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## Editorial

### Dear Reader,

The Journal of Accounting Education and Research (REPeC) is a scientific journal issued by the Brazilian Academy of Accountancy (Abracicon), published quarterly in the electronic form.

In this edition, together with our regular articles, we present the updates of the Instructions for Authors (version 2017). During an Editorial team meeting held on April 20<sup>th</sup> 2017, it was decided to change this document with a view to adjusting REPeC's standards to the practices of the main journals in our area. The main changes were to bring down the maximum number of words per article (to 9,000 words) and change the structure of the abstracts to be more direct, appointing the main elements of the study. Therefore, as from our next issue (v. 11, n. 3), any papers submitted and published by REPeC should comply with that document.

In the current issue, the following scientific articles were published, with a brief description of each study:

The first study, entitled “**Corporate Sustainability and Corporate Governance: An Analysis of the relation between the ISE of BM&FBOVESPA and the Compensation of Brazilian Company Managers**”, by *Thayse Machado Guimarães, Fernanda Maciel Peixoto* and *Luciana Carvalho*, identified the influence of corporate sustainability on the compensation of managers in Brazilian non-financial companies traded on BM&FBOVESPA between 2009 and 2013. Its results appoint the positive relation between manager compensation and the ISE, the quality of corporate governance and the market value. In addition, a negative relation was observed between manager remuneration and the volatility of company earnings. Thus, it can be inferred that the most sustainable companies tend to better compensate their managers.

*Patricia Zanella, Ricardo Adriano Antonelli* and *Sandro César Bortoluzzi* are the authors of the study entitled “**Assessment of Teacher Competencies: Analysis in the Accountancy Program at UTFPR**”, which intended to identify the students' levels of satisfaction and expectation with respect to the teachers in the Accountancy program at Universidade Tecnológica Federal do Paraná (UTFPR). The main research results appoint that the students' expectation of the teachers exceeds their satisfaction; that the best assessed competences are: interpersonal relationship, commitment, mastery of the area, ethics and didactics-pedagogics; while the worst assessed competences are: communication, flexibility, empathy, creativity and teamwork. Hence, the students' general level of expectation by far exceeds their satisfaction, and the teachers should take this into account when planning their subjects.

The third study, entitled “**Theory in the Picture: Video Production as a Tool in Accounting Teaching**”, was written by *Ana Maria Beatriz Sardela, Patricia Souza Costa* and *Gilvania Sousa Gomes* and aimed to analyze the students’ perception concerning the utility of video production as a teaching-learning mechanism in the subject Accounting Theory. Its results suggest that, according to the students, the production of videos turned the content of the subject more interesting, stimulated the creativity to use the concepts and developed skills such as commitment to the group, organization, planning, dynamism, creativity, proactivity, interpretation and self-learning. It was concluded that the method is appropriate and should be maintained for didactical purposes in the teaching of Accounting Theory and other contents.

In the fourth paper, entitled “**Determinants of Republications in the Brazilian Market: An Analysis based on Earnings Management Incentives**”, *Vagner Antônio Marques, Hudson Fernandes Amaral, Antônio Artur de Souza, Kleyverson Leonardo dos Santos* and *Pedro Henrique Rodrigues Belo* identified the existing relation between the earnings management hypotheses and the republications of Financial Statements. The study results appoint that the size, asset growth, being audited by a Big4 and the adoption of the IFRS exerted a positive and statistically significant effect on the probability of republishing the statements. On the other hand, the adoption of the SOX and the distinguished corporate governance levels exerted negative effects.

“**What Teaches me to Teach? A Study About Explanatory Factors of Pedagogical Practices in Accounting Teaching**” by *Uilcleides Braga da Silva* and *Adriano Leal Bruni* was the fifth study, which identified the pedagogical practices of Accountancy teachers in the State of Bahia, segregated into active or passive, with greater or lesser student participation, respectively. The diagnosis elaborated revealed essentially passive teaching, with students’ limited participation. The independent variables used were unable to explain the pedagogical practices. Contradictions were found in the use of practices that characterize active teaching, such as seminars, debates and case discussions by teachers, with clear characteristics of passive teaching, which can indicate the incomplete or inappropriate use of these practices. These may be used in an essentially passive manner, compromising the efficacy of learning.

The sixth paper is a teaching case, written by *Raphael da Fonseca* and *Moacir Sancovski*, entitled “**Teaching Case: The Allocation of Joint Costs in Processes with Multiple Splitoff Points at Refinaria Fluminense S.A.**”, which illustrated the operation of an oil refinery and the challenges the accountants and managers face to verify the costs of the oil products, value inventories, verify the result of the refinery’s operations and analyze decisions to continue processing individual products to increase their value added. The narrative starts with the information that the shareholders are requiring that the management takes the measures needed to increase the company’s profitability. In a profitability analysis of the manufactured and traded products, the managers realize that they do not sufficiently understand the distribution and behavior of the product costs. One of the most relevant contributions of the case is that it grants the opportunity for the students to confront the stylized textbook presentations with the conditions found in the companies. That happens specifically in the case of the application of net realizable value method in processes with multiple split-off points, a case rarely discussed in most books.

Finally, the entire Editorial Team of REPeC hopes you will enjoy your reading!

**Prof. Orleans Silva Martins, Ph.D.**  
**Editor-in-Chief**

# Corporate Sustainability and Corporate Governance: An Analysis of the relation between the ISE of BM&FBOVESPA and the Compensation of Brazilian Company Managers

## Abstract

The objective in this article was to identify the influence of corporate sustainability on the compensation of the managers of Brazilian non-financial companies listed on BM & FBOVESPA from 2009 to 2013. The study of manager compensation and corporate sustainability arouses reflections on the problems arising from the Agency Theory, and also permits the visualization of stakeholder theory and the search for value in the long term. To develop this study, it is expected that the companies that are listed in the Corporate Sustainability Index (ISE) of BM & FBOVESPA will grant better remunerations to their managers. Thus, the regression method with panel data, with fixed effects estimation, was used to test the relationship between the proposed variables. As the main results, we noticed a positive and statistically significant relationship between managers' total remuneration with the ISE, the corporate governance quality variable (companies listed in the Novo Mercado) and the market-to-book value. In addition, a negative relation was observed between the total remuneration of the managers and the volatility of the returns. Thus, it can be inferred that the more sustainable companies tend to grant higher remunerations to their managers, which corroborates the central hypothesis of the research and the assumptions of the Stakeholder theory.

**Key words:** Corporate Sustainability. Corporate Governance. Manager Compensation. Stakeholder Theory.

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## 1. Introduction

Due to the changes perceived in the globalized environment, organizations are increasingly looking for ways to become more competitive and thus achieve better performance. In this sense, the role of the capital market is highlighted as a source of resources that are converted into productive investments (Correia, 2008). In this respect, the importance of corporate governance and corporate sustainability as good practices is highlighted, which tend to enhance the quality and continuity of the business. This is justified because corporate governance corresponds to a set of relationships among the company's management, its board of directors and other stakeholders, in order to provide a structure that enables organizations to achieve economic efficiency and grant greater confidence to investors (OECD, 2004).

It is known that corporate sustainability, understood as a set of activities that involve the relationship of the company with the environment, the economy and society, based on the tripod by Elkington (2001), enables improvements in the image and reputation of companies, advantageous funding and greater competitive advantage (Garcia & Orsato, 2013). In this sense, it is understood that it is fundamental for companies to know how to define their objective function in order to achieve their purposes. For this reason, Jensen (2001) presents the illuminated Stakeholder theory as an alternative, according to which organizations need to consider the essential interests of their stakeholders, in view of the goal of long-term value maximization.

Concern about the reconciliation of different interests is also reflected in the Agency theory. Because there is the inevitable separation between ownership and control, individual cooperation activities can generate conflicts (Jensen & Meckling, 1976). According to Murphy (1998), one way to solve this agency conflict between managers and shareholders is to grant mechanisms to encourage managers, corresponding to salaries, annual bonus plans, stock option plans, among others. Thus, the wealth of an executive is linked to the goal of maximizing shareholder wealth.

With respect to corporate sustainability, it is generally appreciated by sustainability indices of the different stock exchanges around the world. These indices follow Elkington's (2001) proposal. Thus, the United States Dow Jones Sustainability Index (DJSI); FTSE4Good in London; JSE in Johannesburg, South Africa; and the Corporate Sustainability Index (ISE) in Brazil stand out. BM & FBOVESPA's ISE aims to provide for an investment environment compatible with the demands of the sustainable development of the contemporary society.

As Ricart, Rodriguez and Sanchez (2005) argue, a lot of theoretical research involves Corporate Governance and Sustainable Development, but no empirical work has been found that deals with the relationship between these themes. In addition, when considering the different mechanisms of corporate governance, such as, for example, the board of directors; ownership structure and control; protection of minority shareholders; transparency; and compensation of managers, no studies were found that tested the relationship of any one (or all) with the corporate sustainability indices.

Considering this gap observed in the literature on the subject, the research problem in this study is: what is the influence of corporate sustainability on the compensation of managers of Brazilian non-financial companies listed on BM&FBOVESPA? Based on these perspectives, this study presents the following hypothesis: H1 - The companies listed in the ISE of BM&FBOVESPA grant greater compensation to their managers. Thus, in view of the research problem and hypothesis presented, the objective in this study is to investigate the influence of corporate sustainability on the compensation of managers of Brazilian non-financial companies listed on BM&FBOVESPA in the period from 2009 to 2013.

It should be emphasized that this paper presents theoretical contributions, since it proposes the analysis of the relationship between corporate sustainability and compensation of managers, a relationship that involves, respectively, Sustainability and Corporate Governance, which had not been considered previously under this approach. In addition, a practical contribution is provided, since we intend to evaluate if the more sustainable companies, which seek to generate value in the long term, also aim for the alignment of interests among the different stakeholders (in this case managers and shareholders), through greater compensation for their managers.

This research is structured in five parts, of which this section involves the research problem, the hypothesis and the objectives. Part 2 presents the theoretical structure. Part 3 discusses the methodological aspects of the study, the variables analyzed, the methods used in the statistical analysis, as well as the estimated model in the research. Section 4 presents and analyzes the results and, in part 5, the conclusions resulting from the analysis of the theoretical basis on the main themes and empirical treatments are formulated.

## 2. Theoretical Framework

### 2.1 Manager Compensation

In order to understand the emergence of good corporate governance practices, which involve Corporate Governance mechanisms, among which this work focuses on the analysis of compensation of managers, first, we need to understand the emergence of Agency theory. Jensen and Meckling (1976) argue that the establishment of contracts causes the agent to engage in activities for the principal, who assumes the commitment to remunerate the agent. Because of the inevitable separation between ownership and control, however, the activities of individuals are susceptible to various types of conflicts, which have been termed “Agency Conflicts.”

Even though Agency Conflicts are different between countries, it is observed that corporate governance has sought to improve transparency; strengthen independent management monitoring, the alignment between the principals and the agents, shareholders’ rights; and impose financial responsibilities on agents and administrators (Wong, 2009). Thus, in the Brazilian case, the following corporate governance mechanisms can be highlighted: board of directors; ownership and control structure; protection of minority shareholders; transparency of information published; and compensation of managers (Correia, 2008). Among the mechanisms cited, managers’ compensation corresponds to one of the ways to solve the Agency Conflict discussed since, as Murphy (1998) states, the wealth of an executive is linked to the objective of maximizing shareholder wealth.

One of the seminal works in this respect is that of Jensen and Murphy (1990), who sought to show how executives have been paid and observed that, on average, payments are not made based on corporate performance and the remuneration policy is one of the most important factors for the success of organizations as, in addition to being related to the behavior of executives, it also determines the type of executive that is attracted by the companies. Thus, three basic policies are outlined that enable the Chief Executive Officer (CEO) to maximize the value of companies: a) enable executives to be substantial owners; B) structure salaries, bonuses and stock options to generate large rewards when there is superior performance and punishments for poor performance; and c) use the threat of resignation in case of poor performance (Jensen & Murphy, 1990).

In the international and Brazilian literature, although it has been observed that the organizations that perform better guarantee better compensations to their executives (Barontini & Bozzi, 2008, Conyon & He, 2011, Kaplan, 2012, Suherman, Rahmawati & Buchdadi, 2011), the opposite relationship was also verified, that is, situations in which the compensation variables presented a negative relation with the organizational performance (Balafas & Florackis, 2013; Beuren & Beck; Silva, 2012). Therefore, it can not be inferred that the fact that the company performs well guarantees greater compensation to its managers and vice versa.

In a complementary way, Conyon and He (2011) analyzed publicly traded companies in China during the period from 2001 to 2005. The results showed that executive compensation as measured by the logarithm of total compensation (wages and benefits) was positively related with the performance of companies, this being measured by the return of the shares in the last twelve months, and also by the Return on Total Assets (ROA). There was a greater relationship between the payment of managers and the performance of organizations in companies with independent directors and, in state-controlled companies that had concentrated ownership, the incentives were smaller.

As observed in the international studies, some Brazilian researchers sought to understand the influence of corporate governance characteristics on the remuneration of executives. It is worth noting that most studies present results that show a positive and statistically significant relationship between these variables (Camargos & Helal, 2007; Correia, Amaral & Louvet, 2014; Farias, 2012; Pinto & Leal, 2013; Silva, 2010; Victor & Terra, 2009), but there is evidence that corporate governance does not always positively influence managerial benefits (Funchal & Terra, 2006; Sampaio, 2009).

In general, Brazilian research on this topic investigates how corporate performance influences the benefits paid to managers (Beuren, Beck & Silva, 2012; Camargos & Helal, 2007; Dalmacio, Rezende & Slomski, 2009; Funchal & Terra, 2006) and how the compensation of managers impacts the market value or the accounting performance of companies (Carvalho da Silva & Chien, 2013, Krauter, 2013; Perobelli, Lopes & Silveira, 2012; Sampaio, 2009; Sonza, 2012).

Especially, Funchal and Terra (2006) considered a sample of 67 companies from four countries (Argentina, Brazil, Chile and Mexico) in the year 2002 and used cross-sectional regression analysis. Thus, they noted that the company's performance, expressed by the market value and by Tobin's Q and corporate governance, are not influential variables in executive compensation, which was measured by the logarithm of total compensation (wages and benefits). Nevertheless, they found a positive and significant relationship between the size of the company and the compensation of managers, which leads to the conclusion that, in larger companies, executives tend to be better paid.

## 2.2 Corporate Sustainability

In order to understand corporate sustainability, we depart, in principle, from the interpretation of Stakeholder theory. According to the authors Freeman and McVea (2001), managers formulate and implement their strategies to satisfy their stakeholders, rather than maximizing the rights of a single group to the detriment of others. Jensen (2001), however, proposes that organizations meet the most relevant demands of stakeholders, but whose objective function is to maximize value in the long term. In this context, corporate sustainability is visualized, involving the economic, social and environmental aspects. Thus, it is understood that corporate sustainability encompasses a set of economically viable, socially just and ecologically correct practices (Elkington, 2001).

The development of corporate sustainability is associated with the changes observed in the capital market, due to the greater democratization and transparency in the circulation of information (Henderson, 2007). Some historical events marked this development, with particular emphasis on some catastrophes, such as Bhopal in India in 1984 and the Chernobyl nuclear accident in 1986 in Europe. After this kind of episodes, the Brundtland Report was formulated in 1988, which launched sustainability concepts, thus altering some business practices in the world.

As a consequence of further global scandals, such as the collapse of economic groups (Enron, Union Carbide, WorldCom and Tyco), investors began to be wary of the effectiveness of financial results (ISE, 2010). Thus, as from the creation of the DJSI, other indexes appeared, being: FTSE4Good, created in London in 2001; JSE, established in Johannesburg, South Africa in 2003; and ISE, created in 2005 in Brazil. The ISE works as a tool for comparative analysis of the performance of companies listed on BM&FBOVESPA, under the corporate sustainability aspect, and measures the average return of a stock portfolio of publicly traded companies, with a portfolio of no more than 40 companies.

In order to integrate the ISE, it is necessary that the shares cumulatively meet the following criteria: a) be one of the shares with the highest marketability index, calculated in the twelve months prior to the beginning of the revaluation process; B) having been traded in at least 50% of trading sessions in the twelve months prior to the beginning of the revaluation process; and c) meeting the sustainability criteria endorsed by the ISE Board (ISE, 2010). The evaluation method is based on a questionnaire, which contemplates seven dimensions: nature of the product; general; corporate governance; social; economic-financial; environmental; and climate change. Each of these dimensions has its specific evaluation criteria, so that ISE is more than an indicator of financial return, that is, it is capable of translating sustainable management.

It is noteworthy that many Brazilian studies on corporate sustainability adopt BM&FBOVESPA ISE as a variable. In some of them, it could be observed that better sustainability practices are associated with better accounting performance (Lameira, Ness Jr., Quelhas & Pereira, 2013; Nunes, Teixeira, Nossa & Galdi, 2010), generally measured by ROA; higher market values (Carvalho & Tavares, 2013; Lameira et al., 2013; Rossi Jr., 2009), in most cases expressed by the Market-to-Book (MTB) ratio, greater potential of sales and export (Vital, Cavalcante, Dallo, Moritz & Costa, 2009) and higher stock returns (Alves, 2008; Beato, Souza & Parisotto, 2009).

No consensus exists, however, on sustainability investments, since there are cases in which non-ISE organizations present better financial performance indicators (Vital et al., 2009) or situations in which socially responsible investments present returns similar to the other BM&FBOVESPA indices (Machado, Machado & Corrar, 2009).

It is worth noting that investing in a sustainability index, such as the ISE, may provide investors with less risk (Espejo, 2008; Lameira et al., 2013, Teixeira, Nossa & Funchal, 2011), with risk generally being assessed by the volatility of returns; or provide no advantage in terms of minimizing risk (Cavalcanti & Boente, 2011; Nunes et al., 2010). In addition, it has been proven that investing in ISE can guarantee lower indebtedness (Teixeira, Nossa & Funchal, 2011) and greater social and environmental disclosure (Holanda & Mapurunga, 2012; Milani Filho, 2008).

## 2.3 Sustainability and Corporate Governance

Generally, studies on corporate governance and corporate sustainability seek to investigate whether investing in more sustainable strategies that promote a better quality of governance generates some impact on the performance of organizations, this being measured by the accounting performance - ROA (Funchal & Terra, 2006; (Carvalho da Silva & Chien, 2013; Lameira et al, 2013), as well as the risk - volatility of stock returns (Carvalho da Silva & Chien, 2013; Carvalho & Tavares, 2013). The studies that approach these themes together seek to propose theoretical models that link these two perspectives.

In relation to the study by Sprague (2010), the author presents the perspective of corporate governance and corporate sustainability, in addition to the company value, that is, the value generated for the shareholder. The paper corroborates Jensen's (2001) studies, arguing that organizations, which want to ensure long-term value, need to consider stakeholder relationships, rather than simply evidence the pursuit of profit. In addition, this author shows that, at times of crisis, such as the financial crisis of 2008-2009, doctrines that emphasize shareholder and self-interest have led many companies to fail in their market.

Mason and Simmons (2014), on the other hand, affirm that an audit, based on corporate social responsibility, can evaluate the corporate governance systems, meeting the interests of the Stakeholders. In this sense, they proposed a model in which corporate governance incorporates corporate social responsibility. This model was based on Stakeholder theory and involved issues such as power, effectiveness and equity.

This integration was also observed in the survey by Krechovská and Procházková (2014), which investigated 193 small, medium and large companies in the Czech Republic. They found that companies are aware of the importance of sustainability for long-term value creation. In a complementary way, they noticed that many companies do not use sustainability as a corporate strategy and do not include it in managerial performance measures.

According to these authors, corporate governance should first involve sustainability, so that companies comply with sustainable principles, which corroborates the studies of Mason and Simmons (2014). Thus, if sustainability is not included in the formulation of objectives, corporate strategies, and policies and processes (from the top), companies' efforts to be sustainable become unnecessary.

Therefore, there is a shortage in the literature, both nationally and internationally, of research that deals with these two issues in an integrated way. It is also worth mentioning the absence of empirical studies on governance and sustainability, which justifies the present study, showing its differential in relation to the other authors.

### 3. Research Method

#### 3.1 Sample and data

This study is classified as descriptive, quantitative, documentary and survey. Secondary data from different sources were used: (i) Reference Form of the Brazilian Securities and Exchange Commission (CVM) and Report 20-F of the Securities and Exchange Commission (SEC) to obtain the total remuneration of the managers; (ii) ISE portfolios of BM & FBOVESPA to identify companies listed or not in the ISE; (iii) BM & FBOVESPA Corporate Governance Index (IGC) portfolios to identify the companies listed on the Novo Mercado; and (iv) Economática to obtain the control variables.

