Orellano; Quiota, 2011].

3.4 Operationalization of the variables

In order to test the abovementioned hypotheses some proxies, based on the contribution of theory and available data were selected. The variables consist of distinguishable properties in an object of study and which are subject to measurement by means of the values they take. The variables can be dependent or

independent in nature; the independent ones are causes that determine the occurrence of an effect, while the dependent ones are the effects resulting from the independent variables.

For the dependent variable, or response variable, the Tobin Q, which measures the market value of a company, was selected; it has been broadly used in investigations within the field of Corporate Governance [Rossoni; Machado-Da-Silva, 2010; Silva; Chien, 2013; Oliveira, 2014]. The Chung e Pruitt [1994] approximate formula (02) was used and it can be represented in the following manner:

$$Q = (VMA + D) / AT \quad (02)$$

Where, VMA is the market value obtained based on the number of shares of the company multiplied by the price negotiated in the Stock Market. AT consists on the total assets and D is determined formula 03.

$$D = VCPC - VCAC + VCE + VCDLP \quad (03)$$

Where: VCPC = Book value of the company's current liabilities; VCAC = Book value of the company's current assets; VCE = Book value of the inventory; VCDLP = Book value of the long term debts.

Now, for the independent variables the governance and sustainability constructs were identified. Corporate governance was identified as the mechanisms concerning the administration council, the incentives system and the level of governance in accordance with the BM&Fbovespa. With respect to sustainability, the presence of the BM&Fbovespa Sustainability Index was identified. The concentration of property, measured based on the percentage of property of the three largest shareholders, the share control (public or private) and the size of the company measured from their total assets were also observed. Table 01 presents the variables used in the investigation and their corresponding manners of measurement.

Table 01 – Relationship of the variables used.

Dependent Variable*		Initials	Manner of Measurement		
Tobim Q (QT)		QT	Market value of the share over the equity value of the share		
Independent Variable		Initials	Manner of Measurement	Expected Signal	Hypothesis
Governance	Size of the Council	TC	<i>Dummy Variable</i> : 1 if the company has an administration council with an ideal number of participants (5 to 9 members), 0 if not.	+	H1a
	Independence of the Council	Indep	Ratio of number of independent councilors and number of councilors that represent the controller	+	H1a
	New Market	NM	<i>Dummy Variable</i> : 1 is the company participates in the New Market level of governance, 0 if not.	+	H1b
	Share Concentration	CT	Percentage of property of the three largest shareholders of the company	-	H1c
	Total Compensation	RT	Natural logarithm of the total executive compensation of company i during the year t.	+	H1d
	Stock Option Plan	PSO	<i>Dummy Variable</i> : 1 if the company has a variable compensation plan with respect to the stock option, 0 if not	+	H1e
Sustainability	Entrepreneurial Sustainability Index	ISE	<i>Dummy Variable</i> : 1 is the company participates in the ISE, 0 if not.	+	H2a
Control Variables	Share control	Control	<i>Dummy Variable</i> : 1 if the company has the government as part of the control of the company, 0 if not.	+/-	Control
	Size	Tam	Natural logarithm of the total assets of company i during the year t.	+/-	Control

Source: Drafted by the authors.

It can be observed dependent variable, independent variables and control variables as well as research hypotheses that were described in section 3.3. The expected signs indicate the relationship tested based on the theory corporate governance and sustainability.

3.4 Data Analysis Technique and Econometric Model

The data were analyzed based on a linear regression model. Gujarati [2012] highlights that the

linear regression seeks to measure the statistical dependence of a dependent variable with other explanatory variables, thus estimating the average value of the dependent based on the known values of the other variables. Hair et al [2009] complement that the linear regression analysis consists of a multivariate statistical technique used to analyze the relation between a dependent variable (criterion) and the other predicting variables (explanatory) and can be expressed with the basic formula 04, according to Fávero et al [2014]:

$$y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_k X_k + \varepsilon \quad (04)$$

Where,

Y is the dependent variable

$X_1 + X_2 + X_k$ are independent variables

$\alpha, \beta_1, \beta_2, \dots, \beta_k$ are the regression parameters; and

ε is the residual term

The data used were subjected to econometric analysis based on multiple linear regressions (RLM) which consists of a regression model that contains more than one regressor. Quantitative variables that represent the value of the attributes that can be counted or measured in each element of the sample were used.