The sample included open-ended non-financial companies listed on the BM&FBOVESPA between 2009 and 2013 and which presented liquidity of 0.001% of the index, corresponding to the company that had the most liquid shares in 50% or more of the years of the survey, using the year 2013 for reference. This method was proposed by Silveira (2004). The year 2009 was defined as the beginning of the sample period since, previously, few companies disclosed the fixed and variable compensation of the board of directors and the board of directors separately. It was therefore, the enactment of CVM Instruction 480 in 2009 that obliged publicly traded companies to present detailed information on the remuneration of managers in the reference form (Carvalho da Silva & Chien, 2013). Thus, the sample considered involved 236 companies listed on BM&FBOVESPA, composing an unbalanced panel, that is, for some companies, data are available for only part of the sample period.

#### 3.2 Regression model with panel data

This study considers cross-sectional data (i) related to the characteristics of organizations over a time series (t) from 2009 to 2013, involving both a spatial and temporal dimension. Thus, the most appropriate statistical models are panel data regressions (Greene, 2002).

Panel models treat the heterogeneity of data and are divided into fixed effects and random effects models. In order to analyze the most appropriate specification, the Lagrange Multiplier (LM) test proposed by Breusch and Pagan (1980) was first executed, which tests the null hypothesis that the individual non-observable effects are relevant to explain the model and permits choosing between pooled and random effects models. Subsequently, the Hausman test was performed, which evaluates the correlation between  $x_{it}$  and the individual effects of the intercept, under the null hypothesis of  $\text{corr}(u_{it}, x_{it}) = 0$ . Thus, if the effects of the intercept are not correlated with the  $x_{it}$ , the Random Effects model is chosen, but if there is correlation, the Fixed Effects model is preferred.

In addition, Baum's Heterocedasticity test (2001) was performed; as well as the Autocorrelation test by Wooldridge (2002); and the Multicollinearity test, which evaluates the existence of a linear relationship between the variables (Gujarati & Porter, 2011). In short, to evaluate the relationship between corporate sustainability and compensation of managers, the models of Conyon and He (2011) and Funchal and Terra (2006) were used. These authors investigated some variables that may influence the compensation of managers, but did not consider corporate sustainability. Therefore, this study innovates by adding the latter aspect. It is emphasized that Stata 11 software was used for the tests of the estimated model, described below:

$$RT_{it} = \beta_0 + \beta_1 ISE_{it} + \beta_n VC_{it} + \varepsilon_{it} \quad (1)$$

Where,

i = cross-section indicator;

t = time indicator;

n = represents the number of control variables in the equation;

$\beta$  = coefficients associated with the independent and control variables;

RT = total remuneration of managers;

ISE = independent variable of corporate sustainability;

VC = control variables of the equation; and

$\varepsilon$  = error term of the equation.

Figure 1 presents the dependent variable, as well as the independent variable (Corporate Sustainability) and the control variables according to the models considered.

Table 1:

**Research variables – Manager Compensation model and ISE**

Dependent Test Variable				
Var.	Expected Signal	Description	Operational Definition	Authors
RT		Total remuneration of executives	$\ln$ (baseline salary + bonus + other benefits)	Barontini and Bozzi (2008), Conyon and He (2011) and Funchal and Terra (2006)
Independent Test Variable				
ISE	(+/-)	ISE	Dummy 0 and 1 if the companies are listed on the ISE of BM&FBOVESPA	Alves (2008), Beato, Souza and Parisotto (2009), Carvalhal and Tavares (2013), Lameira <i>et al.</i> (2013), Machado, Machado and Corrar (2009), Rossi Jr (2009) and Vital <i>et al.</i> (2009)
Control Variables				
NM	(+)	Participation in <i>Novo Mercado</i>	Dummy 1 for companies listed on the <i>Novo Mercado</i> and 0 for companies listed on other levels and in the traditional market.	Carvalhal da Silva and Chien (2013)
ROA	(+)	Total Return on Assets	$ROA = \frac{\text{Net Profit}}{\text{Total Assets}}$	Carvalhal da Silva and Chien (2013), Funchal and Terra (2006) and Lameira <i>et al.</i> (2013).
VOL	(+)	Volatility of Returns	$VOL = \sigma \left( \ln \left( \frac{P_t}{P_{t-1}} \right) \right)$	Carvalhal da Silva and Chien (2013) and Carvalhal and Tavares (2013)
CRESC	(+)	Growth Opportunities	% increase in net revenue every three years	Carvalhal da Silva and Chien (2013)
MTB	(+)	Market-to-Book	$MTB = \frac{\text{Market Value}}{\text{Total Assets}}$	Carvalhal da Silva and Chien (2013)
TAM	(+/-)	Company Size	$\ln(\text{Total Assets})$	Carvalhal da Silva and Chien (2013), Funchal and Terra (2006) and Lameira <i>et al.</i> (2013)

Source: Elaborated by the authors.

After outlining the research design, sample, data, regression method and selection of the variables for the econometric models, the empirical results of this study are analyzed.

## 4. Results and discussion

### 4.1 Descriptive statistics

Table 1 presents the descriptive statistics of the variables in this study. On average, the total remuneration of managers was R\$ 8.48 million. The standard deviation was \$ 10.76 million, which indicates the large dispersion of this variable, with the highest total remuneration of managers corresponding to R\$ 117.10 million.

In relation to the ISE variable, it is observed that approximately 13% of the sample is made up of companies listed in the BM&FBOVESPA sustainability index. This representativeness is justified, since the ISE's annual portfolios consist of a maximum of 40 companies. In addition, about 49% of the companies analyzed are part of the *Novo Mercado*.

Table 1:

**Descriptive statistics of variables used in the study**

	N. Obs.	Mean	Standard Deviation	Max.	Min.
RT	1024	8.48	10.76	117.10	0.00
ISE	1076	0.13	0.33	1.00	0.00
NM	1076	0.49	0.50	1.00	0.00
ROA	1069	-0.04	1.46	0.57	-46.67
VOL	947	36.19	22.18	236.54	4.04
CRESC	930	0.20	0.80	17.55	-1.71
MTB	1066	1.26	3.74	71.00	0.02
TAM	1069	8.37	1.85	14.16	0.00

Source: Research data

The performance measures and values, then, reveal that, on average, the companies' market value (MTBB) is 1.26 times higher than their book value, an asset profitability (ROA) of -0.04, which indicates that the organizations tend to present accounting losses and that this loss corresponds to about 4% of the total asset, with a mean growth of turnover in the past three years corresponding to 20%. In addition, the mean volatility was 36.19.

### 4.2 Analysis of relationship between manager compensation and corporate sustainability

Table 2 presents the results of the model that estimated the relationship between managers' compensation and corporate sustainability. In addition to the performance variables proposed by Conyon and He (2011) and Funchal and Terra (2006), the corporate sustainability variable influences managers' remuneration.

As results (Table 2), it was observed that there was a significant and positive relationship at 5% between the main variables investigated (managers' compensation and corporate sustainability), which corroborates the hypothesis H1 and suggests that more sustainable companies tend to make possible better remuneration to their managers. In relation to the stock option plan benefit, a 5% significance was also observed, which indicates that the companies that have this type of benefit tend to have higher total remunerations of the executives.

In addition, a negative and significant relationship was observed between the total risk (volatility) and the total remuneration, indicating that the companies with greater risk generally grant lower remunerations to their managers. In this point, we observe a result different from the authors Funchal and Terra (2006), since they did not find a statistically significant relation between the operational risk (standard deviation of the ROA) and the executive compensation (Table 2).

Table 2:

**Association between manager compensation and corporate sustainability**

	RT
PO	0.3474** (0.1638)
BPL	-0.1732 (0.3169)
BPE	-0.0304 (0.1406)
ISE	0.2392** (0.1155)
NM	0.3210** (0.1617)
ROA	-0.1580 (0.3821)
VOL	-0.0044** (0.0017)
CRESC	-0.0343 (0.0284)
MTB	0.1038* (0.0580)
TAM	0.3717*** (0.0927)
CONSTANT	11.8900*** (0.8851)
N	811
R-sq	0.094
adj. R-sq	0.083
Rmse	0.4017
T. Multicollinearity	1.36
T. Heter. by Baum (2001)	0.0000
T. Self-correlation by Wooldridge (2002)	0.0001
T. Hausman	0.0000

Obs.: The asterisks indicate the significance levels: \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; and \*\*\* $p < 0.01$ . The model was estimated using Fixed Effects. The multicollinearity test reveals that the variables presented no multicollinearity problems. Baum's heteroscedasticity test (2001) rejects the null hypothesis of homoscedastic variances. And the Wooldridge test (2002) rejects the null hypothesis of absence of self-correlation.

Source: Research data

On the market value, we noticed statistical significance in the relation between the MTB and the total remuneration at 10%, which corroborates the studies by Barontini and Bozzi (2008), Conyon and He (2011), Kaplan and Rauh (2008) and Kaplan (2012), indicating that executives tend to be paid for high performance. It is also worth noting that the size of the company has also been positively and significantly related at 1%, which suggests that larger companies tend to offer higher total remuneration to the board, corroborating the work of Conyon and He (2011), Funchal and Terra (2006) and Correia, Amaral and Louvet (2014).

In a complementary manner, a 5% statistical significance was observed in the relationship between total compensation and quality of corporate governance, measured by the variable NM, which evaluates whether or not companies are listed on the BM & FBOVESPA Novo Mercado. This finding corroborates the authors Camargos and Helal (2007), Correia, Amaral and Louvet (2014), Farias (2012), Pinto and Leal (2013), Silva (2010), and Victor and Terra (2009), as they suggest that Corporate Governance tools can justify the executive remuneration.

## 5. Conclusion

The objective of this research was to investigate the influence of corporate sustainability on the compensation of the managers of Brazilian non-financial companies of BM & FBOVESPA from 2009 to 2013. The basis for this study is the Agency theory, according to which managers can prioritize their interests to the detriment of corporate interests, and Stakeholder theory, which argues that companies need to reconcile stakeholder interests with employees, customers, suppliers and the community to ensure long-term value.

The concern with the alignment of the interests of the principal and the agent has been evidenced in the literature and it is known that one of the ways to align these interests is to offer the managers incentive mechanisms, which are translated into baseline salary, annual bonus plans, stock option plan, among others.

The topics Corporate Governance and Corporate Sustainability, as discussed above, cover a large volume of isolated surveys, but few of them focus on the interaction between these two themes. No empirical studies on these two constructs - Governance and Sustainability - were found in Brazilian or international literature. Specifically, the relationship between corporate sustainability and compensation of managers was not observed either under the theoretical approach, which shows a differential of this work.

Regarding the method of this research, we analyzed the descriptive statistics of the variables used in the study and applied the regression method with panel data to test the proposed relationship. The descriptive analysis revealed that, on average, the total compensation of managers is R\$ 8.48 million, about 13% of the sample involves companies listed in the BM&FBOVESPA ISE and 49% are listed on the Novo Mercado. In addition, companies have an average market value of 1.26 times the book value, a negative asset yield of around 4%, an average growth in sales for the last three years corresponding to 20% and a volatility of 36.19 during the period investigated.

Regarding the results of panel regression models, a positive and statistically significant relationship was observed at 5% among the variables of interest. Thus, it is inferred that the companies listed in the ISE of BM&FBOVESPA tend to grant higher total remuneration to their managers. In addition, a negative relationship between volatility and total managers' remuneration was observed, which indicates that companies with higher risks tend to offer lower total remuneration to their executives.

In addition, it was noticed that the larger companies generally grant better remunerations to their managers, which corroborates the studies by Conyon and He (2011), Funchal and Terra (2006) and Correia, Amaral and Louvet (2014).

It should also be noted that a positive and statistically significant relationship was observed at 10% between the total remuneration and the market value (MTB). Thus, it is suggested that executives are usually paid for high performance, as observed in the studies by Barontini and Bozzi (2008), Conyon and He (2011), Kaplan and Rauh (2008) and Kaplan (2012).

This research contributed to the literature on Manager Compensation and Corporate Sustainability, not only because it involves two relevant topics in the literature, but also because it shows that companies listed in the ISE tend to better remunerate their executives, which indicates that organizations that are concerned with long-term generation and value tend to also seek the mitigation of conflicts of interest between shareholders and managers through greater compensation to managers.

As suggestions for future research, one can evaluate how the other mechanisms of corporate governance affect the compensation of managers, as well as construct a sustainability indicator and test the relationship of this indicator with the total remuneration of the managers.

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# Assessment of Teacher Competencies: Analysis in the Accountancy Program at UTFPR

## Abstract

The competences related to university teaching encompass the knowledge, skills and attitudes that their professionals need to properly exercise their work. The evaluation of such skills may allow the teacher to reflect on his or her stance towards the students, and although such a procedure is complex, its results may be important for improving the quality of teaching. In this context, this study aimed to identify the level of satisfaction and expectation of the students in relation to the professors of the Accountancy course at the Universidade Tecnológica Federal do Paraná (UTFPR), Campus Pato Branco. The research is characterized as descriptive and quantitative and the data collection was carried out through questionnaires applied to the course students. The main results of the research are: (i) students have a higher expectation (average 9.1) of teachers when compared to the satisfaction (average 6.9); (ii) the competences the students evaluate best are: interpersonal relationship, commitment, mastery of the area, ethics and didactic-pedagogical; (iii) the competencies with the worst evaluations by the students are: communication, flexibility, empathy, creativity and teamwork; and (iv) the female gender has higher expectations of teachers when compared to the male gender. The main implications / conclusions of the present study are: (i) the present study does not present significant divergences in relation to previous studies; (ii) teachers of the course studied and similar courses should be alert to the skills with the lowest level of satisfaction; (iii) the student's general level of expectation is well above the satisfaction level and teachers should take this into account in the planning of their subjects; and (iv) competencies with lower levels of student satisfaction refer to attitudes and skills rather than knowledge dimensions. This conclusion is fundamental for the teacher to be aware that the student values other dimensions beyond knowledge. In addition, these results also serve for the courses and co-ordinations to consider these competencies in their training planning.

**Key words:** Competency. Satisfaction. Expectation. Education.

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## 1. Introduction

Universities are the driving force behind the development of a country as, besides providing people fit for the job market, they also play a role in training people critical of society's main issues of interest, such as culture, politics and economics (Fava de Moraes, 2000). In this context, where the university stands out in the formation of people, it is necessary to discuss the evaluation of the teacher since, according to Apio and Silvino (2013), the teachers are the main responsables for the teaching-learning process. The authors state that the greatest concern of a Higher Education Institution (HEI) must be focused on the quality of teaching and, furthermore, it must be assumed that the performance of teachers in the classroom is one of the variables with the greatest impact on the teaching-learning process.

However, the process of evaluating teachers' performance is complex and has demanded that the HEIs constantly improve their instruments and techniques, as cited by Apio and Silvino (2013). In addition, Miranda, Casa Nova and Cornacchione Junior (2014) cite that the evaluation of teaching qualifications has been a recurring theme in the literature and not without controversy.

Despite the complexity, many authors believe that the teacher evaluation process is an important instrument for improving the quality of teaching (Castanheira & Ceroni, 2007). According to the authors, teacher evaluation is an important diagnostic tool for their work. It is pointed out, however, that the evaluation is used only for verification purposes and has no effect on the dynamics of the pedagogical action conducted by the teacher (Luckesi, 2002). In this sense, several authors argue that the evaluation should go beyond the simple fact of evaluating / verifying (Luckesi, 2002; Ribeiro, 2012, Apio & Silvino, 2013), so that it should also be an instrument that allows the teachers to rethink their position towards the results, besides being inclusive, welcoming and integrative (Luckesi, 2002).

Thus, Ribeiro (2012) addresses some of the teachers' attitudes after the evaluation process: (i) reflect on the result; (ii) discuss with students the results of the evaluation process; (iii) with these results, seek changes in their performance; and (iv) take interest only in the positive result, ignoring the negative. The author points out that, in the research carried out, no statement was found that indicated a denial posture of the teacher after receiving the result, i.e. the teachers, upon receiving the result of the evaluation, decide to improve their performance. The author also adds that, in the research carried out with teachers of public HEI, elements that indicate the presence of an attitude of reflecting on the results of the evaluation appeared, so that, later, improvements of the pedagogical action are implemented. Therefore, it is necessary to discuss the dimensions, variables and ways of performing teacher evaluation. In that sense, Antonelli, Colauto and Cunha (2012) report that one way of evaluating the quality of teaching is through the expectation / satisfaction relationship of students in relation to the teacher competencies.

According to Grohmann and Ramos (2012), the term "teacher competence" is used in research that addresses the quality of teaching, teacher and student satisfaction. In addition, the authors report that the idea of competence has two main currents: the American current, which considers competence as a set of knowledge, skills and attitudes; and the European current, which understands that skills are demonstrated as soon as teachers achieve or exceed expected results in their work. It should be noted that the present work follows the American trend, which understands competence as a set of knowledge, skills and attitudes.

Focusing on the quality of teaching, it is important that HEIs conduct their teachers' evaluation in order to verify if they are attending to the needs and expectations of their students, thus obtaining feedback to seek continuous improvement, culminating in the increasing quality of education. In view of the above, the research problem in this study is: what is the level of satisfaction and expectations of the students in the Accountancy Course at the *Universidade Tecnológica Federal do Paraná (UTFPR) - Campus Pato Branco*, in relation to their teachers? Thus, the main objective of this study is to evaluate the degree of satisfaction and expectation of UTFPR Accountancy students in relation to teacher competencies.

This research is justified by the theoretical and practical contribution to the theme “Teacher Competence Assessment”. In relation to the theoretical contribution, we highlight the replication of yet another study in a complex context and with countless needs for improvement, such as the teaching competencies and, consequently, the quality of teaching. Another theoretical contribution highlighted relates to the findings of the present research and the comparison made with previous research, since it reveals that, even with the passage of time, many teaching skills are neglected in the planning process of the subject, in addition to the planning process of the training course coordinators and educational institutions offer.

Regarding the practical contribution, the usefulness of the study for the analyzed course is highlighted, as it may encourage improvement actions that contribute to the quality of teaching. This practical contribution reaches the course students, the teachers and the management of the university, who can analyze the results in order to improve the teaching-learning process, since, as quoted by Lima, Oliveira, Araújo and Miranda (2015), many sleep as accountants and wake up as teachers, entering university education without any pedagogical training, which often forces them to venture into trial and error teaching for many years. In the same sense, Miranda et al. (2014) argue that higher education teachers in general do not go through a systematized pedagogical preparation for teaching. In addition, the study is limited to UTFPR's Accountancy course. Therefore, it should be noted that the results presented are valid for the course analyzed. The data collection tool, however, can be replicated to other courses and universities.

## 2. Theoretical Framework

### 2.1 Conceptual aspects of competencies

The concept of competencies has been studied and reviewed by several authors, such as Parry (1996), McLagan (1997), Hipólito (2000), Fleury and Fleury (2001), Bitencourt (2001), Sant'anna (2002), Silva (2003), among others. For Fleury and Fleury (2001), the word competency is part of common sense, applied when an individual has the capacity to perform some task, that is, competency is related to the ability or knowledge of people on a subject.

In the academic milieu, McClelland (1973) initiated the competence debate, defined as a characteristic underlying a person who is casually related to superior performance in performing a task, or situation. The author distinguishes between competencies and abilities, the latter being the particular talents acquired through daily practice; aptitude, which would be the natural talent of each person; and knowledge, which is what the person needs to know to perform a given task (Fleury & Fleury, 2001).

According to Perez (2005), the subject of competence began to be used in a pragmatic way, in France and in the large capitalist countries, especially in workplaces of leading companies. In Brazil, the author indicates that the theme initially emerged at the academy, and has subsequently been adopted experimentally in the companies. The importance of competencies was already predicted by Zarafin (2001), when indicating that the shift had begun, in which the competence logic would be imposed with or without negotiations.

Considering the available literature, Fleury and Fleury (2001) sought to carry out a more effective approach to the evaluation of the competencies of people selected to work in organizations since, in the exams previously used, it was not possible to evaluate the success of the individual at work and throughout their lives. Boyaltzis (2004 apud Pereira, 2007) analyzed the dimensions of competencies and concluded that, for a better understanding, they should be analyzed in the following perspective: knowledge (what needs to be done); Ability (how a task should be performed); and attitude (why it should be done). By combining these three elements, the individual becomes fit for a given function and presents the results desired by the organization.

Durand (1998) conceptualized “competence” as a set of interdependent knowledge, skills and attitudes necessary for the development of a specific goal. According to him, the individual, when performing work, simultaneously exercises this set of competencies and not one at a time. In competency studies, in general, two dimensions are studied: individual and organizational. For Filenga, Moura and Rama (2010), the individual competencies have received more attention in research, but both are important because, in accordance with Dutra (2008), for the establishment of individual competencies, reflection linked to the organizational competencies is due, given the mutual influence between them. Along the same lines, Fleury and Fleury (2001) complement by indicating that the set of individual competencies developed and the business strategies constitute the core competencies for the organization.