Thus the adequacy and robustness were verified with estimations by pooled methods, random effects and fixed effects, and for both the *F Chow test*, the *Lagrange Multiplier Test* and the *Hausman Test* were used, in addition to the verification of the existence of heteroscedasticity based of the *Breusch-Pagan test*.

Moreover, considering the effects of endogeneity and reverse causality, studies involving the verification of the sensitivity of corporate governance and performance [Silva, Chien, 2013; Souza, Kloeckner, 2014; Oliveira, 2014] have applied the estimation of panel data by means of the generalized moment method (GMM) which considers multiple observations of each individual in the long term.

Hence we proceeded to the econometric analysis by means of the dynamic GMM method [Bond, 2002], using a lagged endogenous variable as explanatory variable in the model. The Arellano and Bond [1991] tests were carried out for the validation of the model in order to verify the existence of first and second order serial correlation and the Hansen over-identification test was performed in order to test the validity of the instrument used in the specification of the model.

Indeed, the econometric model designed to test the hypotheses and the corresponding variables of the investigation was described according to model 05.

$$QTOBIN = \alpha + \beta_1 TC_{it} + \beta_2 Indep_{it} + \beta_3 NM_{it} + \beta_4 PSO_{it} + \beta_5 RT_{it} + \beta_6 CT_{it} + \beta_7 ISE_{it} + \beta_8 Control_{it} + \beta_9 Tam_{it} + \varepsilon \quad (05)$$

The variables correspond to company i of the energetic sector selected in the sample in the year t . The meaning of the variables is presented in Table 01. The data were modeled based on the linear regressions analysis with grouped data.

4. Results and Discussion

The model of the investigation was estimated based on panel data. Initially, it was found that the estimation by the stacked model method (Pooled) could present specification bias by not considering the effects of individual firms, omitting therefore relevant information. We then proceeded to compare the estimation of fixes effects and random effects.

Nevertheless, in models with many binary variables, the estimation by fixed effects can lead to the loss of degrees of freedom and hence to multicollinearity and inaccurate estimation of the parameters. Furthermore, some *dummy variables* of the general model of the investigation did not evidence variance throughout time thus presenting perfect collinearity and not allowing that the estimation by fixed effects identify the impact of said variables.

Moreover, the null hypothesis of the Hausman test, which tests the absence of correlation between the non-observable effects and the exogenous variables of the model, was not rejected indicating a greater efficiency in the estimation by random effects.

Finally, the estimation by the GMM-Sys method was considered in order to mitigate possible endogeneity effects [Barros et al, 2010]. The results of the regressions estimated by Random Effects and the General System Method with the estimated coefficients, pattern errors and statistical significance are presented in Table 02. The validation tests of the models are described below the table.

Table 02 – Results of the Regression

		(1)	(2)
		EA	GMM-Sys
Intercept	β	1.47	3.42
	Se	1.51	1.21
QT (<i>t</i> -1)	β		0.871***
	Se		0.444
Indep	β	.334*	0.516*
	Se	.401	0.466
Total	β	0.334***	.274***
	Se	0.401	0.094
NM	β	1.06***	1.18***
	Se	0.17	0.21
RT	β	-0.198***	-0.109*
	Se	0.054	0.060
CT	β	0.042**	-0.044***
	Se	0.009	0.014
ISE	β	.235**	0.425***
	Se	.131	0.100
Control	β	-0.348*	-0.434***
	Se	0.188	0.107
Size	β	2.03***	2.46***
	Se	0.52	0.79
R ²		0.8556	0.8838
Hausman Test		0.2859	
Breuch-Pagan Test		0.000	
Hansen J Test			0.76
AR1			0.005
AR2			0.666

Source: Investigation Data

Note: (i) ***, **, *, significant at 1%, 5% and 10% respectively;

Besides the tests already described, attention to some assumptions of the linear regression was also given. Firstly a correlation between variables was found; a low correlation in the explanatory variables was identified, a fact that is important for the model because should the model present high correlation, it would have low efficiency since the variables would evidence an exact linear combination.