In the literature, it is possible to find research with a focus on organizational competencies, such as Hamel and Prahalad (1995) and Ruas, Antonello and Boff (2005), whose competencies were related to organizations. For Ruas et al. (2005), the concept of competence is related, on the one hand, to the mission, vision and competitive strategies of companies and, on the other hand, to individual competencies. Meanwhile, Hamel and Prahalad (1995) say that, if companies identify and develop their competencies, in the future, they tend to be more successful.

At the individual level, competencies are related to the abilities each person has in performing a given job, which, according to Medeiros and Oliveira (2009), is associated with knowing how to act, mobilize, learn, transfer knowledge, commit, have a strategic vision and take responsibility. Therefore, it is necessary that people can put their skills into practice, so that they can be improved every time. For Pereira (2007, pp. 63), individual competences are described as “characteristics of a person and that are related to their performance in any professional activity”. The assessment of the individual competencies, however, occurs through the relation between the tasks and positions occupied by the people. Following this line of thinking, “competency-based management” is just a more modern label to manage an organizational reality still grounded in the principles of Taylorism-Fordism (Fleury & Fleury, 2001).

Considering that individual competencies are the basis for the establishment of organizational competencies, which exert mutual influence, according to Dutra (2008), it is inferred that the organization prepares the individual to face new situations, both organizational and personal while, on the other hand, the individuals offer the organization their learning so that it can face its challenges.

In this context, according to Filenga, Moura and Rama (2010), there is a consensus in the literature that learning is a key point, so it is considered to be the driving force behind the development of competencies, in line with Souza (2005). In this sense, Hamel and Prahalad (1995) introduced the concept of core competence, in which they emphasize that the companies with the greatest success will be those that better identify and develop their competencies, enhancing their competitiveness in comparison with their competitors. In the study by Hamel and Prahalad (1995), the concept of core competence is defined as a set of skills and technologies, not a single skill and isolated technology that allows the organization to offer a unique fundamental benefit to the client. Moreover, for the authors, a core competence is considered as such when it constitutes the basis for the entry into new product markets.

In this way, the present research consists of analyzing the competences related to the individual, being based on the teacher competencies under the evaluation of the Accountancy students.

## 2.2 Teachers’ Competencies

Many concepts of competence exist, as described above and, for Pereira (2007, pp. 83), the competencies of a college professor “is the set of interdependent knowledge, skills and attitudes necessary for the exercise of teaching activities and research in higher education.” In this way, teachers increasingly need broad knowledge about the subjects taught in the classroom, in order to meet the expectations of their students. Therefore, for the teacher to be able to deal clearly with the content addressed in the classroom, it is indispensable that he makes all possible efforts to develop the competencies necessary for the students’ teaching-learning.

### 2.2.1 Set of teachers' competencies

Accounting, as an applied social science, is affected by changes in the environment, being known as the language of business, and its teaching should be focused on the mutable aspect that science entails (Vasconcelos, 2009). Antonelli et al. (2012) emphasize two important definitions of literature competence: the ability to mobilize a set of cognitive resources, such as knowledge, skills, information, among others, to solve a series of situations pertinently and effectively (Perrenoud, 2000); and a set of interdependent knowledge and skills necessary for the development of predefined purposes (Durand, 1998).

In the study by Durand (1998), the competencies are grouped in three dimensions: Knowledge, Skills and Attitudes.

The knowledge dimension encompasses everything that is learned in the classrooms, in daily work, in the coexistence with other people and which is taken to the personal and professional life of each individual. For Vasconcelos (2009, pp. 57), "Knowledge can be understood as a series of information assimilated by the human being throughout his life, based on his experiences in formal education or specific training."

Skill, according to Vasconcelos (2009, 57), "is related to knowing how to do, to put into practice the information acquired throughout life, in practical situations." Thus, it is understood that ability is related to knowing how to transform into practice all the knowledge acquired during his academic and professional life, in order to solve certain situations.

On the other hand, the dimension of attitudes is related to the way of acting, with the feelings and the way of relating of each person. For Pereira (2007, pp. 85), the attitude is "related to the behavioral knowledge, related to the willingness of the individual to want to do something, usually linked to social or affective aspects." When working with people who share more affinities, the attitudes may be different though, because the communication and interaction between them is better than with a person with less affinities.

Thus, 14 competencies needed for teachers can be listed, based on the study by Pereira (2007) and grouped in the three dimensions of Durand (1998), which were used by Antonelli et al. (2012), as shown in Table 1.

Table 1:

**Teacher Competencies Needed**

Dimension	Competency	Definition of the Competency	
Knowledge	Mastery knowledge area	Is the ability to possess solid knowledge in a specific area, as well as professional experience gained through scientific research.	
	Didactical-pedagogical	Is the knowledge of fundamental, didactical-pedagogical concepts, acquired through courses and/or specific training.	
Skills	Interpersonal relationship	Is the ability to establish a harmonious and healthy relationship with their students, also knowing how to administer occasional conflict situations that may emerge in a balanced manner.	
	Teamwork	Is the ability to cooperate and obtain cooperation from colleagues in teaching activities with common objectives.	
	Creativity	Is the ability to create innovative solutions in the conduction of the teaching-learning process.	
	Systemic view	Is the ability to perceive the integration and interdependence of different topics that contribute to greater efficacy in the teaching-learning process.	
	Communication	Is the ability to listen, process, understand and express themselves in different forms and use feedback appropriately to facilitate the interaction with their students.	
	Leadership	Is the ability to encourage and influence their students to reach or overcome their personal objectives in their learning process.	
	Planning	Is the ability to plan and organize the different activities of the teaching-learning process.	
	Attitudes	Commitment	Is the behavior related to the level of engagement in the achievement of positive results in the teaching-learning processes under their responsibility.
		Ethics	Is the behavior guided by principles and universal values of citizenship, especially in the relation with their students.
		Proactivity	Is the behavior related to the act of practicing concrete actions upon personal initiative to enhance the teaching-learning process.
Empathy		Is the ability to put themselves in the student's place and, then, create a relationship of trust and harmony that leads to a higher degree of opening by the students to accept advice and suggestions.	
Flexibility		Is the ability to adapt to new situations and reconsider postures, when necessary, in their activities in the teaching-learning process.	

Source: adapted from Durand (1998), Pereira (2007) and Antonelli *et al.* (2012).

Table 1 presents the necessary competencies for teaching. The dimensions are: (i) Knowledge; (ii) Skills; and (iii) Attitudes. These dimensions of competence assessment follow the American trend (Grohmann & Ramos, 2012). For each of the dimensions, the criteria for the evaluation of each competency are presented.

### 3. Research Method

The method of this study is classified as follows: (i) from the point of view of its objectives, as descriptive, since the facts are observed, registered, analyzed, classified and interpreted, without the interference of the researcher; (ii) concerning the means of investigation, non-experimental methods are used because they do not manipulate the variables directly; (iii) regarding the problem approach, it is characterized as a quantitative study, since statistical techniques are used in the collected data; and, finally, (iv) in relation to the research procedures, the field study is used (Cooper & Schindler, 2003; Hair, Babin, Money & Samouel, 2005).

For the operationalization of this study, the questionnaire from the study by Antonelli et al. (2012) was replicated, originating in the study by Pereira (2007) and modified by Vasconcelos (2009). The choice of the questionnaire was motivated by the tests and validations the instrument had been subject to, due to its ability to capture the skills that contribute to improve the understanding of college teachers' work.

Initially, Pereira (2007) conceived a model of 13 competencies necessary for the teaching role, one specific competency for teaching (didactical-pedagogical competency) and another for research (scientific method competency). In this study, the author applied the instrument to the professors of the Chemical Engineering course.

Subsequently, Vasconcelos (2009) adapted and replicated the model proposed by Pereira (2007) for the teachers of the Accountancy course. The adaptations made by Vasconcelos (2009) are reflected in the difference between the realities of the Chemical Engineering course and the Accountancy course professors. Thus, two attributes were included in the initial instrument: (i) ability of the teacher to be available for extraclass attendance to the students (commitment competency); and (ii) willingness to do self-assessment of their work as teachers (flexibility competency). In the study by Vasconcelos (2009), the instrument was composed of 27 assertions, all of them of the adapted Likert type, with eleven levels ranging from "0" (does not have) to "10" (totally owns) to measure the degree of intensity of the teacher competencies.

To capture the expectations and satisfactions of the Accountancy course students instead of the teachers, Antonelli et al. (2012) adapted Vasconcelos' instrument (2009), which was applied at three public universities in Brazil. Therefore, the data collection occurred through the replication of the instrument by Antonelli et al. (2012), with adaptations in the block regarding the respondents' characteristics, because the previous research had been applied at three universities in the last two course years and, in the present study, it was applied at a single university to all course years.

As for the instrument applied, it is subdivided into two blocks: Characterization of the Respondent and Assertions to Measure Expectations / Satisfaction. The changes made in the first block were as follows: (i) the assertion that requested the institution of the respondent was withdrawn; and (ii) in the question on the course term the student was in, the four course years were added as an option. The questions that were retained from the original instrument by Antonelli et al. (2012) were: gender, age, work professionally at the moment and if already concluded another undergraduate course.

Regarding the second block, no changes were required so that, in the study by Antonelli et al. (2012), the expectations and satisfaction of the students were verified by means of 24 assertions, fragmented in three dimensions (knowledge, skills and attitudes), which were decomposed into the following teaching competences: Knowledge domain; Didactical-pedagogical; Interpersonal relationship; Teamwork; Creativity; Systemic view; Communication; Leadership; Planning; Commitment; Ethics; Proactivity; Empathy; and flexibility. All questions in this block are of the adapted Likert type, with 11 levels ranging from 0 ("does not have") to 10 ("fully owns"). Table 2 shows the questions used, according to their dimensions and competencies.

Table 2:

**Instrument – expectation/satisfaction block**

Dimensions	Competency	Question	Description of the question
Knowledge	Mastery knowledge area	Q01	Have solid knowledge on the subjects taught.
	Didactical-pedagogical	Q02	Have basic knowledge of didactical-pedagogical concepts.
Interpersonal relationship		Q03	Establish a harmonious and healthy relationship with their students.
		Q04	Administer occasional conflicts in the relation with their students in a balanced manner
Teamwork		Q05	Develop teaching activities together with other teachers with common objectives
Creativity		Q06	Create innovative solutions in the teaching activities under their responsibility.
		Q07	Perceive the integration and interdependence between a subject taught and other subjects in an undergraduate program.
Systemic view		Q08	Reflect with their students about the relation between what they are learning and global aspects of science and/or society as a whole.
		Q09	Listen to, process and understand the students' different needs and provide appropriate feedback.
Communication		Q10	Express themselves well, particularly orally, so that their students can easily understand them.
		Q11	Encourage their students to achieve or overcome their personal objectives in their learning process.
Leadership		Q12	Influence their students concerning their personal responsibilities in their learning process.
		Q13	Know how to elaborate programs and course plans of undergraduate subjects.
Planning		Q14	Know how to prepare didactical material to support the course activities.
		Q15	Organize the logical sequence of the activities in each class taught.
Commitment		Q16	Commit to the achievement of positive results in the teaching activities under their responsibility.
		Q17	Show their willingness to attend to the students beyond the classes.
Ethics		Q18	Demonstrate respect for their students.
		Q19	Use a single assessment criterion for all of their students.
Proactivity		Q20	Take personal initiative to practice concrete actions that contribute to the enhancement of the education process in general.
		Q21	Create a relationship of trust and harmony with their students, leading to a higher degree of opening (by the teachers) to accept advice and suggestions.
Empathy		Q22	Put themselves in the students' place and try to understand their personal behavior, aiming to be able to help them to be more productive in their learning.
		Q23	Adapt to new situations when necessary in view of new challenges in the teaching processes they act in.
Flexibility		Q24	Be willing to reconsider the teaching process based on results of assessments made.

 Source: adapted from Pereira (2007); Vasconcellos (2009) and Antonelli *et al.* (2012).

After obtaining the final version of the instrument, the data collection was started, through visits during the undergraduate classes, which took place from January 10, 2013 to January 31, 2013. Firstly, the objective of the research was explained to the respondents and the printed questionnaire was distributed. A total of 92 valid answers were obtained, constituting the final sample of this research. Before starting the statistical analyses in the instrument, Field (2009) cites the importance of checking the reliability of the scale. In this sense, Cronbach's Alpha coefficient was chosen, with a minimum ideal value of 0.7, and 0.6 could be accepted for exploratory research (Hair, Black, Babin, Anderson & Tatham, 1998).

In verifying the scale reliability using Cronbach's alpha coefficient, the test was first applied to the satisfaction assertions and, subsequently, to the expectation assertions. In the 24 assertions that measure student satisfaction, the coefficient obtained was 0.947, an acceptable value that demonstrates the reliability of the model. In the assertions of expectations, the coefficient obtained was 0.96, which is also acceptable. It is important to note that the assumption of the Cronbach's alpha coefficient was met in both situations (correlations between items should be positive). In the study by Antonelli et al. (2012), the Cronbach's Alpha coefficients obtained were also high, with 0.943 in student satisfaction and 0.859 in expectations, reinforcing the reliability of the model's scale.

The statistical analysis took place in three steps: (i) Evaluation of Normality and Homogeneity of Variances; (ii) Evaluation of the best and worst evaluated competencies; and (iii) Comparison of Competencies segregating the Sample by Class and Gender.

## 4. Analysis of Results

### 4.1 Sample characteristics

To measure the intensity of satisfaction and student expectations regarding the teacher competencies, we questioned the students of the Accountancy course at the UTFPR - Pato Branco Campus. In the application of the research instrument, some characteristics of the sample are highlighted below. Of the 92 valid answers obtained, the segregation of the students by class is as follows: 18 first-year respondents (with 19.6% representativeness); 24 second-year (26.1%); 23 third-year (25.0%); and lastly, 27 students from the fourth year (29.3%). In this division of the sample, it can be observed that the four classes contain a number of nearby elements.

Regarding the gender of the interviewees, the majority of the respondents are women with an expressive percentage compared to the men, which was not common some years ago. Women accounted for 67.4% of the respondents and men for only 32.6%. The age range was also analyzed, with the majority of respondents being between 20 and 25 years old, representing 66.3% of the sample. The other ages had the following results: up to 19 years (21.7%); 26 to 30 years (7.6%); 31 to 35 years (3.3%); and over 46 years (1.1%).

Another point observed was the high incidence of activities parallel to the undergraduate program, with 87 students, representing 94.6% of the sample. With regard to students working in the area, it is observed that 69.6% (64) work in the accounting area. Referring to the reason that led to the choice of the Accountancy course, most answered that their choice was due to the opportunities that the course provides (70.7%). The last question for the characterization of the respondents was whether or not they held another degree. It was verified that 84 respondents (91.3%) did not have another undergraduate degree, while only eight students held such degree, in Administration (5 people), Geography (1), Information System (1) and Technical Nursing (1).

After the analysis of the statements to characterize the respondents, it is observed that, in general, they are women, in the age group between 20 and 25 years, and most of them already work in the accounting area. The choice of the course was due to the opportunities it provides.

## 4.2 Analysis of teacher competencies

To analyze the competencies, the average and standard deviation were calculated for each competency, separated between the satisfaction and expectation groups, as displayed in Table 3.

Table 3:

**Means and standard deviations of competencies**

Satisfaction			Expectations		
Competency	Mean	Mean deviation	Competency	Mean	Mean deviation
Mastery of the area	7.6	0.9	Mastery of the area	9.4	0.7
Didactical-pedagogical	7.3	1.0	Didactical-pedagogical	9.2	0.7
Interpersonal relationship	7.9	0.9	Interpersonal relationship	9.2	0.7
Teamwork	5.4	1.9	Teamwork	8.4	1.4
Creativity	5.7	1.7	Creativity	8.8	1.1
Systemic view	7.0	1.1	Systemic view	9.0	0.8
Communication	6.7	1.1	Communication	9.3	0.7
Leadership	6.9	1.2	Leadership	9.0	0.8
Planning	6.9	1.1	Planning	9.2	0.7
Commitment	7.7	1.0	Commitment	9.4	0.6
Ethics	7.5	1.0	Ethics	9.3	0.7
Proactivity	7.2	1.3	Proactivity	9.2	0.8
Empathy	6.5	1.4	Empathy	9.0	0.9
Flexibility	6.7	1.3	Flexibility	9.3	0.8
TOTAL	6.9	1.2	TOTAL	9.1	0.8

Source: elaborated by the authors.

It can be observed that students generally expect more of their teachers (general average of 9.1) when compared to the satisfaction they experience (average 6.9) during the course. There is also a difference between the mean deviations that, at first, suggest a greater dispersion in satisfaction-related responses when compared to expectations. In the dimension of satisfaction, by the absolute values of the means, some competencies can be found in which the students say they are more satisfied with respect to others. To permit this statement, however, statistical tests of comparison of means need to be carried out, which are described next.

In order to compare the averages of the competencies and rank them based on the intensity of the answers, the data were first standardized and, later, the normality and homogeneity of the data were verified by means of the Kolmogorov-Smirnov and Levene tests, respectively. In the normality test, with a significance level of 5% for all competencies, the null hypothesis ( $H_0$ ) was accepted, reporting the non-normality of the data, both for satisfaction and expectations assertions. In relation to the Levene test, it is also observed that the variances of the data are not homogeneous. Therefore, a non-parametric technique had to be used to evaluate the difference between the means.

The nonparametric Kruskal-Wallis test permitted comparing two or more sample groups of unpaired data, in this case, the 14 competencies studied from the perspective of satisfaction and student expectations. For the tests from both perspectives, a significance level of 5% was used, with the null hypothesis that there were no statistically significant differences between the sample means. For student satisfaction, the  $H_0$  hypothesis was rejected, statistically proving the existence of differences between the means [ $H(13) = 184,80$ ,  $p < 0,05$ ]. For the expectations, statistical differences were also found [ $H(13) = 34,76$ ,  $p < 0,05$ ], rejecting  $H_0$ .

The next step was the application of post hoc hypothesis tests to verify which means are statistically different. The option was the Mann-Whitney hypothesis test, applying the Bonferroni correction in all effects, with a significance level of 0.0083 [0.05 / 6]. Table 4 lists the competencies ranked by means of the Kruskal-Wallis test, with their respective differences.

Table 4:  
**Ranking of competencies related to student satisfaction**

STUDENT SATISFACTION	Ranking	Interpersonal relationship	Commitment	Mastery of the area	Ethics	Didactical-pedagogical	Proactivity	Planning	Systemic view	Leadership	Communication	Flexibility	Empathy	Creativity	Teamwork	
Ranking	+	Highest Rank and Lowest Rank													-	
Interpersonal relationship	+	=	=	=	=	≠	≠	≠	≠	≠	≠	≠	≠	≠	≠	
Commitment	Lowest rank and Highest Rank	=	=	=	=	=	≠	≠	≠	≠	≠	≠	≠	≠	≠	
Mastery of the area		=	=	=	=	=	=	=	=	≠	≠	≠	≠	≠	≠	
Ethics		=	=	=	=	=	=	=	=	=	≠	≠	≠	≠	≠	
Didactical-pedagogical		=	=	=	=	=	=	=	=	=	=	=	=	≠	≠	
Proactivity		≠	=	=	=	=	=	=	=	=	=	=	=	=	≠	≠
Planning		≠	≠	=	=	=	=	=	=	=	=	=	=	=	≠	≠
Systemic view		≠	≠	=	=	=	=	=	=	=	=	=	=	=	≠	≠
Leadership		≠	≠	=	=	=	=	=	=	=	=	=	=	=	≠	≠
Communication		≠	≠	≠	=	=	=	=	=	=	=	=	=	=	=	=
Flexibility		≠	≠	≠	≠	=	=	=	=	=	=	=	=	=	=	=
Empathy		≠	≠	≠	≠	=	=	=	=	=	=	=	=	=	=	=
Creativity		≠	≠	≠	≠	≠	≠	≠	≠	≠	≠	=	=	=	=	=
Teamwork		1	≠	≠	≠	≠	≠	≠	≠	≠	≠	=	=	=	=	=

Source: elaborated by the authors.

De acordo com a Tabela 4, é possível ordenar as competências docentes mais bem avaliadas de acordo com a satisfação dos alunos. De acordo com a Tabela 4, as melhores avaliadas competências docentes podem ser classificadas acima das menos avaliadas em relação à satisfação dos alunos, conforme segue: relacionamento interpessoal; comprometimento; domínio da área; ética; didática-pedagógica; proatividade; planejamento; visão sistêmica, liderança; comunicação; flexibilidade, empatia; criatividade; e trabalho em equipe. Para as cinco melhores avaliadas competências, a Tabela 4 apresenta a igualdade estatística entre elas, ou seja, a satisfação dos alunos com elas é estatisticamente a mesma. A sexta competência (proatividade), então, é estatisticamente diferente da primeira, a melhor avaliada, o relacionamento interpessoal. Neste raciocínio, na Tabela 4, pode-se observar que as competências classificadas no meio da matriz diferem daquelas classificadas nos extremos. As cinco competências com a pior avaliação também possuem estatisticamente iguais médias, porém diferentes das melhores avaliadas.

Therefore, summarizing the information in Table 4, it is observed that the students are more satisfied with their teachers in the following competences: Interpersonal relationship; Commitment; Mastery of the area; Ethics; and Didactical-pedagogical. On the other hand, students are less satisfied with the following competencies: Communication; Flexibility; Empathy; Creativity; and Teamwork.

Using the same statistical technique as for student satisfaction, the student expectations were analyzed, according to Table 5.

Table 5:  
**Ranking of competencies related to student expectations**

STUDENT EXPECTATIONS	STUDENT EXPECTATIONS														
	Ranking	Commitment	Mastery of the area	Proactivity	Flexibility	Ethics	Communication	Planning	Didactical-pedagogical	Interpersonal relationship	Empathy	Leadership	Systemic view	Creativity	Teamwork
Ranking	+	Highest Rank and Lowest Rank											-		
Commitment	+	=	=	=	=	=	=	=	=	=	=	=	=	=	≠
Mastery of the area		=	=	=	=	=	=	=	=	=	=	=	=	=	≠
Proactivity		=	=	=	=	=	=	=	=	=	=	=	=	=	≠
Flexibility		=	=	=	=	=	=	=	=	=	=	=	=	=	=
Ethics		=	=	=	=	=	=	=	=	=	=	=	=	=	=
Communication		=	=	=	=	=	=	=	=	=	=	=	=	=	=
Planning		=	=	=	=	=	=	=	=	=	=	=	=	=	=
Didactical-pedagogical		=	=	=	=	=	=	=	=	=	=	=	=	=	=
Interpersonal relationship		=	=	=	=	=	=	=	=	=	=	=	=	=	=
Empathy		=	=	=	=	=	=	=	=	=	=	=	=	=	=
Leadership		=	=	=	=	=	=	=	=	=	=	=	=	=	=
Systemic view		=	=	=	=	=	=	=	=	=	=	=	=	=	=
Creativity		=	=	=	=	=	=	=	=	=	=	=	=	=	=
Teamwork	!	≠	≠	≠	=	=	=	=	=	=	=	=	=	=	=

Source: elaborate by the authors.

Differently from the student satisfaction, the expectations show greater similarity among the competencies. In Table 5, only a lower expectation of teamwork is observed when compared to commitment, mastery of the area and proactivity. All other comparisons showed no statistical differences.

### 4.3 Analysis of teacher competencies segregated by class and gender

Segregating the sample into groups, according to the assertions to characterize the respondent per class and gender, the aim was to evaluate the possible existence of statistical difference between the classes and the genders.

Firstly, the Kruskal-Wallis test was applied, separating the sample into four groups, represented by the four classes surveyed. With respect to student satisfaction, the H0 hypothesis was accepted for all competencies, revealing the lack of statistical difference between the classes. The gender sample was also segregated in order to verify the differences, which was not detected either. Thus, it is observed that student satisfaction with the competencies does not vary among classes and genders.

The same application method of the Kruskal-Wallis test for the satisfaction was used in the students' expectations. In the grouping among classes, no statistical differences were detected. With respect to gender, however, some statistical differences were detected, rejecting H0, according to Table 6.

Table 6:

**Comparison student expectations in relation to competencies – segregation per gender**

Dimension	Competency	Result Kruskal-Wallis test - Gender Group	Gender with greatest expectation
Knowledge	Mastery of the area	=	Equal
	Didactical-pedagogical	=	Equal
Skill	Interpersonal relationship	=	Equal
	Teamwork	=	Equal
	Creativity	=	Equal
	Systemic view	≠	Female
	Communication	=	Equal
	Leadership	≠	Female
	Planning	≠	Female
Attitude	Commitment	≠	Female
	Ethics	≠	Female
	Proactivity	≠	Female
	Empathy	≠	Female
	Flexibility	≠	Female

Source: elaborated by the authors.

As shown in Table 6, when expectations differ between the genders, higher expectations have always been found for the female gender, that is, it is probable that women expect more from their teachers. Another relevant factor is that the expectations are not different in the competencies of the knowledge dimension while, in all the competences of the attitude dimension, these diverge, besides the differences in three competencies from the skills dimension.

#### 4.4 Comparison between results obtained and earlier research

The results obtained here were compared with earlier studies. These verifications are related to student satisfaction. The target studies for comparison are Vasconcelos (2009) and Antonelli *et al.* (2012). The comparisons among the results appointed in the studies are displayed in Table 7.

Table 7:

**Comparison between results and studies by Vasconcelos (2009) and Antonelli *et al.* (2012).**

Comparison of means per competency					
Competencies	Questions	Mean Vasconcelos (2009)	Mean Antonelli <i>et. al</i> (2012) (A)	Mean Present Study (B)	Difference (B-A)
Mastery knowledge area	Q01	8.0	6.7	7.6	0.9
Didactical-pedagogical	Q02	7.9	6.1	7.3	1.2
Interpersonal relationship	Q03 and Q04	9.1	6.7	7.9	1.2
Teamwork	Q05	8.2	4.5	5.4	0.9
Creativity	Q06	8.4	4.9	5.7	0.9
Systemic view	Q07 and Q08	8.8	6.0	7.0	1.0
Communication	Q09 and Q10	8.8	5.6	6.7	1.1
Leadership	Q11 and Q12	9.0	5.9	6.9	1.0
Planning	Q13 and Q14 and Q15	9.0	6.1	6.9	0.8
Commitment	Q16 and Q17	9.1	6.1	7.7	1.6
Ethics	Q18 and Q19	9.2	7.5	7.5	0.0
Proactivity	Q20	8.6	5.9	7.2	1.4
Empathy	Q21 and Q22	9.0	5.6	6.5	0.9
Flexibility	Q23 and Q24	9.1	5.6	6.7	1.1
GENERATES		8,7	5.9	6.9	1.0

Source: elaborated by the authors.

It is important to point out that the comparison with the study by Vasconcelos (2009) cannot be carried out completely, due to the fact that the author has applied the instrument to the teachers while, in the present research, it was applied to the students, aiming to capture the teacher / competency relationship. It is observed in the results of the study mentioned that the teachers consider they are more aligned with the competencies, since all the competencies had higher averages when compared to the study by Antonelli *et al.* (2012) and the present study, both applied to students.

In the comparison between the present research and that of Antonelli *et al.* (2012), it is observed that, in all competencies, the student satisfaction in this research obtained higher averages, except for the ethics competency which, in both studies, had an average of 7.5. The major differences between the studies are related to commitment and proactivity. A possible explanation for the divergences detected can be the divergences in the study samples, considering that the present study investigated the students only from the UTFPR - Pato Branco Campus, in all classes of the course, while the previous study questioned the students from the two final years at three federal universities.

In the previous study, students were more satisfied with ethics (7.41) and mastery in the field of knowledge (6.69) and still less satisfied with teamwork (4.48) and creativity (4.85). In the current study, students are more satisfied with the interpersonal relationship (7.91) and mastery in the area of knowledge (7.58) and less satisfied with the same skills as in the previous study, which are teamwork and creativity.

## 5. Conclusion

The objective in this study was to identify the level of satisfaction and expectation of the students in the Accountancy course at UTFPR - Campus Pato Branco in relation to their teachers. Therefore, a questionnaire with objective and closed questions was applied to all the course students in order to evaluate the students' satisfaction and expectations. In addition, questions to characterize the respondents were submitted to the sample.

The survey found that the students expect more from their teachers, as the average for satisfaction is below the average for expectations. As for student satisfaction, it was observed that the interpersonal skills, commitment, mastery of the area, ethics and didactical-pedagogical were the best evaluated, with no statistical difference among them. Among the best evaluated competences, it is observed that the two representative of the dimension "Knowledge" rank among the five most evaluated, which suggests that students are more satisfied with the technical knowledge of their teachers.

Among the competencies with the worst evaluation, communication, flexibility, empathy, creativity and teamwork are considered. This suggests students with less satisfaction in the competencies from the Ability and Attitude dimensions, which can be explained by the lack of didactic-pedagogical preparation of their teachers, given that the vast majority of Accountancy courses do not focus on the preparation of teachers. In this sense, the low satisfaction with the teamwork competency is also reported in the research.

Therefore, according to the results obtained for student satisfaction, better communication with the students is suggested to the teachers, flexibility in some situations, empathy in the sense of the teachers putting themselves in the student's place, stimulating activities / work in groups, and, finally, trying to innovate the classes, using creative activities to arouse the interest of the student in the discipline. These findings are in line with the study by Lima Filho and Bruni (2012), which indicates that teachers of the accounting subjects should make greater efforts to adjust their didactic agendas. In addition, Miranda et al. (2014) conclude on the need to educate the teachers themselves about the importance of their qualification, which is one of the ways in which they can improve their performance in the competencies researched here.

With regard to student expectations, the similarity between them, different from satisfaction, was observed. The only difference detected is in the competency of teamwork, since the students do not expect that much when compared to most other competencies. These similarities can be explained by the high expectation that the students have, in general, in all competencies and dimensions.

In the comparison of satisfaction and expectations among the classes and the genders, all the results were the same, except for the expectations segregated by gender. Some competencies come with higher expectations than others and, for these, women have higher expectations. This information suggests that the female students "charge" their teachers more, because they expect more of them in relation to the competencies needed for teaching.

In summary, the first important implication/conclusion of the results refers to the low divergence between the present study and previous studies. This leads to the conclusion that, even over time, the main problems related to teacher competencies remain. However, the complexity of the teaching activity and the managers' possibilities to change this environment is notorious, but the evidences reaffirmed in this present study indicate the need for many improvements.

The second relevant implication / conclusion of the results suggests the need for teachers to be attentive to competencies with worse levels of satisfaction, such as communication, flexibility, empathy, creativity and teamwork. It is important to remember that teachers need to value these competencies equally to those of knowledge.

The third prominent implication / conclusion refers to the general level of student expectation, which is well above satisfaction, and teachers should be considered this in the planning of their subjects.

The final important implication / conclusion refers to the competencies with lower levels of student satisfaction in the attitudes and abilities dimensions, and not in the knowledge dimension. This conclusion is fundamental for the teacher to visualize that the student values other dimensions than only the knowledge, but also to help the courses and coordinations to consider these additional competencies in their training planning.

It is concluded based on the results obtained in the present research that universities should invest more and more in the teacher competencies, so as to directly influence the quality of the courses offered, with the possibility to train professionals who are better qualified to practice the accounting profession. It is also important that the HEIs reflect with their teachers about the competencies that have obtained low satisfaction levels, so that they can improve them in the future in order to better satisfy their students.

Regarding the limitation of the research, it is important to emphasize the impossibility to generalize the results obtained due to the sampling method used, which was non-probabilistic. For future research, replicating this study for different undergraduate courses and at other universities is suggested. It is also suggested to verify the possible causes and reasons of the results found in order to plan improvements in the course investigated.

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# Theory in the Picture: Video Production as a Tool in Accounting Teaching

## Abstract

Leveraging students' interest and experience in using technology to achieve learning objectives in a course is a challenge for educators. The production of video by students is a teaching-learning method that involves technological resources and requires that the student take an active posture in the learning process. This activity can help in the development of the skills and competences required for accountant training, such as thinking conceptually, relating theory and practice and exercising creativity and leadership. In that sense, the purpose of this research is to analyze the students' perception of the usefulness of video production as a teaching-learning mechanism in the subject Accounting Theory. The study participants were 65 students, enrolled in this discipline in the second semester of 2015 at a public university in Minas Gerais. The results of the research suggest that, in the students' perception, the production of videos made the content of the discipline more interesting, instigated the creativity to use the concepts, besides developing skills such as commitment to the group, organization, planning, dynamism, creativity, proactivity, interpretation and self-learning. It is concluded that the method is timely and its continuity is recommended as didactics in the teaching of Accounting Theory and other contents.

**Key words:** Video production; Accounting Theory; Teaching technology.

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## 1. Introduction

Technology has become a significant element in the university environment (Goode, 2010) and students are immersed in a context of high availability of resources, both inside and outside the classroom. With rapid technological progress, the new generations of students, known as generation Y (born between 1960 and 1980) and generation Z, identified as digital natives (born between 1990 and 2010), are always connected to the internet, making intensive use of resources (Castanha & Castro, 2010). Thus, the challenge for educators in higher education is to leverage students' interest and experience with technology to achieve the learning objectives of a course (Engin, 2014). Therefore, it is necessary to discuss the inclusion of such resources in the teaching-learning process in order to attract students' attention (Castanha & Castro, 2010).

The production of videos by students is a teaching-learning method that involves technological resources and requires that the students take an active posture in the learning process (Engin, 2014). This method allows the student to research and understand the topic, having to simplify the information, summarize, synthesize the relevant parts of a subject - which requires a critical and responsible attitude in learning (Engin, 2014). With this, creating videos enables learners to build and rebuild their learning, helping them to develop creativity and leadership skills; teamwork; communication; critical and conceptual thinking; and relating theory and practice (Silva & Oliveira, 2010, Holtzblatt & Tschakert, 2011, Engin, 2014).

Lessons can be made more dynamic by preparing videos, reducing the number of lectures and allowing students to research and develop activities outside the classroom (Holtzblatt & Tschakert, 2011). For Holtzblatt and Tschakert (2011), this strategy can offer several benefits to the teaching of Accounting, such as: helping students memorize key concepts, linking them to practical experience; improving communication skills and persuasion; favoring greater accommodation of the different learning styles; and increasing student motivation and enthusiasm. For the authors cited, the video preparation strategy reaches the cognitive and emotional levels of the student, strongly impacting the motivation and the affective learning. Video production also has the ability to engage students, stimulate a strong interest in a topic, activate emotional states, and facilitate the absorption and processing of information (Marshall, 2002).

The elaboration of videos is an appropriate strategy for the teaching-learning of both practical and theoretical contents (Sargent, Borthick, & Lederberg, 2011). According to Sargent et al. (2011), such an activity may be useful in reducing students' anxiety about mathematics-related content in the teaching-learning process of accounting, in order to make learning the practical content of accounting easier and more motivating, as well as to develop, in students, the ability to think conceptually and to build a solid conceptual foundation in the learning of Accounting Theory. Thus, from the beginning of the course, in the introductory disciplines of Accounting, conceptual thinking could be developed through the production of videos (Sargent et al., 2011).

Thus, in essentially theoretical disciplines, such as Accounting Theory, the use of video production could make classes more dynamic, interesting and didactic, benefiting students and teachers. In this discipline, compulsory in the course of Accountancy since the publication of Resolution No. 732/1992 (CFC, 1992), concepts, theories, controversies and principles of accounting are presented. On that occasion, the student is instigated to think conceptually and critically, skills that can be developed during the construction of the videos.

In this context, the objective of this research is to analyze the students' perception of the usefulness of video production in the teaching-learning process of the subject Accounting Theory. The students' perception was obtained through a survey carried out with 65 students from the sixth period of the Accountancy course at a public university in Minas Gerais, in the second semester of 2015.

This research is relevant to evaluate the students' perception about the use of video production as a teaching-learning mechanism, being a sign of effectiveness in the approach of theoretical contents of Accounting and to verify if there is an increase in the practical training of the student (such as the development of skills in group work, organization and distribution of tasks). Based on its results, we hope to contribute to the literature by expanding discussions about strategies that produce improvements in accounting learning. In addition, the students' perception of the effectiveness and results of the application of the method may point to an alternative path when skills and competencies need to be developed that are relevant to the training of accounting professionals.

## 2. Literature Review

### 2.1 Technology and teaching of Accounting Theory

People belonging to generations Y and Z have grown up under the influence of technology because they know the innovations and even help other people to use these new technological resources, such as smartphones, tablets, notebooks (Castanha & Castro, 2010). For Castanha and Castro (2010), in relation to the teaching-learning process with teacher-centered educational models, many of these people, mainly generation Y, do not present good results and show apathy in performing the activities suggested by educators. Therefore, when teachers use technology tools the students are familiar with and use on a day-to-day basis, they can get closer to the students, stimulating their interest in the activities carried out in the classroom.

Still from the authors' perspective, the Y generation lives in an immediate world, connected all the time, obtaining the most diverse information it needs from the available technological resources and easy access to the media. Thus, it will not be possible for the educator to disregard technological advances and existing generational changes and disregard differentiated strategies that create a space of communication between student and teacher (Castanha & Castro, 2010).

For Engin (2014), teaching, through the various technological devices, makes the students become active in the learning process, granting them the responsibility for researching part of the content studied. Dahawy, Tooma and Kamel (2005) believe that the use of information technology and communication in the classroom allows students to learn at their own pace, as they will have more time and flexibility to use the material, freedom to take initiative, which will arouse creativity in the learning process. These authors also point out that the use of technology in classrooms enables students to learn to work together.

According to Machado, Vieira and Meirelles (2012), Castanha and Castro (2010) and Silva and Oliveira (2010), the way the teacher plans the lesson and how it happens is what awakens a certain degree of interest in the students, demanding the use of teaching methods based on the technological resources of information and communication and the intention to make education more appropriate to the reality of digital natives.

It is also opportune that teachers combine several teaching methods to attract students, since, according to Neves Júnior and Rocha (2010), no two persons are the same, with different learning styles that deserve the educators' attention. For the authors, the knowledge obtained through the different teaching methods leads the students to take advantage of the learning strategies employed by the teachers, to develop the skills and competences that may be required by the job market in the future.

Machado et al. (2012) believe that the use of technologies within the classroom transforms teaching, often theoretical and decontextualized, into a more dynamic and pleasurable process. Thus, the use of technology in teaching Accounting Theory may be appropriate because it is an essentially theoretical discipline, which may mitigate difficulties in understanding and interpreting accounting procedures and norms, reducing the students' lack of interest, because it is a discipline that requires more attention, concentration and reading (Campos, Machado, & Rech, 2015).

It can be perceived, therefore, that students and teachers can gain from the use of technologies in the teaching-learning process of the discipline Accounting Theory, since this method can arouse the creativity and motivation of students in the development of activities and in studying the course content.

## 2.2 Video production as a teaching-learning strategy

For Leal and Cornachione Júnior (2006), the school is the place where the student can experience and have contact with problems and elaborated questions, awaken critical thinking and learn to be creative. In the Accountancy course, Accounting Theory has the role of instigating students to reflect, seeking to develop critical thinking and encouraging them to expose and confront their ideas with other points of view (Campos et al., 2015).

Silva and Oliveira (2010) believe that the production of videos helps in the development of diversified skills in student training, being a pedagogical tool that produces learning in a meaningful, motivating and dynamic way. For these authors, media resources, especially video, awaken creativity while building multiple learnings in accordance with the students' sensitivity and emotions.

The video production, then, as a teaching-learning tool, furthers the students' in-depth understanding of the course content, awakening critical thinking and the will to explore (Engin, 2014). When approaching a theme through video production, the student will have to learn the content to pass on its knowledge and understanding to those who are watching (Engin, 2014).

In this context, video production is associated with the development of the idea of responsibility assumed by the students, in the collective construction of a product, in which the teacher has the role of mediator in guiding the groups (Pereira & Rezende Filho, 2013). The video production enhances the student's autonomy in the learning process and the teacher helps the students in the interaction with the proposed activity and among the peers (Almeida, 2013).

According to Vargas, Rocha and Freire (2007), although the production of digital videos is related to entertainment and fun, it can be used as a teaching-learning activity with high educational potential. The authors highlight the main educational benefits that can be achieved with this method:

- Improvement of critical thinking: it develops an analytical basis necessary for the student to become more observant and critical about the products of this type of media;
- promotion of expression and communication: the students involved in this activity tend to lose their shame and expand their forms of discussion, that is, to be in a group, the students need to express their opinions and get into the picture to develop the activity;
- fostering of an interdisciplinary vision: the process of producing videos is an activity in which students learn in an interdisciplinary, flexible and practical and not only theoretical way, that is, it causes the student to convey their understanding about the subject, instead of just standing as a passive listener;
- integration of different capacities and intelligences: the production of videos awakens possibilities, such as: linguistic, logical-mathematical, musical, spatial, body-synesthetic, interpersonal and intrapersonal intelligence; and
- boosting of group work: it values social interaction, participation and the initiative of the students, demanding good coexistence among them.

The creation of videos can help in the development of skills and competences required for the exercise of the accounting profession (Holtzblatt & Tschakert, 2011). For Costa, Santana, Brounbeck and Gomes (2016), the most appropriate skills for the training of the accounting professional are: the ability to determine several alternatives for solutions to real problems; interpret scenarios; consolidate various contents of the subject and course and associate them with practice; and develop critical sense and individual accountability for the learning itself. It is noticed that the video production activity can help in the improvement of these skills.