The linearity of the parameters must be one of the first assumptions to be analyzed. In order to verify the linearity of the parameters of the regression, the Ramsey RESET (Regression Specification Error Test) functional test was used. With it, it is possible to verify a linear specification before a quadratic alternative. In this way, the null hypothesis of the test consists on the linearity and the alternative hypothesis consists on that of non-linearity [Gujarati, 2012].

To meet this assumption, the relation between the independent and dependent variables must be represented by a linear function so as to use the functional form of ordinary least squares in the adjustment of the model. The violation of this assumption leads to biased estimators or indicates that the relevant variables were omitted [Gujarati, 2012; Hair et al, 2009]. The obtained result (Prob. > F = 0.38) suggests that it is not possible to reject the hypothesis of linearity for the specified regression model thus having a model that meets the assumption of linearity of the parameters being it specified correctly.

After working with the sample, the assumption of normality if the residuals of the regression based on the Shapiro-Wilk test was verified, the null hypothesis of the test and the sample originate from a normal population. The p value presented in the Shapiro-Wilk statistic was 0.41, therefore, greater that a significance level (alpha) of 0.05 thus not rejecting the premise of normality.

In order to avoid the multicollinearity problem which occurs when one of the regressors is the linear combination of other regressors [Corrar et al, 2007], a multicollinearity diagnosis was applied to find if there is correlation between the independent variables. The test used was the VIF – *Variance Inflation Factor* statistic and the commonly used reference value for these tests consists of a VIF lower or equal to 10, given that values above this index indicate multicollinearity [Hair et al, 2009].

The specified model meets the assumption of the absence of multicollinearity since besides there not being any variable with an index of more than 10, the average value found was 2.8, well within the acceptable limits. Additionally, the correlation of the panel data by means of the Wooldridge [2010] test was identified. This test has as its null hypothesis the absence of first order correlation. The statistics of the test indicates the absence of self-correlation in the data.

Another validation test carried out was with respect to the non-existence of heteroscedasticity. The problem of heteroscedasticity occurs when the variances are not the same for all the observations. The

statistic is distributed as a chi-square distribution with p degrees of freedom under the null hypothesis of non-heteroscedasticity and that the error of regression is normally distributed [Hair et al, 2009]. The assumption of equal variances is fundamental in order to make inferences with respect to $\beta_0, \beta_1, \beta_n \dots$. The Wald test was used in order to detect homoscedasticity, and the result found was 0.479, thus, at a significance level of 0.05 the null hypothesis is not rejected therefore the model does not evidence heteroscedasticity.

In the model estimated by the GMM-Sys method, the Arellano/Bond [1991] test rejected the first order serial self-correlation (AR1) in the residuals and accepted the second order self-correlation (AR2), assumed for the validity of the instrument based on discrepancy. With respect to the Hansen test, the J statistics point to the non-rejection of the null hypothesis of validity of the instrument.

The Pseudo R2 value determines that the group of explanatory variables proposed for the model explains the fact of the companies having a higher corporate value in 85.56% and 88.38% at a significance value α of 0.001.

The results of the estimations indicate that the variables of governance and sustainability positively relate with the creation of market value for the electric energy companies selected in the sample. The only variable that evidenced signs opposite to those expected was that concerning the executive compensation. In the case of compensation, it was observed that the companies with greater compensation have a lower market value, suggesting some form of misalignment between the compensation policy and the market performance of the companies being analyzed. However, when the stock options policy was observed as the main form of incentive for executives to act on the creation of long term value, there is a Strong positive relation with the Tobin Q dependent variable.

Consequently, the variable share concentration variable evidenced a negative relationship with the corporate value indicating that the companies with lower share concentration have a higher market value. In turn, the share control variable reveals the fact that belonging to the government can reflect a lower market value, notwithstanding that the size of the companies has a positive relationship with the generation of corporate value.