In addition to the skills mentioned, Martin, Evans and Foster (1995) also point out that the method of producing videos requires a greater degree of active participation and concentration than traditional methods, such as the lecture. The production of videos makes the students research the subject, search for bibliographies, understand, simplify, evaluate and select the relevant information, which forces them to leave their comfort zone and take responsibility for their own learning (Engin, 2014). For Engin (2014), the process of researching, collecting and explaining information about a given topic is a fundamental part of knowledge development.

Some skills and competencies can be developed throughout the process of creating videos. Vargas et al. (2007) divide this process into three stages: 1) pre-production, which consists of the preparation, planning and design of the video to be produced; 2) production, which is the filming of the scenes that will compose the video; and 3) post-production, which consists of the finalization of the video, with the editing and the organization of the scenes. Pereira and Rezende Filho (2013) also point out that, in this process, students spontaneously resort to non-mandatory elements, such as music and dramatization, which are part of their culture and make the video more attractive, showing that this activity arouses creativity and enthusiasm in learning.

Almeida (2013), in investigating the production of videos in the classroom, concluded that students, in addition to solving the requirements proposed by the activity, also develop organizational skills, group negotiation and search for solutions to unexpected issues. In this line of thought, Vargas et al. (2007) concluded that the use of video awakens motivation in students; promotes the loss of shyness and increased self-confidence; instigates teamwork and causes students to get out of the routine of passive agents in the teaching-learning process. This assertion is confirmed by Malheiros, Lima and Mariani (2016, p.1088), when referring to the playful function of video as a form of motivation and involvement, considered as a “source of pleasure and the benefit becomes indispensable and motivating for the spectators, being a *conditio sine qua non* for learning to occur.”

Besides the playful function, pointed out by Malheiros et al. (2016), the production of videos also has informative functions (when portraying realities); evaluative (self-assessment results from being able to see how others see it, permitting the identification of addictions, behaviors, expressions and other points of improvement); motivational (possibility of stimulation, sensitization and provocation of the public); and expressive (the video portrays the manifestation of visions, desires and feelings of its authors).

Table 1 presents a summary of the skills and competencies that can be developed through the production of video, according to the literature.

Table 1:

**Skills and competencies that can be developed through video production**

Skills and competencies	Source
Dynamism	Silva and Oliveira (2010)
Autonomy in the learning process	Almeida (2013)
Memorization of key concepts, linking them to the practical experience.	Holtzblatt and Tschakert (2011)
Sharing the learning	Engin (2014)
Understanding of content	Engin (2014)
Communication	Vargas <i>et al.</i> (2007)
Concentration	Martin <i>et al.</i> (1995)
Creativity	Silva and Oliveira (2010), Pereira <i>et al.</i> (2013)
Stimulating strong interest in a topic	Marshall (2002)
Facilitating the absorption and processing of information.	Marshall (2002)
Interaction among peers and group work	Vargas <i>et al.</i> (2007), Almeida (2013)
Interdisciplinarity	Vargas <i>et al.</i> (2007)
Motivation and enthusiasm	Vargas <i>et al.</i> (2007), Silva and Oliveira (2010), Pereira <i>et al.</i> (2013), Malheiros <i>et al.</i> (2016)
Negotiation and leadership	Almeida (2013)
Active participation	Martin <i>et al.</i> (1995), Vargas <i>et al.</i> (2007)
Critical thinking	Vargas <i>et al.</i> (2007), Engin (2014)
Research	Engin (2014)
Accountability for learning, self-learning	Pereira <i>et al.</i> (2013)

Source: elaborated by the authors.

In short, the use of video production can further the expansion of the students' knowledge, turning the teaching-learning process attractive and allowing them to interact more in the classroom, also arousing organization and planning skills.

### 3. Methodological Aspects

The strategy of video production was used as an evaluation activity for two classes that studied the subject Accounting Theory, taught in the sixth period of the Accountancy course at a public university in Minas Gerais during the second semester of 2015. It should be emphasized that the Accountancy course at the university studied takes five years, that is, ten semesters.

To perform the activity called Theory in the Picture, students at the beginning of the semester met in groups of three or four members and chose a topic, among those that would be discussed in the subject Accounting Theory (any subject listed in the menu or course plan) to search and compose a video. During the semester, on specified dates, the groups should deliver the following activities: 1) theme, justification and relevance; 2) bibliographic research and timeline for video development; 3) script; 4) first version; and 5) final version of the video. Each activity was evaluated by the teacher of the discipline and discussed with the groups in two-weekly orientation meetings. Students used their own resources (cell phone, camera, location, editing material, etc.) to develop the videos.

The final video version of each group was presented to both classes during a single session in the college amphitheater. After the groups had handed in the activity and before the grades were distributed, a questionnaire was applied (Attachment A) to collect students' perceptions about the use of this teaching method.

The survey was carried out by means of a questionnaire structured in three parts (Attachment A). In the first part, the profile of the respondents was characterized (Table 2). Sixty-five students participated in the study, 43 (66%) of whom were female and 22 (34%) male; 34 studied fulltime (52%) and 31 (48%) in the evening. Most students (56) were enrolled in the sixth course period, when the subject Accounting Theory is taught. In addition, most students in the sample (78%) were working when they answered the questionnaire. The average age of the students is not statistically different.

Table 2:

**Characteristics of respondents**

Items	Semesters'				Total	
	Sixth	Seventh	Eighth	Others		
Gender	Female	36	3	4	4	43
	% sample	55%	5%	6%	6%	66%
	Male	20	0	1	1	22
	% sample	31%	0%	2%	2%	34%
Period	Fulltime	31	1	2	2	34
	% sample	48%	2%	3%	3%	52%
	Evening	25	2	3	3	31
	% sample	38%	3%	5%	5%	48%
Works	Yes	43	3	4	4	51
	% sample	66%	5%	6%	6%	78%
	No	13	0	1	1	14
	% sample	20%	0%	2%	2%	22%

Source: elaborated by the authors.

The second part of the questionnaire was intended to identify the students' perception about the activity Theory in the Picture (Tables 3 and 4). In the Tables, the 24 questions about the students' perception of the skills and competencies developed in the activity are displayed, as well as about the benefits of video development in the subject. The students attributed scores between one, indicating complete disagreement, and ten for complete agreement with each of the 24 assertions.

Table 3:

**Questions about the perception of the activity Theory in the Picture**

I consider that the development of the Project Theory in the Picture...	Attributes
1. facilitated the understanding of the subject	Understanding
2. made me study more to develop the project	Study
3. furthered the application of the theoretical concepts	Application
4. the activity significantly contributed to my performance in the subject	Performance
5. aroused my interest in the subject	Interest
6. I was able to enhance my knowledge	Knowledge
7. I became more creative after the development of the project	Creativity
8. favored greater interaction among my classmates	Interaction
9. the results of the activity were better because they were developed in group	Group
10. enhanced my teamwork skills	Team
11. improved my communication skills	Communication
12. made me develop my ability to use new technologies	Technology
13. helped me to develop my problem-solving skill	Problems
14. helped me to develop my leadership skills	Leadership
15. helped me to develop my planning skills	Planning
16. I felt motivated and enthusiastic about participating in this activity	Motivation
17. I consider that the project is suitable for the subject	Fitness
18. the method contains obstacles that are hard to overcome.	Difficulty
19. I felt satisfied with the results at the end of the activity.	Satisfaction
20. the method is dynamic.	Dynamism
21. provides for self-learning.	Self-learning
22. How do you rate the use of videos as a teaching-learning strategy?	Use
23. How do you rate the activity Theory in the Picture in the teaching-learning process in the subject Accounting Theory?	Activity
24. Do you recommend the further application of the activity Theory in the Picture in the subject Accounting Theory?	Recommendation

Source: elaborated by the authors.

In Table 4, the two yes-no questions and the three open-ended questions in the questionnaires have been illustrated, aiming to allow the students to describe positive and negative aspects in the development of the activity.

Table 4:

**Yes/no and open-ended questions about the activity Theory in the Picture**

A. If I had the opportunity, would I do this activity again? ( ) YES ( ) NO
B. Were you one of the characters in the video your group made? ( ) YES ( ) NO If yes, do you feel more uninhibited when being filmed or when presenting activities personally in the classroom? Please comment.
C. In your opinion, can the application of the video activity offer other benefits than those presented earlier in the questionnaire?
D. In your opinion, what are the positive points of applying the activity Theory in the Picture in the subject Accounting Theory?
E. This space is yours! You can use it to register your criticism and suggestions to allow us to enhance subsequent versions of this activity.

Source: elaborated by the authors.

The third part of the questionnaire was intended to analyze the students' self-assessment about their performance in the activity Theory in the Picture (Table 5). The students scored their self-assessed performance and participation between one and ten.

Table 5:

**Self-assessment questions about the activity Theory in the Picture**

1. Integration and relationship with the group.
2. Individual extra-class reading.
3. Search for complementary material.
4. Proactivity.
5. Commitment to my responsibilities in the group.
6. Time available for the activity.
7. Use of extra-class attendance to monitors, lecturers and Master's students.
8. The activity granted me a comprehensive view.
9. I participated in the accomplishment of all phases and activities in the project.

Source: elaborated by the authors.

The questionnaire applied in this research was elaborated based on the studies of Martin et al. (1995), Weil, Laswad, Frampton and Radford (1999), Weil, Oyelere, Yeoh and Firer (2001), Silva and Oliveira (2010), Holtzblatt and Tschakert (2011), Almeida (2013), Pereira and Rezende Filho (2013) and Engin (2014). To validate the questionnaire, a pre-test was carried out with five students and three professors from the Accountancy course of the university studied. The suggestions obtained in the pre-test were incorporated into the instrument. For ethical reasons, precautions were taken in order to preserve the image of the respondents, who freely expressed their consent to participate in the survey.

Data analysis involved factor analysis and was performed using the Statistical Package for the Social Sciences (SPSS). Factor analysis "is a multivariate technique that seeks to synthesize the relationships observed between a set of interrelated variables, seeking to identify common factors" (Fávero, Belfiore, Silva & Chan, 2009, p 235). The conduction of the factor analysis requires four steps, according to Fávero et al. (2009): 1) analysis of the correlation matrix and fitness of the factor analysis; 2) initial extraction of factors; 3) factor rotation; and 4) interpretation of factors. In addition, in the application of the factor analysis, the frequency distribution of the variables should be analyzed by means of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO). KMO measures close to 0 indicate that the factor analysis may not be fit, as there is a weak correlation between the variables. On the other hand, the closer the measure is to 1, the better the use of the technique.

## 4. Results

The analysis of the results was divided in three sections, in line with the parts of the questionnaire. First, the perceptions about the efficacy of the method to develop skills and competencies are evidenced, collected by means of closed questions. Next, the advantages and disadvantages of video production are shown and, finally, the students' self-assessment answers about their engagement in the activity are denoted.

#### 4.1 Concerning the contributions of the video production activity

In Table 6, the students' answers are presented for the 24 questions displayed in Table 3 on their perception of the teaching strategy that uses the creation of videos. In the students' perception, the benefits of the activity Theory in the Picture in terms of the personal search for content and knowledge, typical of active learning, rank first (Study) and third (Self-learning). The students' satisfaction with the accomplishment of the activity, indicated as the fifth most important item, and the increased knowledge acquisition (Activity), in the sixth position, reinforce the attributes discussed earlier and attest that the method can be useful to enhance the levels of learning.

Table 6:

##### **Ranking of the perceived benefits of the video production**

Rank	Attributes	Mean	Median	Maximum	Minimum	Mode	Standard Deviation
1	2. Study	7.57	8	10	2	8	2.16
2	20. Dynamism	7.48	8	10	1	10	2.29
3	21. Self-learning	7.43	8	10	1	8	2.28
4	9. Group	7.29	8	10	1	8	2.38
5	19. Satisfaction	7.25	8	10	1	8	2.02
6	23. Activity	7.09	7	10	1	7	1.97
7	22. Use	7.04	7	10	1	8	2.12
8	6. Knowledge	7.03	7	10	1	7	2.3
9	24. Recommendation	6.98	8	10	1	10	2.81
10	10. Team	6.95	8	10	1	8	2.36
11	3. Application	6.94	7	10	2	8	2.26
12	17. Fitness	6.88	7	10	1	5	2.3
13	15. Planning	6.66	7	10	1	8	2.21
14	8. Interaction	6.57	7	10	1	8	2.57
15	11. Communication	6.46	7	10	1	8	2.48
16	1. Understanding	6.44	6	10	1	8	2.51
17	4. Performance	6.35	7	10	1	6	2.37
18	13. Problems	6.12	7	10	1	7	2.43
19	12. Technology	6.11	6,5	10	1	5	2.38
20	14. Leadership	6.11	6	10	1	5	2.42
21	18. Difficulty	6.11	6	10	1	10	2.85
22	7. Creativity	5.85	6	10	1	5	2.31
23	5. Interest	5.83	6	10	1	6	2.53
24	16. Motivation	5.62	6	10	1	5	2.43

Source: elaborated by the authors.

Still about the acquisition of knowledge, the attributes that rank seventh and eighth portray the students' positive perception of the fact that the videos are valuable as a method of learning and an extension of the theoretical scope on the subject studied.

Ranking fourth and tenth on the list of the averages, the students also considered the attributes related to teamwork as positive points since, according to them, there was an improvement in the capacity to learn and create in group (Team). In addition, the fourth position in the ranking highlighted the agreement that the results of the activity were better because it was performed in groups. These results reveal, among other things, that preparing videos is an activity with the potential to improve skills and competencies, expands the possibilities for acquiring knowledge through active learning, and covers the benefits of peer collaboration and knowledge exchange. These findings confirm the studies by Almeida (2013), Engin (2014) and Vargas et al. (2007).

Regarding the application of the method in the subject Accounting Theory, questions 1, 17, 23 and 24 were intended to capture these perceptions. It is observed that the respondents judged the items positively, since the average of the scores assigned to each one of the questions is superior to five. In terms of importance, the highest averages were attributed to: a) contributes to the improvement in the teaching-learning process of the subject Accounting Theory (question 23 / sixth position); B) it is recommended that the method continues to be used in the subject Accounting Theory (question 24 / ninth position); C) the method is appropriate to the discipline Accounting Theory (question 17 / twelfth position); and d) facilitates the understanding of the discipline (question 1 / sixteenth position).

According to the students' opinion, the production of videos, even if it has scored averages superior to five, is less useful to arouse interest in the subject (question 5 / twenty-third) and, ranking last in terms of importance, it motivated them to participate in the activity (question 16 / twenty-fourth position). It is noteworthy that question number 18 (Difficulty) also presented an average superior to five (6.11), which suggests that the students realized that the method had obstacles difficult to overcome.

Thus, it is observed that the activity is an appropriate option, according to the students, to be used as teaching method in theoretical subjects, because it facilitates the understanding in a fun and creative way, causing the student to deepen the studies on the subject to better convey it to his classmates, also being responsible for his own learning. These results are in line with the research by Campos et al. (2015) and Machado et al. (2012), which asserted that, because it contains a high theoretical load, the subject Accounting Theory is fertile ground for the application of methods that make classes more dynamic and light. Still about the acquisition of knowledge, the attributes that rank seventh and eighth portray the students' positive perception of the fact that the videos are valuable as a method of learning and an extension of the theoretical scope on the subject studied.

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Similarly, the activity serves for the students to interact with each other, to exchange ideas and experiences obtained in the development of the project, and to reinforce the planning and teamwork skills, because it is necessary to plan and organize the development phases of the theme, -production, filming, editing and presentation of the video, confirming the study by Vargas et al. (2007).

Although all subjects registered average scores higher than 5, those that had the highest repetition of grade 5 (Mode) were: the students became more creative after the development of the project (7. Creativity); the activity made it possible to develop the capacity to use new technologies (12. Technology); helped to develop leadership skills (14. Leadership); provoked enthusiasm in participating in the activity (16. Motivation); and considered that the project is fit for the discipline (17. Fitness). As for the question about the development of the capacity to use new technologies, the ranking can be justified by the fact that the average age of most respondents in the sample is 21 years. They belong to generation Z, also known as digital natives, who already make intensive use of technological resources (Castanha & Castro, 2010) and, therefore, this does not represent the development of a new ability.

Aspects of commitment, good relationship with the group, and solving unexpected problems corroborate Holtzblatt and Tschakert's (2011) studies, which have identified that, in order to produce videos, the student has to interact with others and work as a team in order to be successful. Almeida (2013) also noted that, when students create videos, they are developing reading, organizing, group negotiation skills and finding solutions to unexpected issues.

The aspects of responsibility to participate in the accomplishment of the work; search for complementary material and responsibility for self-learning coincide with the findings by Engin (2014), who noted that students were concerned about the search for materials with a view to the accuracy of the content presented. Pereira and Rezende Filho (2013) also identified an increase in student responsibility for the video production; and Silva and Oliveira (2010) corroborate the evidence that, by participating in all stages of the work, students construct and recreate their own knowledge. In addition, Martin et al. (1995) similarly observed that the use of the activity encourages students to take control of their learning.

By analyzing the data in descriptive terms, we tried, through the technique of factor analysis, to examine if there were dimensions underlying the variables that could be synthesized, in order to summarize the information contained therein, furthering the understanding and depth of the data analysis in the sample. The first step in conducting the factor analysis was to verify if the use of this technique is appropriate, using the KMO and Bartlett's tests. The KMO of 0.823 makes it reasonable to apply the factor analysis. The level of significance of Bartlett's test (Chi-square 53.165; p-value = 0.000) shows that there are correlations between the variables, which confirms the usefulness of this analysis.

The next step is the extraction of factors from the correlation matrix, in order to find a set of factors that constitute a linear combination of the variables in the correlation matrix. Thus, highly correlated variables will be combined to constitute a factor with the other variables in the correlation matrix. In Table 7, the main components and eigenvalues are extracted for each factor and the respective variance percentages are explained.

Table 7:

**Extraction of the factors**

Factor	Eigenvalues	% Variance	Accumulated Eigenvalues	% Accumulated Variance
1	11.511	47.962	11.511	47.962
2	2.189	9.121	13.700	57.084
3	1.644	6.852	15.345	63.936
4	1.244	5.183	16.588	69.118
5	1.166	4.858	17.754	73.976
6	0.871	3.631	18.625	77.606
7	0.712	2.967	19.338	80.573
8	0.585	2.438	19.923	83.011
9	0.566	2.358	20.489	85.369
10	0.540	2.252	21.029	87.621
11	0.485	2.022	21.514	89.642
12	0.477	1.988	21.991	91.630
13	0.356	1.484	22.347	93.114
14	0.291	1.214	22.639	94.328
15	0.251	1.045	22.890	95.373
16	0.240	1.002	23.130	96.374
17	0.206	0.858	23.336	97.232
18	0.179	0.746	23.515	97.978
19	0.120	0.499	23.635	98.477
20	0.097	0.405	23.732	98.883
21	0.087	0.361	23.819	99.244
22	0.081	0.336	23.899	99.580
23	0.060	0.249	23.959	99.829
24	0.041	0.171	24.000	100.000

Source: elaborated by the authors.

According to the rule to retain factors with eigenvalues superior to 1 (Fávero *et al.*, 2009), four factors were retained. Examining the eigenvalues, five factors are found with eigenvalues superior to 1, which are able to explain 73.976% of the variance in the original data. The first factor explains 47.962% of the data and the remainder 9.121%, 6.852%, 5.183% and 4.858%, respectively. The final factor analysis is displayed in Table 8.

Table 8:

**Matrix of factors after the rotation**

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Understanding		0.783			
Study		0.814			
Application		0.814			
Performance		0.831			
Interest		0.668			
Knowledge		0.688			
Creativity	0.538				
Interaction				0.768	
Group				0.633	
Team				0.674	
Communication	0.646				
Technology					0.489
Problems	0.653				
Leadership	0.835				
Planning	0.753				
Motivation	0.763				
Fitness			0.813		
Difficulty					0.876
Satisfaction				0.514	
Dynamism			0.619		
Self-learning				0.511	
Use			0.533		
Activity			0.743		
Recommendation			0.858		

Source: elaborated by the authors.

The results obtained through the application of the Factor Analysis technique, using the normalized varimax criterion, as observed in Table 8, showed, in the first factor, the following variables: Creativity (0.538); Communication (0.646); Problems (0.653); Leadership (0.835); Planning (0.753); and Motivation (0.763). The nature of these variables would lead one to infer that the first factor would refer mainly to relational and emotional skills. It should be noted that this factor is considered the most relevant, since it corresponds to 47.962% of the total data variance (Table 7).

The second factor revealed the following variables: Understanding (0.783); Study (0.814); Application (0.814); Performance (0.831); Interest (0.668); and Knowledge (0.688). The variables seem to be associated with the learning and practical application of the content learned. The third factor highlighted the following variables: Adequacy (0.813); Dynamism (0.619); Use (0.533); Activity (0.743); and Recommendation (0.858). The essence of these variables suggests that the third factor is related to the benefits of the discipline Accounting Theory.

The variables evidenced in the fourth factor are: Interaction (0.768); Group (0.633); Team (0.674); Satisfaction (0.514); and Self-learning (0.511). These variables are linked to collaborative learning and interpersonal relationships. In the fifth factor, the variables were: Technology (0.489); and Difficulty (0.876). The nature of these variables leads one to infer that the fifth factor is linked to what has contributed little in terms of skills or what has generated discomfort.

## 4.2 Analysis of yes/no and open-ended questions

In Table 9, the students' answers are presented for the two yes/no questions C and D, as to whether students would do the activity again and if they were characters in the videos developed, respectively. For those who participated in the staging of the video, they were also asked whether they felt more uninhibited being filmed or presenting work personally in the classroom.

It is observed that, in the evening class, there were more students who participated as characters than in the fulltime class. Regarding gender, 74% (23) of those who participated were girls and 26% (8) boys. The sample contained 43 girls and 22 boys though, based on which it can be assumed that girls are more enthusiastic about participating in activities like this than boys, who tend to be more timid. Of the students who were characters in the video, 81% work.

When asked if they would do the activity again, 31 students answered yes, 48% (15) from the fulltime group and 52% (16) from the evening group; and 65% of those students who would do the activity again are female and 35% male, reinforcing the idea that girls prefer such activities more than boys. It can be inferred that, when students participate actively in the video produced, having the opportunity to use the abilities aroused in the development of the activity, they perceive the positive effects and would therefore seize other opportunities to repeat tasks like this.

Table 9:

### Relation between role in the video and interest in the activity

Characteristics of respondents	Were you a character in the video?				Would you repeat the activity?				
	Yes	%	No	%	Yes	%	No	%	
Period	Fulltime	11	35%	23	68%	15	48%	19	56%
	Evening	20	65%	11	32%	16	52%	15	44%
	Total	31	100%	34	100%	31	100%	34	100%
Gender	Female	23	74%	20	59%	20	65%	23	68%
	Male	8	26%	14	41%	11	35%	11	32%
	Total	31	100%	34	100%	31	100%	34	100%
Works	Yes	25	81%	26	76%	25	81%	26	84%
	No	6	19%	8	24%	6	19%	8	26%
	Total	31	100%	34	100%	31	100%	34	100%

Source: elaborated by the authors.

Table 10 shows the students' perception of the skills and competencies based on yes/no questions, in order to verify if the students who acted in the videos and recommend the reapplication of the activity score the questions in the first part of the questionnaire higher.

For all items analyzed, it is evident that those who participated as a character reveal a more positive view of the benefits of the method, and even those students who would feel comfortable performing a similar task again scored the attributes of the 24 questions higher. Thus, it is assumed that, the greater the degree of involvement in the activity, the greater the perception of benefits derived from it, and the greater the openness of interest in a new participation, like a vicious circle of active learning: the more involved, the more one learns.

Moreover, the results also indicate that the students who participated actively in the project and who would like to repeat this method attributed higher scores by recommending the continued application of the Theory in the Picture activity in the discipline Accounting Theory (24. Recommendation) and believe that it is appropriate to use video production as a teaching-learning strategy (22. Use).

Table 10:

**Mean scores for active participation and willingness to repeat the activity**

Abbreviation	Would you repeat the activity?		Were you a character in the video?	
	Yes	No	Yes	No
Understanding	6.97	5.97	6.67	6.24
Study	7.65	7.50	7.81	7.35
Application	7.45	6.47	7.58	6.35
Performance	7.03	5.74	6.94	5.82
Interest	7.23	4.56	6.65	5.09
Knowledge	7.55	6.56	7.39	6.71
Creativity	6.48	5.26	6.23	5.50
Interaction	6.87	6.29	7.32	5.88
Group	7.71	6.91	7.94	6.71
Team	7.45	6.50	7.77	6.21
Communication	7.19	5.79	7.32	5.68
Technology	6.55	5.70	6.43	5.82
Problems	6.58	5.71	6.55	5.74
Leadership	6.94	5.35	6.68	5.59
Planning	7.52	5.88	7.35	6.03
Motivation	6.90	4.44	6.35	4.94
Fitness	7.90	5.94	7.19	6.59
Difficulty	5.77	6.41	6.26	5.97
Satisfaction	7.61	6.91	7.90	6.65
Dynamism	7.97	7.03	8.00	7.00
Self-learning	8.03	6.88	7.77	7.12
Utilization	8.30	5.94	7.30	6.82
Activity	8.07	6.24	7.47	6.76
Recommendation	8.30	5.82	7.50	6.53

Source: elaborated by the authors.

Analyzing the second part of the questionnaire, in the open-ended question D, we asked the students who participated as characters in the video if they felt more uninhibited being filmed or when presenting works personally in the classroom. It can be noticed that 35 of them answered this question, being that: 40% (14 students) prefer the video method; 32% (11 students) prefer to present work in person in the classroom; 11% do not care about the choice of the method, since they do not experience difficulty in presenting themselves; and 17% (6 students) prefer not to present themselves because they are shy.

Some students reported that they prefer the video production method because they have the option to redo the recording and correct errors, read the script again, and edit as many times as necessary. One of the students stated: "I have no particular difficulty to present in the classroom. But I prefer filming. If you make a mistake, stutter, you can do it again. The nervousness is less." Another student commented: "I prefer to be filmed because it has no audience at the time of the recording." Hence, it is observed that the video activity can be corrected before being submitted for presentation and evaluation, and allows the students to read and reread the script as many times as necessary before recording, as they will need to master what they are talking about when acting in the videos.

This activity also favors those students with greater difficulties to speak in public in person because, when recording a video, the students feel more at ease as, at the time of the recording, they are not standing in front of many people. On the other hand, there are students who do not feel comfortable being filmed, preferring the presentation in the classroom, like in the following reports: “I prefer personal presentations, video does not make me feel at ease.” Also, expressions like “it takes a lot of work to make videos”, “I do not feel comfortable in front of a camera”, and “I do not feel good seeing myself on video and listening to my recorded voice.”

There are students whose degree of shyness does not allow them to feel calm about any of the methods, as observed in the narratives: “Neither situation. I panic about presenting anyway “and” I do not feel uninhibited being filmed, much less presenting myself personally, out of shame of being mistaken or stammering. “ For those very shy students, whatever method of public presentation represents a big challenge.

There are, moreover, students with no restrictions for public appearances, which usually occurs with extroverted people who find it easy to communicate in public, as two students report: “I have no difficulties in presenting in the classroom, so there was no difference” and “Regardless of the occasion, I do not see problems in presenting.”

In question G, shown in Table 3, it was asked if the students recommend that the activity continues to be applied in the subject Accounting Theory, assigning a score from one to ten, as shown in Table 3 (24. Recommendation), and, if no, a justification was requested for the answer. It was verified that the greatest restrictions regarding the development of the activity are related to the difficulty of physical locomotion for the group meetings, required to develop the activity. This may be related to the fact that most of the students who completed the questionnaire worked and / or studied in the evening.

The open-ended question H, presented in Table 4, asks the student to discuss other benefits that can be achieved through video production, in addition to those previously mentioned in the questionnaire. The main comments were: “other benefits would be greater interaction with the class” and others further reinforced the idea of creativity, discussed by Leal and Cornachione Júnior (2006), according to the report: “In my opinion, the main benefit is to use the imagination to apply the concepts (...) “, and, moreover:” ... another positive point is the exercise of creativity and the use of technology to develop the activity.”

Another participant also highlights the benefits: “Creativity, group work and for those who are shy, it helps with the ‘disinhibition’”. Other advantages were also highlighted, such as: “we learned how to plan, divide tasks, and study more for the presentation.” It is emphasized, then, that the most mentioned benefits in this question are related to creativity and teamwork, since this activity requires that the students use the imagination to create a different and attractive project about the concepts of the discipline, and greater interaction in the group, so that everything goes as planned. This playful side, the possibility of expression and motivation, presented in the reports collected in question H, are corroborated by the findings of Malheiros et al. (2016).

In question I, Table 4, the students were asked about the positive points of applying the Theory in the Picture activity in the discipline Accounting Theory. It could be verified that the positive points the students appreciated most were related to self-learning; Strategic planning of the group; development of creativity and oratory; interaction in the team; dynamism of the activity; highlights in the video; which remind you of the subject discussed more easily; and knowledge exchange. These points can be exemplified through the narratives “make self-learning happen with field research,” and “For the application of the subject it can be positive, because students must necessarily research, read and study for the presentation.” These reports reinforce the findings by Engin (2014) that the video production activity provides self-learning and prompts students to seek their own understanding of the topic.

The students also accentuated, as beneficial factors, didactic-methodological innovation: “it is a different work than we are accustomed to do” and “it is a different way of learning, better than theory, slides, etc.” Another important point was observed in relation to the volume of theoretical content in the subject Accountancy Theory, in which the students believe that the Theory in the Picture activity helps in understanding the discipline and facilitates the understanding of the contents, converging with the views by Campos et al. (2015) and Machado et al. (2012) that very theoretical content needs to be approached in a less tiring and more motivating way.

This idea is also reinforced in the students' statements: "Dynamic method of learning, because it is a very theoretical discipline, the application of the activity facilitates the understanding and fixation of the content", and another, in turn, quotes: "The fact that this subject is very theoretical, is addressed in the form of video work, is interesting to draw more attention from the students to the content of the subject"; also emphasizing the didactic functions of the method highlighted by Malheiros et al. (2016).

In the final open-ended question J, illustrated in Table 4, students were asked to record their criticisms and suggestions for subsequent versions of the activity. The criticism most quoted by all students was related to the choice of groups, which happened by drawing lots. It is noticeable that the students did not like the strategy of choosing the groups in statements like: "The biggest problem was the group being chosen by the teacher" and "It could be better if we could choose the group itself".

It is noticed that the students would feel more comfortable if they could choose their own group because, certainly, they would choose people whom they have more intimacy and affinity with. This fact may point to a limitation of living together or working as a team with people outside the community, a difficulty that usually occurs in professional life. Thus, the production of activities of this type in the undergraduate program can anticipate the entrepreneurial market scenario of socializing and carrying out activities with whom one does not have affinity. Nonetheless, other students argued that the teacher's choice of groups instigated interactivity among those with whom they did not have much contact, and this increased their commitment to the group, so that there was no disagreement.

It is concluded, through the students' statements and the abilities aroused during the activity, that this method is beneficial both for the discipline Accounting Theory and for the students' experience with active learning, teamwork, organization, leadership and creativity mechanisms.

### 4.3 Self-assessment

In Table 11, the students' answers to the nine self-assessment questions have been illustrated.

Table 11:

**Students' self-assessment in the performance of the activity**

Question	Mean	Median	Maximum	Minimum	Mode	Standard Deviation
Relationship with the group	7.91	8	10	1	10	2.08
Individual Extra-class reading	7.55	8	10	1	8	2.23
Search for Complementary Material	7.64	8	10	1	8	2.10
Proactivity	7.86	8	10	3	8	1.62
Commitment to the group	9.05	10	10	3	10	1.35
Time for the activity	6.83	7	10	2	7	2.01
Advice for monitors, teachers and Master's students	4.08	4	10	1	1	2.94
Comprehensive view in the activity	7.22	8	10	1	8	2.39
Participation in the development of the task	8.97	10	10	1	10	1.75

Source: elaborated by the author.

In the students' self-assessment, the performance related to the commitment to the group, the involvement in the accomplishment of all the stages and activities of the work and the relationship with the team occupy the first three positions. This reinforces the evidence that the production of videos made the students interact more with their classmates and dedicate themselves to the task.

Because it is an activity in which the students are going to explain content, it is necessary that they search for materials related to the topic addressed and study to pass on their knowledge to the class. In this sense, it is observed that they also engaged in individual extraclass reading and the search for complementary materials.

It is also noticed that there was proactivity, that is, the students had to work hard to solve unexpected problems. In addition, they devoted themselves to staying within the activity, as a whole, participating in the stages developed, and spent time to perform the task. It can be seen from Table 11 that the students did not make much use of the extra-class attendance with monitors, teachers and Master's students (question 7), because the average score was 4.08 and the most repeated score (mode) was 1 (one).

## 5. Final Considerations

The general objective of the study was to analyze students' perception of the usefulness of video production in the teaching-learning process of the subject Accounting Theory. Sixty-five students from two classes attending the sixth period participated in the study in the second semester of 2015.

The results allowed us to suppose that the students liked to carry out the activity and that it has great value as a teaching-learning mechanism because, when they create videos, students exercise and develop reading, interactivity; group organization and self-learning skills; seek solutions to unexpected issues; different forms of content exposure; improve oratory and the ability to develop planning and leadership; and dedicate themselves to the project. Therefore, 72% of students recommend that the activity continues to be offered in the subject Accounting Theory.

The discipline Accounting Theory is essentially theoretical, and the Theory in the Picture activity has made students leave their routine as passive agents and explore content by themselves, exercising active learning, which arouses creativity and excitement, making them use their imagination to explain the content in the format of newspaper and theater presented through the videos. The activity is methodologically different from the traditional teaching format, which engages students in researching new ideas and the responsibility for designing a project.

The size of the sample does not permit generalization of the results. Nevertheless, we hope that the results of this research may serve as a stimulus for other teachers to be encouraged to innovate in their teaching-learning processes, through the strategy of video production by students.

This research contributes to students by showing that, when they are deeply involved in processes of promoting learning through active methods, greater gains are perceived than those obtained in traditional teaching methods, based on lectures, such as: greater interaction among peers; Improvement of oral communication; Organization, planning and leadership; and creativity and responsibility for learning itself. In addition, the production of videos facilitates the absorption and learning of theoretical content, in a light and relaxed way.

For teachers, the benefits are linked to the fact that, by applying student-centered teaching-learning mechanisms, levels of involvement with the discipline and content are achieved that sometimes not achieved with those centered on the teacher. In addition, the strategy can also be used in other disciplines.

Teaching institutions take advantage of the results of this research by noting that changes are needed in the training process, which currently focuses on the teacher, shifting it to the student, which has revealed clearly positive consequences. Also, for effective changes to take place in educational processes, basically, structural changes, teacher training and technology investments are needed.

For future research, it is suggested to enlarge the sample, as well as to verify the opinion of the teachers about this method. Similarly, it would be appropriate to investigate whether the production of videos helps in the training of future distance education professionals.

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## Attachment A – Evaluation Questionnaire – Theory in the Picture

This questionnaire is intended to identify the students' perception on the project Theory in the Picture. The answers provided are confidential and has didactical qualification purposes. It also serves to assess its efficacy as a teaching tool. In addition, it permits verifying whether the learning goals of the activity were achieved.

Please do not leave any question unanswered. Your opinion is very important.

Thank you for your cooperation!

CHARACTERISTICS OF THE RESPONDENT

Name: \_\_\_\_\_

Age: \_\_\_\_\_ (in years) Regular Course Term: \_\_\_\_\_

Period: ( ) Fulltime ( ) Evening Gender: ( ) Female ( ) Male

Marital Status: ( ) Single ( ) Married ( ) Widowed ( ) Separated

Works: ( ) Yes ( ) No

Are you taking the subject Accounting Theory for the first time? ( ) Yes ( ) No

### THEORY IN THE PICTURE

The following questions refer to how you perceive the activity Theory in the Picture developed in the subject Accounting Theory. The objective in this questionnaire is to assess your opinion on the utility of using videos as a teaching-learning method.

Score your level of agreement with each of the questions below from 1 to 10, with 1 indicating: complete DISAGREEMENT and 10: complete AGREEMENT with each question.

I consider that the development of the Project Theory in the Picture ...	Score 1 to 10
facilitated the understanding of the subject	
made me study more to develop the project	
furthered the application of the theoretical concepts	
the activity significantly contributed to my performance in the subject	
aroused my interest in the subject	
I was able to enhance my knowledge	
I became more creative after the development of the project	
avored greater interaction among my classmates	
the results of the activity were better because they were developed in group	
enhanced my teamwork skills	
improved my communication skills	
made me develop my ability to use new technologies	
helped me to develop my problem-solving skill	
helped me to develop my leadership skills	
helped me to develop my planning skills	
I felt motivated and enthusiastic about participating in this activity	
I consider that the project is suitable for the subject	
the method contains obstacles that are hard to overcome	
I felt satisfied with the results at the end of the activity	
the method is dynamic	
provides for self-learning	

If I had the opportunity, would I do this activity again? ( ) YES ( ) NO

Were you one of the characters in the video your group made? ( ) YES ( ) NO

If yes, do you feel more uninhibited when being filmed or when presenting activities personally in the classroom? Please comment.

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How do you rate the use of videos as a teaching-learning strategy?  
(score between 1 and 10)

How do you rate the activity Theory in the Picture in the teaching-learning process in the subject Accounting Theory?  
(score between 1 and 10)

Do you recommend the further application of the activity Theory in the Picture in the subject Accounting Theory?  
(score between 1 and 10)

If no, justify your answer:

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In your opinion, can the application of the video activity offer other benefits than those presented earlier in the questionnaire?

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In your opinion, what are the positive points of applying the activity Theory in the Picture in the subject Accounting Theory?

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This space is yours! You can use it to register your criticism and suggestions to allow us to enhance subsequent versions of this activity.

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Self-assess, scoring your performance on the following items between 1 and 10. These answers will contribute to reveal the relations between the tools used and their actual contribution to the students' performance.

Item for self-assessment	Score between 1 and 10
Integration and relationship with the group	
Individual extra-class reading	
Search for complementary material	
Proactivity	
Commitment to my responsibilities in the group	
Time available for the activity	
Use of extra-class attendance to monitors, lecturers and Master's students	
The activity granted me a comprehensive view	
I participated in the accomplishment of all phases and activities in the project	

# Determinants of Republications in the Brazilian Market: An Analysis based on Earnings Management Incentives

## Abstract

The republication of the financial statements is considered a proxy for the quality of the accounting information, according to the literature on the subject (Dechow, Ge and Schrand, 2010). Therefore, the objective of this study was to analyze the relationship between the Hypotheses of Earnings Management and the Republications of the Financial Statements. The descriptive, documentary and quantitative research analyzed data from 344 companies listed on BM & FBOVESPA from 1998 to 2014. The analysis was performed through panel data regression, testing the hypotheses that the Compensation Package of the managers, the Level of Indebtedness and the Size of the company affect the Republication of the Financial Statements. It was observed that the size, growth of assets, being audited by a Big4 and the adoption of IFRS had a positive and statistically significant effect on the probability of republishing the statements. On the other hand, the adoption of SOX, NivGov has negative and statistically significant effects.

**Key Words:** Earnings Management; Republication; Corporate Governance.

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## 1. Introduction

Financial decisions made by external users are rigorously made based on the information available in the market, including the financial statements (Chalmers, Clinch, & Godfrey, 2011). In this sense, they expect that the information released periodically by the companies will be reliable, free of errors and biases (Mackenzie, Coetsee, Njikizana, Chambobo, Colyvas & Hanekom, 2013).

The case is that different aspects can negatively affect the appropriate measuring, recognition and disclosure of financial information, such as individual characteristics (Jensen & Meckling, 1994), the flexibility of accounting standards (Watts, 1992) and cognitive failures (Chen & Chih, 2005). In the field of finance, this debate is recurrent, as they refer to the agency problems and require a governance structure to mitigate them.

According to Brickley and Zimmerman (2010), corporate governance refers to any mechanism used to monitor and align managers' interests with those of shareholders. Not every governance mechanism is appropriate though, as it may imply an effective agency cost, without the actual expected benefit. This adverse effect was also one of the arguments used by opponents of the enactment of the Sarbanes-Oxley Act (SOX), a North American law that forced companies trading on the New York Exchange Commission (NYSE) to implement more robust and effective internal control systems, mitigating the possibility of frauds like what happened at Enron (Iliev, 2010).

In recent years, there has been an effort by the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) to develop a set of high-quality accounting standards in order to increase the relevance and quality of accounting information (Dechow & Schrand, 2004). This has implied a process of convergence and harmonization of standards that, in Brazil, culminated in the adoption of the International Financial Reporting Standards (IFRS) (Martins, 2012). These actions may not necessarily imply significant improvements in the quality of information, however, since cultural, educational and legal aspects may result in different interpretations and non-homogeneous practices (Ball, 2006).

Despite the adoption of standards such as SOX and IFRS, their real effects are not known in terms of improving the quality of accounting information (Marques, 2016). First, because these standards are relatively recent; second, because the quality of financial information is a broad and operationally complex construct to measure (Francis, Olsson, & Schipper, 2006); third, because different measures exist to assess the financial information quality and the effect of the adoption has not been assessed for each of these measures (Dechow, Ge, & Schrand, 2010).