In what respects the other governance metrics, the size of the council within the standard suggested by the governance codes, a greater level of independence of the council, and the fact of belonging to the higher differentiated levels of corporate governance have positive influence in the creation of corporate value. With respect to sustainability, the companies that belong to the Bovespa Sustainability Index and are committed with better sustainability and social responsibility practices, have a higher market value.

All the variables discussed evidence statistical significance at 1%, 5% or 10%. Therefore the relationships presented were statistically validated not existing reasons to reject the hypotheses that arose in the investigation, with the exception of hypothesis 1d. The results evidence indications that the companies selected within the electrical energy sector have a positive relationship between governance, sustainability and creation of corporate value, which empirically indicates the importance of the adoption of better practices for the sustainable performance of companies and the consequent generation of value for their different users.

5. Conclusion

The objective of this study was the analysis of the relationship between the creation of corporate value and the best governance and sustainability practices in companies of the electric energy sector listed in the BM&Fbovespa. To this purpose three hypotheses were stated for the investigation based on the Agency Theory and the *Stakeholders Theory*.

The first hypothesis of the investigation expected a positive relationship between the corporate value, measured by the Tobin Q, and governance practices. The hypothesis was confirmed based on the proxies size of the council in accordance with the standard recommended by the governance codes, degree of Independence of the council, adoption of variable compensation by means of stock option plans and the adoption of a differentiated level of governance in accordance with the New Market and Level 2 segments of the BM&Fbovespa.

The second hypothesis tested a positive relationship between the corporate value and sustainability practices. To that extent, the fact of the company belonging to the BM&Fbovespa Sustainability Index was used as *proxy*. Companies committed to actions of sustainability and social responsibility, are the ones that are part of the index. A positive association was found thus confirming the second investigation hypothesis.

It was found that the study makes contributions for the development of empirical investigations that address the issue of the importance of governance and sustainability for the creation of value. It can be highlighted that the study covered a sector that has been widely addressed in investigations given its

relevance and amplitude but one which is lacking empirical analysis in the dimensions being investigated. Furthermore, previous studies address the matter separately; however the gathering of metrics is relevant in order to perceive the impact of the two dimensions that must be together for the development of sustainable global development.

Hence, the study embarked in the interaction between governance and sustainability and the results reflect on the importance of the companies of the electric sector to look beyond its economic function, observing the other aspects that may create legitimacy and reputation thus increasing the possibilities of market value as is described in the study of Rossoni and Machado-da-Silva [2010], in addition to looking at the precepts of the social and environmental functions in correspondence to the expectations of all the users of the company [Freeman; Mcvea, 2000].

Therefore, the importance of the results for the different interested parties of the entrepreneurial societies is highlighted. For the government it demonstrates the importance of public policies focusing on promoting companies to adopt said practices; for the regulating agents it demonstrates the relevance of strengthening regulations in order to guarantee and seek improvement in the adoption of sustainable practices. For investors it demonstrates the importance of seeking for sustainable investments in search of the boosting of social development, environmental protection and potential growth of the market value. For the shareholders, the generation of wealth can be highlighted, and for the agents, executives, and employees of the companies there is a better market performance which results in better benefits and the satisfaction of being part of a company which seeks sustainable growth.

Finally, for the society it is important to have great corporations that seek sustainable actions and protection of their multiple users, given that these attitudes generate a great impact considering their size. Furthermore, by seeking the best practices, these companies contribute to the environment and to the social well-being and valued for this reason. They therefore obtain a higher corporate value which consequently is reverted into new actions that excel in social, economic and environmental development.

The study has some limitations that do not outshine the result presented but that suggest new investigations in order to overcome them. The impossibility to generalize given the number of observations and which was limited to three years and did not cover all companies, limiting it to those listed as a result of the lack of data for the other companies, must be considered.

Hence, it is suggested that new studies consider a larger sample by adding other listed and non-listed companies as well as a broader lapse of time. Another suggestion would be to broaden the model with the deployment of dimensions of sustainability. Moreover studies that specifically approach the sensitivity of executive compensation in companies of the electric sector should be considered given that it gave signs that were different from those expected. Lastly, the adoption of other explanatory variables and other metrics in order to attract corporate value is suggested.

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