The literature on the quality of financial information prioritizes the evaluation of earnings management, persistence of profits, conservatism and value relevance (DeFond, 2010). Therefore, studies on the republication of statements have been neglected or have been marginalized in research on the subject, even though they are considered as indicative of prior earnings management and have shown growth in recent decades (Huber & Bochner, 2012).

Republications consist of the re-elaboration and disclosure of financial information when material error or omission is identified after disclosure and publicity (He & Chiang, 2013). According to Dechow, Ge and Schrand (2010), one of the ways to evaluate the quality of financial statements is that it indicates the existence of intentional manipulation of accounting earnings.

Earnings management can derive from several incentives, being studied based on three main hypotheses, namely: (i) opportunism of agents, (ii) level of indebtedness and (iii) political costs (Martinez, 2001). Agent opportunism refers to the possibility for managers to manipulate accounting information in order to maximize their current or future compensation package (Healy, 1985). On the other hand, the hypothesis of the level of indebtedness considers that the managers can manipulate the accounting information in order to comply with debt covenants/leading agreements and also reduce the perceived risk of the company (Dhaliwal, 1985).

Finally, the Political Costs refer to earnings management in order not to draw attention to the unions, regulators, competitors, etc. (Watts & Zimmermann, 1978; Jones, 1991, Key, 1997). Given this context, the present study sought to answer the following question: what is the relationship between republication of financial statements and incentives towards earnings management? Thus, the objective of this study was to verify if the manager remuneration package, the level of indebtedness and the size of the company affect the republication of the financial statements, one of the quality proxies of the accounting information. Additionally, the effect of the regulatory and regulatory environment on republication was observed.

Studies of this nature are justified by the need to understand the determinants of republication and if this proxy of financial information quality is influenced by variables that operationalize the hypotheses that motivate earnings management (Shelton, Owen-Jackson, & Robinson, 2011). In addition, the adoption of SOX and IFRS had the objective of mitigating agency conflicts and improving the quality of financial information. The study sought to contribute to the literature in Accounting and Finance, presenting empirical evidence on the determinants of republication of financial statements and the effect of the regulatory environment. Among the expected empirical implications, we highlight signaling to regulators and market participants about the possible variables that affect the probability of republishing the statements, making it possible to establish monitoring policies that consider this information.

The descriptive, documental and quantitative research used a sample of 344 companies through regression analysis with panel data to reach the objective. The results showed that the size and growth of the assets increase the likelihood of chances of republishing the financial statements. Likewise, the adoption of the IFRS and the fact that the company is audited by the Big4 increases the odds of being republished. Among the variables that reduce this probability of republication, we highlight the Return on Assets (ROA) and the Compensation of the Directors.

The article is divided into five sections, including this introduction. In section two, the main theoretical supports for the development of hypotheses and discussion on the theme are presented. In section three, we present the methodological procedures adopted, highlighting the models, operation of variables and tests used in the study. In section four, the results are recorded and discussed in the light of the theoretical framework. Finally, in section five, the final considerations, limitations of the study and suggestions for future research are presented.

## 2. Theoretical Framework

### 2.1 Agency Theory and Governance principles

According to Jensen and Meckling (1976), the main objective of the managers hired by the shareholders is the maximization of company value because, as a result of the separation between ownership and control, the main shareholders outsource the management with the expectation that agents (managers) will seek to achieve the previously defined goals. Some problems are inherent in the process though. First, agents are self-optimizing, evaluating, creative and have unlimited desires (Jensen & Meckling, 1994). Second, because contracts are incomplete and cannot totally eliminate moral hazard, agents can use these contractual imperfections to maximize their own well-being, generating the risk of adverse selection (Aghion & Holden (2011).

Therefore, the firm, as a nexus of contracts, uses several instruments to reduce moral hazard and behavioral anomalies that potentiate adverse selection (agency problems). Lambert (2001) emphasizes that agents will tend to prioritize their interests to (1) reduce the work effort, (2) divert resources for use or consumption, (3) protect their reputation and its effect on the future pay package and (4) mitigate the risk.

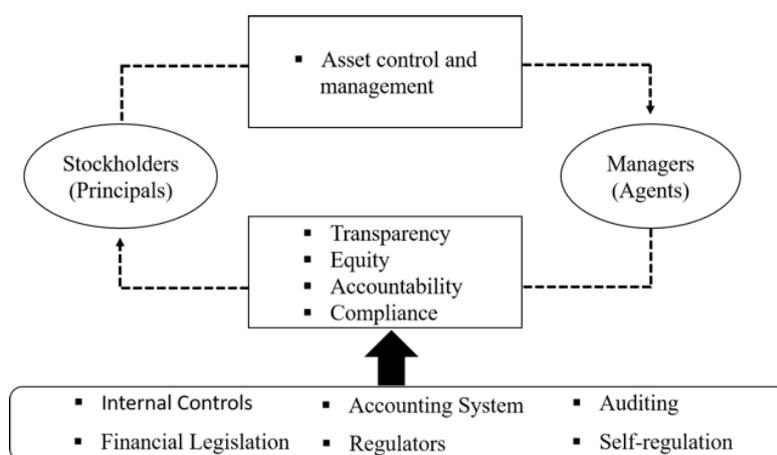
Evidence that agency problems are part of the business environment is numerous (Di Pietra, McLeay, & Ronen, 2014). Young & Peng (2013) noted that in the period from 1995 to 2009, revenue fraud and fictitious transaction recognition were the main reasons for Accounting & Auditing, Enforcement Releases (AEER). (2015) Lisic, Silveri, Song and Wang (2015) complement that, in view of the imminent risk of agency problems, regulatory and institutional environments play an important role.

In this scenario, since the 1980s, the debate about corporate governance has intensified, because the recurrence of cases of accounting fraud and the greater connection between the financial and capital markets have given rise to a global concern that has led to: (i) greater concern of economic agents with the regulatory environment they operate in; (ii) the enactment of standards that assigned greater responsibility to managers through the internal control system; (iii) enactment of standards that protect investors (mainly non-controlling shareholders); (iv) establishment of minimum standards of governance accepted by accession; and (v) improved accounting standards (Ball, 2006; Brickley & Zimmerman, 2010; Dechow, Ge, & Schrand, 2010; Di Pietra, McLeay, & Ronen, 2014).

As shown in Figure 1, in summary, all these efforts are based on the principles of Corporate Governance. Corporate governance is understood to be any internal and external mechanism that aims to align interests between agents and principals and mitigate agency problems (Armstrong, Guay, & Weber, 2010). The agent (manager), assuming the management of resources on behalf of the principals, is obliged to render accountability in a transparent and equitable manner, in accordance with the standards and laws in force (Brown & Caylor, 2009; Yoo & Jung, 2015).

The Brazilian Securities and Exchange Commission (CVM) suggests an ideal Corporate Governance Structure (EGC) (Comissão de Valores Mobiliários, 2016). As can be seen in Figure 1, there are several specific mechanisms, such as: (1) internal controls, (2) accounting system, (3) auditing, (4) corporate legislation, (5) regulators, and (6) self-regulation. Internal controls are manuals and rules of procedures that seek to minimize the risk of expropriation and / or inefficiency in the process of carrying out the activities.

According to Ronen (2014), the Enron case exposed the weaknesses of internal control systems but, on the other hand, it stimulated the assignment of better defined responsibilities to managers and the definition of more structured controls. On the other hand, the accounting system, at the same time as it serves as a mechanism of control, monitoring and reduction of asymmetry (Sunder, 2014), it acts as an instrument of manipulation, since the flexibility of the accounting standards allows the agents to use it to meet specific objectives (Watts, 1992; Ball, 2006).



**Figure 1.** Agency Relationship and Governance Principles

Source: Elaborated based on Brickley & Zimmerman (2010), Di Pietra and Ronen (2014).

In this context, Ramanan (2014) also observes that auditing plays an important role in the corporate governance structure. Internal Audit seeks to reduce the risks related to critical processes by structuring, reviewing and monitoring the due compliance with internal controls and policies defined by companies, in order to mitigate the occurrence of errors and fraud. The purpose of the External Audit is to evaluate the adequacy of the financial statements to be disclosed to the market.

The regulatory environment that encompasses the laws and regulations established by regulators with police power over economic agents play an essential role as a governance instrument, since they establish the rules and restrictions the various economic agents are subject to, as well as the punishments that may occur in case of infringements. The regulatory environment and the enforcement power of the standards have consistently proven to be relevant to improve the business environment, quality of accounting information, and even republication (Pfarre, Smith, Bartol, Khanin & Zhang 2008; Khanin & Mahto, 2012).

Finally, the market itself seeks mechanisms for greater efficiency and differentiation among economic agents. In this sense, the efforts of the various market participants to better relate to the various stakeholders have been intense. In Brazil, since the 1990s, private non-profit institutions have sought to stimulate the improvement of corporate transparency.

The Brazilian Corporate Governance Institute (IBGC), created in 1995, for example, has published the Code of Good Corporate Governance Practices since 1999. In 2000, this movement stimulated the creation of the Differentiated Levels of Governance of companies whose shares are traded on BM & FBOVESPA. It is a ranking of listed companies that adopt differentiated Corporate Governance practices. BM & FBOVESPA (2016) requires a series of requirements to be listed on the differentiated levels (Level 1, Level 2 and New Market), namely: (i) issuing of common stock, (ii) minimum circulation of 25% of stock, (iii) encouragement of share dispersion, (iv) encouragement of share dispersion, (v) encouragement of board independence, (vi) concession of Tag Along.

## 2.2 Earnings management hypotheses

Earnings management refers to the making of accounting and operational choices to meet the specific interests of the firm (and/or manager). According to Defond (2010), the increase in studies on the quality of profits (earnings) is based on issues such as: (1) harsh accusations by the SEC regarding earnings management; (2) accusations of opportunistic actions by managers of publicly held companies; (3) criticism as to the possible connivance of auditors with earnings management; (4) the recurring accounting frauds, such as the Enron case and; (5) change in the regulatory environment, such as SOX and, more recently, IFRS.

It is an event that originates in the agency conflict and aims to meet the objectives of the agents and / or the firm, having several motivations based on three main hypotheses: (1) opportunism of agents, (2) level of indebtedness and (3) political costs (Dechow, Ge, & Schrand, 2010).

### 2.2.1 Opportunism of agents

Opportunism occurs when agents use informational asymmetry to meet their objectives to the detriment of those of (major) shareholders. Fields, Lys & Vincent (2001) note that, although accounting choices arise from the exercise of judgment in the application of accounting standards, the manager's interest in positively affecting the results may be one of the reasons for its occurrence. According to Bergtresser and Philipon (2006), the main motivations for the opportunism of agents is the manager's interest in maximizing his compensation package, either through the performance bonus or through the exercise of options and actions under his control. From this relationship, the first research hypothesis ( $H_1$ ) of the study emerges:

$H_1$  = The remuneration of managers positively affects the republication of the statements.

As managers tend to seek to maximize their well-being, there is potential for earnings managing for that purpose. Elayan, Li and Meyer (2008) argue that republications are a major negative event in companies and are associated with earnings management, sometimes encouraged by the opportunism of agents interested in maximizing their compensation package. Evidence that this event occurs has been systematically observed in studies such as Masulis, Wang & Xie (2012), Dao, Huang, Chen and Huang (2014), Collins, Masli, Reitega & Sanchez (2015) Chen and YurAustin (2015), Khalil and Ozkan (2016).

### 2.2.2. Hypothesis of indebtedness

The level of indebtedness is an indicator of the firm's risk and growth opportunity (Myers & Majluf, 1984). Despite the fact that debt has a cost of capital lower than equity and optimizes the value maximization, there is an acceptable limit to this level of indebtedness (Modigliani & Miller, 1963; Myers & Majluf, 1984). In this context, agents (and companies) will be concerned about this measure. Graham, Harvey & Rajgopal (2005) point out that 26.5% of executives believe that the level of indebtedness is a strong incentive towards earnings management.

First, because the increase in the level of indebtedness can lead to violation of debt covenants; Secondly, that raising this indicator may undermine credit risk, and therefore increase the cost of capital, restrict access to other lines of financing, among other implications. Third, because this motivation is strongly associated with the reputation and performance of the manager and, hence, his package of incentives and career opportunities. Based on this context, the second research hypothesis ( $H_2$ ) was analyzed:

$H_2$  = The level of corporate indebtedness positively affects the republication of the statements.

According to Mayers & Majulf (1984), the indebtedness, in addition to the lower cost, signals to the market about the investment opportunity, besides receiving influence from external members in the governance structure due to debt covenants. On the other hand, it can increase the risk perceived by the market and generate adverse effects, such as increased cost of capital and risk of bankruptcy, for example. These effects, in turn, may be reasons for earnings management. Previous studies such as Bardos (2011), Badertscher, Collins and Lys (2012), Chen, Cheng & Lo (2013), Dao et al. (2014) and Baber, Kang, Liang and Zhu (2015) have shown that more indebted companies tend to have higher levels of republication.

### 2.2.3. Hypothesis of Political Costs

According to Watts and Zimmerman (1978), the political costs refer to the possibility of expropriation in one of the parties and derives from the visibility of the company, be it to regulators, competitors and other interested parties. According to Key (1997), in the Political Cost Theory, to the extent that a firm is subject to the potential transfer of wealth to stakeholders (political process), agents will be prone to making accounting choices that will reduce such transfer. This is a concern of the agents with the visibility of the firm towards analysts, institutional investors, regulators, the treasury, competitors and other stakeholders (such as trade unions for example).

The implication of this theory is that companies with higher visibility will be more likely to incur political costs, either because of the need to increase employee compensation, to pay taxes due to tax fines or to increase the cost of capital and reduce the stock value resulting from the higher perceived risk (Dechow, Ge, & Schrand, 2010; Graham, Harvey, & Rajgopal, 2005; Tan, 2013; Nelson & Skinner, 2013; Beatty & Liao, 2014). In this context, managers will seek to present a result that: (1) is relatively homogeneous, (2) meets market expectations; (3) does not differ excessively from other companies in the sector. From this perspective, the third hypothesis ( $H_3$ ) of this study was tested:

$H_3$  = The size of the companies positively affects the republication of the statements.

Studies that have considered the size effect on republications have shown that, because large firms are more susceptible to fraud and error risk, they tend to republish financial statements more (Ettrede, Scholz, Smith & Sun, 2010; Alexander, Baugruss, Bernili, Lee & Westberg, 2013). The fact is that these republications have significant adverse effects on the firm's market value, cost of capital and reputation (Cao, Myers, & Omer, 2012; Palmrose, Richardson, & Scholz, 2004), so they will make efforts to mitigate these risks, as the costs for reputation rebuilding are higher, including for auditors (Kryzanowski & Zhang, 2013, Francis, Michas and Yu, 2013). The evidence found supports more persistently that, the larger the firms, the greater the likelihood of republication (Schrand & Zechman, 2012, Chen, Cheng & Lo, 2013, Cao, Feroz & Davalos, 2015, Agrawal & Copper, 2015, Baber et al., 2015).

## 2.3 Republication of the Financial Statements: concepts and implications

Republication consists of correcting the recognition, measurement or disclosure of data that significantly changes the evaluation and interpretation of external users, reducing the risk of their adverse selection. This change may result from an intentional and adequate change in the accounting policy, or an error or fraud, identified a posteriori, requiring rectification of the information disclosed (Marques, 2016).

Elayan et al. (2013) state that the restatements are associated with accounting irregularities and have consumed millions of dollars in recent years due to the risks of litigation, reputation and expropriation. It is not restricted to this though, since the republications can also be based on qualitative motivations, to correct data related to the explanatory notes, management reports, among others (Hellou Netto & Pereira, 2010). Marques (2016) complements that the republications can be compulsory or spontaneous. Obligations occur when the regulator or interested party (auditor, for example) requires the republication of the information disclosed. The spontaneous republications are done by the company's own will and do not derive from normative or contractual imposition. The author notes that most of the statements republished in Brazil are spontaneous (83%) and that 73% of republications are to correct qualitative data.

Burks (2010), when analyzing data from the Government Accountability Office (GAO) for the period 1997-2005 in North American companies, concluded that the recognition, disclosure and measurement of events related to revenues, costs, assets, insurance and reclassifications account for 75% of the republications in the period.

In Brazil, studies of this magnitude are not available, largely because the available databases with information about republications do not present a level of detail that makes such a survey possible. Some scientific effort has been made in this direction though.

Dantas, Chaves, Silva and Carvalho (2011, p. 57) analyzed 65 republications by determination of CVM from 2001 to 2009 and grouped the motivations in: (1) Recognition and measurement of assets and liabilities (45.4%); (2) Shortage in disclosure of explanatory notes (39%); (3) Recognition and measurement of revenues and expenses (7.8%); and (4) Others (7.8%). These results move in the same direction as the international studies on the motivations towards compulsory republication, since problems of measuring equity and income items account for more than 50% of the motives in recent times (Collins et al., 2015).

Republishing can generate relevant empirical implications. On the one hand, this is a proxy for higher (or lower) quality of accounting information with associated problems (Dechow, Ge, & Schrand, 2010). For example, Cao, Myers & Omer (2012) emphasize that republication has an adverse effect on corporate reputation, which can reduce the value of the company, increase the cost of capital, start execution and bankruptcy, among others. Chen, Elder & Hung (2014) emphasize that the market reacts negatively to republications, causing subsequent information disclosed by companies to lose credibility. In this perspective, some studies were carried out in the Brazilian context, which are relatively scarce though (Murcia & Carvalho, 2007).

Among the few studies identified, Helou Netto & Pereira (2010) sought to analyze the effect of republishings on market value. To do so, they analyzed 197 republishings of 24 companies listed on BM & FBOVESPA from 2001 to 2009. The results showed that compulsory republishings had a positive effect on the value of the company, suggesting that the Brazilian market receives the rectification positively when it is mandatory. On the other hand, the other motivations did not significantly affect prices, suggesting information irrelevance of spontaneous republishings for example.

Cunha, Magro & Fernandes (2015) conducted a study on the effect of republication on Earnings Management. The authors analyzed data from 40 republishings that occurred between 1999 and 2012. The results showed that republication has a negative effect on discretionary accumulations, which is consistent with the literature in the area. The compulsory republication is a requirement of the regulator. Sometimes, this demand seeks to correct problems related to the recognition of assets, liabilities and results (Dantas et al., 2011, Collins et al., 2015). This implies that, if there is a compulsory republication, the agency will require that a potential event associated with the discretionary accumulations be rectified, since the agent will tend to manage earnings (up or down). The regulator, in turn, will require that the procedure adopted previously be reversed, implying the result found by Cunha, Magro & Fernandes (2015).

### 3. Research design

In this study, we present information about republishings between 1998 and 2014. The sample consisted of 33 companies listed on BM&FBOVESPA, distributed among the listing segments as follows: 25 Level 1, 15 Level 2, 109 New Market and 195 Traditional segment. The data were collected on the websites of CVM and BM&FBOVESPA.

#### 3.1. Models and variables

The analysis of the hypotheses used regression with panel data. The models with panel data are appropriate to reduce the econometric effects and/or problems, such as individual heterogeneity, besides increasing the degrees of freedom and permitting more robust inferences (Fávero L. , 2013). In this study, two specifications were used. The first, logistic, in which the probability of republishing [P(repub)] was a function of the Managers' Compensation, Indebtedness Level, Company size and the Control variables,  $f(\text{RemGes}, \text{NivEnd}, \text{Tam}, \text{Control Variables})$ . Figure 1 presents the operation of the variables and the expected signals of each coefficient.

Figure 1:  
Description of the Variables

Variable	Expected signal	Sigla	Operacionalização
	Abbreviation	Operation	Total de Republicações Acumuladas até o ano t/Total de Publicações Obrigatórias até o ano t.
Cumulative Republication Rate		TRA	Total Cumulative Replications by year t/Total Compulsory Publications by year t.
Replication		Repub	Dummy variable equal to 1 when the statement was republished and zero when not.
Compulsory Republication	+	RepObrig	Dummy variable equal to 1 in case of compulsory republication of the statement and zero in case of spontaneous republication.
Total Manager Compensation	+	RemTot	Logarithm of index between Managers' compensation in year t by Compensation in the immediately preceding year (t-1)
Director Compensation	+	RemDir	Logarithm of index between Director compensation in year t by Compensation in the immediately preceding year (t-1)
Audit Committee Compensation	+	RemCFisc	Logarithm of index between Audit Committee compensation in year t by Compensation in the immediately preceding year (t-1)
Indebtedness Level	+	NivEnd	Total Liabilities divided by Total Assets
Size	+	Asset	Logarithm of total Assets of company i in year t
Asset Growth	+	CrescAt	Logarithm of total current assets/total previous assets
Return on Assets	-	ROA	Index between EBIT/ Total Assets
Previous Cumulative Republication Rate	+	TRAt-1	Total de Republicações Obrigatória até o ano t/Total de Republicações Obrigatórias até o ano t
<i>Total Cumulative Replications by year t-1/Total Compulsory Publications by year t-1</i>	+	AT	[(Ativo Circulante Operacional – Passivo Circulante Operacional) - Depreciação] /Ativo Total (t-1)]
Compulsory Republication Rate	+	TRO	Total Compulsory Republications by year t/Total Compulsory Republications by year t
Total Accruals	+	AT	[(Current Operating Assets – Current Operating Liabilities) - Depreciation] /Total Assets (t-1)]
Profit Variation Coefficient	+	CVEbit	Variation Coefficient of EBIT by year t of company i
Return on Shares	+	Ri	Logarithm of (PtPt-1) in which Pt is the mean stock price in the three months subsequent to the publication of the statement and Pt-1 the mean stock price in the three months before the publication
Economic Segment	+/-	SegEcon	Dummy variable equal to 1 for the i-eth sector, 0 for the others
Governance Level	-	NivGov	Dummy variable equal to 1 for Governance Level (N1, N2 or NM), 0 for traditional
Sarbanes-Oxley	-	SOX	Dummy variable equal to 1 for the initial year of SOX, 0 for the others.
International Financial Report Standards Partial	-	IFRS Parcial	Dummy variable equal to 1 for the initial year of Partial IFRS and 0 for the others.
International Financial Report Standards Full	-	IFRS Full	Dummy variable equal to 1 for the initial year of Full IFRS and 0 for the others.
Big Four	+	Big4	Dummy variable equal to 1 for companies audited by one of the Big4, 0 for the others.

**Source:** Elaborated based on Bardos (2011); Badertscher, Collins e Lys (2012); Masulis, Sing & Xie (2012); Schrand & Zechman, (2012); Chen, Cheng & Lo (2013); Dao et al. (2014), Baber et al., (2015); Collins et al., (2015); Cao et al., (2015); Agrawal & Copper (2015); Lin et al. (2015) Khalil and Ozkan (2016), Marques (2016).

The estimation of the model was performed by means of Maximum Likelihood. Pindyck and Rubinfeld (2004) state that, when using a logit or probit model, this technique is the most appropriate. The interpretation consists of analyzing the marginal effect of the explanatory variables on the probability of observing the explained variable (Wooldridge, 2010). Therefore, the effect of Compensation (RemTot, RemGes and RemCFisc), Level of Indebtedness and Size of the Company on the likelihood of republishing the financial statements (Repub) was analyzed. In addition to these variables that operationalize the hypotheses evaluated in the study, we used control variables, which have been systematically identified in the literature as having significant effects on earnings management in other proxies (Bardos, 2011; Baidertscher, Collins and Lys, 2012, Masulis, Sing & Xie, 2012, Schrand & Zechman, 2012; Chen, Cheng & Lo, 2013; Dao et al., 2014; Baber et al., 2015; Collins et al., 2015; Cao et al., 2015; Agrawal & Copper, 2015; Lin et al., 2015; Khalil and Ozkan, 2016; Marques, 2016).

For statistical significance, a maximum level of 10% was considered, so z-statistics with p-values equal to or lower than 10% were considered significant, values commonly accepted in the area of Accounting (Fávero, Belfiore, Lopes da Silva & Chan, 2009). The initial model tested was defined by (Equation 1):

$$P(\text{Repub})_{it} = \beta_0 + \beta_1 \text{RemTot}_{it} + \beta_2 \text{Remdir}_{it} + \beta_3 \text{RemCFisc}_{it} + \beta_4 \text{NivEnd}_{it} + \beta_5 \text{Tam}_{it} + \beta_6 \text{ROA}_{it} + \beta_7 \text{AT}_{it} + \beta_8 \text{CVEbit}_{it} + \beta_{10} \text{TRA}_{it-1} + \beta_9 \text{Ri}_{it} + D_1 \text{SegEcon}_{it} + D_2 \text{NivGov}_{it} + D_3 \text{SOX}_{it} + D_4 \text{IFRS}_{it} + D_5 \text{Big4}_{it} + \epsilon_{it} \quad (1)$$

In addition, the robustness was tested, using the Cumulative Republication Rate as an explanatory variable (Equation 2). This index is calculated based on the total Cumulative republications until year “t” divided by the total publications the company was obliged to publish until year “t.” It is a relative measure used by Marques (2016) with a downward trend, as the republications are expected to be isolated and not recurrent events.

$$\text{TRA}_{it} = \beta_0 + \beta_1 \text{RemTot}_{it} + \beta_2 \text{Remdir}_{it} + \beta_3 \text{RemCFisc}_{it} + \beta_4 \text{NivEnd}_{it} + \beta_5 \text{Tam}_{it} + \beta_6 \text{ROA}_{it} + \beta_7 \text{AT}_{it} + \beta_8 \text{CVEbit}_{it} + \beta_{10} \text{TRA}_{it-1} + \beta_9 \text{Ri}_{it} + D_1 \text{SegEcon}_{it} + D_2 \text{NivGov}_{it} + D_3 \text{SOX}_{it} + D_4 \text{IFRS}_{it} + D_5 \text{Big4}_{it} + \epsilon_{it} \quad (2)$$

The interpretation of the data used the significance parameter but, in this case, the interpretation is to analyze the marginal effect of the explanatory variables on the TRA, which is a percentage. Hence, the 1% increase in ROA will imply an increase by X percentage points in TRA.

### 3.2. Tests of differences between means and medians

The tests of differences between means and medians were useful to evaluate the existence of statistical differences between the Pre and Post IFRS periods. As different normative periods are treated, a comparison of the means between the two is justified. Therefore, the T, Wilcoxon and Kruskal Wallis tests were used. Parametric and non-parametric tests are useful for comparison between groups with different characteristics (Favero et al., 2009; Manly, 2008). The null hypothesis evaluated in the “t” test consisted of . The rule of decision was to reject  $H_0$  when the p-value is equal or inferior to 10%. The null hypothesis evaluated in the Wilcoxon and Kruskal Wallis tests consisted of . Therefore, when the p-value is equal or inferior to 10%, we reject .

## 4. Analysis and interpretation of results

### 4.1. Descriptive statistics

Initially, we analyzed the main aspects of descriptive statistics (Table 1). In this respect, considering the separation between the Pre and Post periods, it is important to highlight the observed changes in the variables in terms of homogeneity. It was observed that the Coefficient of Variation ( $\mu / \sigma$ ) dropped in all accounting variables except the Return (LnRi) and Total Accruals. This result, on the one hand, presents indications of better data quality for the purpose of quantitative studies, since less dispersion contributes mainly to the estimation. On the other hand, it presents indications of greater conservatism in dealing with Total Accruals and greater uncertainties perceived by the market when the stock returns are observed. In general terms, the variables used increased in most cases. This increase comes with different interpretations, because the increase in the level of indebtedness, for example, can be understood as a bad sign a priori (Hutton, Marcus, & Teharainian, 2009), but, positively, it can show an increase of the investment opportunities (Myers & Majluf, 1984).

Table 1:  
Descriptive statistics of variables in the models

	Before IFRS						Post-IFRS						T test t(Prob > t)	Wilcoxon z(Prob > z)	Kruskal Wallis x <sup>2</sup> (Prob F)
	n	$\mu$	S	CV	1o.Q	3o.Q	n	$\mu$	S	CV	1o.Q	3o.Q			
Panel A – Quantitative variables															
TRA	3.367	0.12	0.21	1.74	0.00	0.20	2.432	0.27	0.23	0.87	0.08	0.39	-24.8059*	-32.028*	931.727*
TRAD	3.367	0.09	0.26	2.88	0.00	0.00	2.443	0.26	0.23	0.91	0.08	0.38	-24.5356*	-31.072*	867.497*
LnNivEnd	1.760	-1.13	1.19	-1.06	-1.38	-0.43	1.984	-1.27	1.36	-1.08	-1.57	-0.46	3.0188*	2.673*	7.144*
LnAtivo	3.367	8.87	6.45	0.73	0.00	13.87	2.415	12.86	4.15	0.32	12.31	15.03	-28.5671*	-25.640*	650.925*
LnRemTot							1.717	12.75	5.77	0.45	13.44	16.09			
LnRemDir							1.717	11.38	6.69	0.59	8.88	15.91			
LnRemCFisc							1.717	10.37	5.66	0.55	10.20	14.09			
LnRi	3367	0.09	0.43	4.78	0.00	0.00	2.415	-0.00	0.22	-100.44	-0.02	16.09	10.8097*	9.820*	82.872*
Total Accruals	3367	-0.12	3.00	-25.64	-0.05	0.00	2.415	-0.04	5.34	-123.23	-0.09	0.02	-0.7060	2.014**	3.989**
CrescAtivo	3.367	0.09	0.71	8.01	0.00	0.10	2.415	0.11	0.80	7.01	-0.01	0.16	-1.2104	-7.392*	53.778*
ROA	3.367	-1.89	8.53	-4.51	0.00	0.09	2.415	-2.84	7.37	-2.59	0.00	0.12	1.7707***	-9.786*	94.681*
CVEbit	3.367	9.81	28.37	2.89	6.05	11.26	2.415	6.25	1.21	0.19	5.90	6.87	7.5577*	26.705*	713.132*
Panel B – Qualitative variables															
Republic	3.367	0.14	0.35	2.48	0.00	1.00	2.443	0.30	0.46	1.52	0.00	1.00		-15.140*	112.729*
TipRes	3.367	0.16	0.37	2.26	0.00	0.00	2.443	0.24	0.42	0.42	0.00	0.00		-5.923*	16.809*
NivGov	3.367	0.43	0.50	1.15	0.00	1.00	2.443	0.43	0.50	1.15	0.00	1.00			
SOX	3.367	0.10	0.30	2.98	0.00	0.00	2.443								
IFRS Full							2.443	0.14	0.35	2.45	0.00	1.00			
Big4	3.367	0.39	0.49	1.26	0.00	1.00	2.443	0.65	0.48	0.73	0.00	1.00		-19.348*	283.375*

**Obs.:** \*, \*\*, \*\*\* - Difference statistically significant at 1%, 5% and 10%. Means of qualitative variables (dummy) refer to the proportion of the characteristic equal to 1.

**Legend:** **TRA:** Total Cumulative Republications by year t/Total Compulsory Publications by year t; **Repub:** Dummy variable equal to 1 when the statement was republished and zero when not; **RepObr:** Dummy variable equal to 1 in case of compulsory republication of the statement and zero in case of spontaneous republication; **RemTot:** Logarithm of index between Managers' compensation in year t by Compensation in the immediately preceding year (t-1); **RemDir:** Logarithm of index between Director compensation in year t by Compensation in the immediately preceding year (t-1); **RemFisc:** Logarithm of index between Audit Committee compensation in year t by Compensation in the immediately preceding year (t-1); **NivEnd:** Liabilities/Assets; **Tam:** **CrescAt:** Logarithm of total current assets/total previous assets; Ln(Asset); **ROA:** Index between EBIT/ Total Assets; Total Compulsory Republications by year t/Total Compulsory Republications by year t;

: Total Compulsory Repuplications by year  $t$  / Total Compulsory Repuplications by year  $t$ ; **AT**: [(Current Operating Assets – Current Operating Liabilities) - Depreciation] / Total Assets ( $t-1$ ); **CVEbit**: Variation Coefficient of EBIT by year  $t$  of company  $i$ ; **Ri**: Logarithm of  $P_t/P_{t-3}$  in which  $P_t$  is the mean stock price in the three months subsequent to the publication of the statement and the mean stock price in the three months before the publication; **SegEcon**: Dummy variable equal to 1 for the  $i$ -eth sector, 0 for the others; **NivGov**: Dummy variable equal to 1 for Governance Level (N1, N2 or NM), 0 for traditional; **SOX**: Dummy variable equal to 1 for the initial year of SOX, 0 for the others. **IFRS Partial**: Dummy variable equal to 1 for the initial year of Partial IFRS and 0 for the others. **IFRS Full**: Dummy variable equal to 1 for the initial year of Full IFRS and 0 for the others; **Big4**: Dummy variable equal to 1 for companies audited by one of the Big4, 0 for the others.

In addition, there is an improvement in some indicators relevant to the financial analysis, such as: LnAtivos, CrescAtivo, ROA. A reduction in important indicators for the same purpose was also observed, especially: LnRi, Total Accruals and CVEbit. With regard to the indicators that increased, these are parameters used to evaluate the companies' potential of generating return, so their increase may indicate an increase of this potential (Jiao, Kaning & Roosenboom, 2012).

Likewise, the variables whose averages dropped strictly are used by the market in their evaluations, but with opposite interpretations. In the case of the return (LnRi), this reduction indicates a deterioration in the performance of stock prices, which may generate adjustments downward of investors' expectations. Regarding the reduction of the Accruals (Accruals) and the Profit Variation Coefficient (CVEbit), the first can be related to post-IFRS conservatism (Abed, Al-Badainah, & Serdaneh, 2012) which, in turn, tends to reduce the variability of profits, suggesting what is understood in the Accounting and Finance literature as Income Smoothing, one way of earnings management (André, Filip, & Paugam, 2015). Finally, it was verified that the differences were statistically significant, according to the tests of differences between the averages used.

## 4.2. Incentives towards republication of the statements

Initially, the logistic model (1) was analyzed to evaluate the effect of the earnings management hypothesis on the republication (Table 2). With respect to the Hypothesis of Agents' Opportunism ( $H_1$ ), it was observed that, consistently, only the Remuneration of the Directors (RemDir) was statistically significant at 1%. The predicted signal [S (p)] was negative though, evidencing that the remuneration package is a great incentive to improve the quality of accounting information, in the present study, using the proxy of republication. Schrand & Zechman (2012) identified a positive relationship between remuneration package and republication, confirming the hypothesis of agents' opportunism.

The incentive package is one of the companies' strategies to mitigate agency risks (Jensen & Meckling, 1976). Since agents have a self-renewing and insatiable desire, however, the risk may remain (Jensen & Meckling, 1994). Masulis, Wang & Xie (2012) point out that the appropriate compensation scheme may discourage managers from acting opportunistically. Healy (1985) already recommended the formulation of contract contracts that would meet the objectives of the principals, since the agents are prone to accounting choices, considering the remuneration packages. Another relevant aspect that supports the results is that there is a positive association between replication and the turnover of managers, external auditors - this means that there is an imminent risk of potential losses of these agents, which may discourage republication (Kryzanowski & Zhang, 2013, Collins et al., 2015).

Table 2:

**Logit (1) model for Determinants of Financial Statement Republications**

P (Repub)	1998-2014			1998-2007			2008-2014		
	S(P)	OR	z	S(P)	OR	z	S(P)	OR	z
Intercept	-	0.0326	-5.00*	-	0,0460	-5.08*	+	0.0261	-9.36*
NivEnd	-	0.9890	-0.19	+	1,0884	1.22	+	1.1054	0.45
Tam	+	1.1108	2.87*	+	1,1696	3.72*	+	1.1285	4.50*
RemTot	+	1.0311	1.37				+	1.0219	1.14
RemDir	-	0.9619	-2.39**				-	0.9698	-2.12**
RemCFisc	+	1.0245	1.23				+	1.0074	0.42
Ri	+	1.5747	1.45				+	1.4955	1.48
<i>Total Accruals</i>							-	0.9815	-1.53
CrescAtivo	+	1.6956	1.80**	+	1,7495	2.31**	+	1.0821	1.01
N1	+	1.5651	1.66***	-	0,7942	-0.84	+	1.5407	1.60***
SOX				-	0,5253	-2.56**			
<i>IFRS Full</i>	+	5.8242	7.75*				+	5.0490	8.14*
Big4	+	1.5501	2.21**	+	1,2363	1.30	+	1.5252	2.47**
N.Obs./Groups		1395   321			1760   247			1717   349	
F stat (Prob > F)/Wald (x <sup>2</sup> )		116.82   0.0000			62.09   0.0000			127.88   0.0000	

**Obs:** \*, \*\*, \*\*\* Statistically significant at 1%, 5% and 10%. The Wooldridge test evidenced the presence of self-correlation and heteroscedasticity using clustered robust standard errors in the company. The Logistic Panel Data Model with Random Effects was used according to the adjustment properties described by Fávero et al. (2009). **In the period 1998-2007** a negative and statistically significant effect was observed in the following years: 1998 ( |OR| 0.2230158 |z| -3.89\*), 1999 ( |OR| 0.5652443 |z| -2.13\*\*), 2000 ( |OR| 0.3128625 |z| -4.01\*), 2001 ( |OR| 0.6217064 |z| -1.89\*\*), 2003 ( |OR| 0.416642 |z| -3.39\*), 2004 ( |OR| 0.4150204 |z| -3.45\*), 2005 ( |OR| 0.5989329 |z| -2.14\*\*) and 2006 ( |OR| 0.6672775 |z| -1.75\*\*\*). **In the period 2008-2014** statistical significance was observed in the dummies for the years 2011 ( |OR| 2.404319 |z| 4.43\*), 2012 ( |OR| 2.059242 |z| 3.62\*) and 2013 ( |OR| 1.36857 |z| 1.54\*). The remaining variables were omitted due to lack of statistical significance, except for the variables directly related with the general earnings management hypotheses. According to the instructions by Wooldridge (2010), variables with Z statistics equal or higher than 1 were maintained, even if not statistically significant at 1%, 5% and 10%.

**Legend:** **Repub:** Dummy variable equal to 1 when the statement was republished and zero when not; **NivEnd:** Liabilities/Assets; **Tam:** ln(asset of total assets); **RemTot:** Logarithm of index between Managers' compensation in year t by Compensation in the immediately preceding year (t-1); **RemDir:** Logarithm of index between Director compensation in year t by Compensation in the immediately preceding year (t-1); **RemFisc:** Logarithm of index between Audit Committee compensation in year t by Compensation in the immediately preceding year (t-1); **Ri:** Logarithm of ) in which is the mean stock price in the three months subsequent to the publication of the statement and the mean stock price in the three months before the publication; **AT:** [(Current Operating Assets - Current Operating Liabilities) - Depreciation] /Total Assets (t-1); **CrescAt:** Logarithm of total current assets/total previous assets; **NivGov:** Dummy variable equal to 1 for Governance Level (N1, N2 or NM), 0 for traditional; **SOX:** Dummy variable equal to 1 for the initial year of SOX, 0 for the others. Dummy variable equal to 1 for the initial year of Full IFRS and 0 for the others; **Big4:** Dummy variable equal to 1 for companies audited by one of the Big4, 0 for the others.

The Hypothesis of Indebtedness () states that more indebted companies are more likely to manage earnings, either to reduce the perception of risk or to avoid debt covenants. Therefore, it was expected that the level of indebtedness would positively affect republications. In the present study, the results were consistent with the theoretical expectation regarding expected signals (Tan, 2013; Baber et al., 2015, Cao et al., 2015), but were not statistically significant. According to Jensen and Meckling (1976), if the company presents a higher level of indebtedness and, therefore, a higher level of perceived risk, it can be stimulated by the benefit of the higher quality of the information provided, as this would generate a lower cost of capital (Bardos, 2011; Agrawal & Cooper, 2015). In the present study, however, the level of indebtedness did not present sufficient statistical significance to support the proposed theory.

The last hypothesis tested ( $H_3$ ) was that firm size has a positive effect on republication (Elayan, LI, & Meyer, 2008, Kryzanowski & Zhang, 2013, Khalil & Ozkan, 2016). This hypothesis was confirmed both in the Pre IFRS and in the Post IFRS period. This means that larger companies are more likely to republish. In the Brazilian context, however, it should be noted that most of the republications are of the “spontaneous” type, so it is not necessarily an increase in irregularities. Marques (2016) observes that the increase of the republications, if they are spontaneous and qualitative information, do not necessarily mean a problem. In that sense, Helou Netto & Pereira (2010) observed that, in the Brazilian market, only mandatory republications have a significant effect on the behavior of stock prices. In foreign literature, republishing generates adverse market behavior more quickly, which is expected given the level of capital market development, as well as the fraud and error events in the last two decades (Di Pietra, McLeay, & Ronen, 2014).

The normative environment is relatively important in Accounting research (Di Pietra, McLeay, & Ronen, 2014), because Accounting is strongly influenced by the current normative standard, so that the study in the field without considering its effect can bias the analysis. In the present study, a temporal cut-off was made between the pre-IFRS (1998-2007) and post-IFRS (2008-2014) data. This separation was necessary due to the fact that most of the variables are of an accounting nature, which implies that, as they were measured from different standards, the joint analysis could bias the results. On the other hand, the separation makes it possible to better visualize the differences between the periods.

In addition, the effect of adopting two important standards for accounting, Sarbanes-Oxley (SOX) and IFRS was controlled. SOX has established stricter internal control rules (Alexander et al., 2013). IFRSs consist of a standard of accounting standards, a priori, of better quality (Dechow, Ge, & Schrand, 2010). The results showed that the implementation of SOX generated a reduction in the probability of republishing. This result reinforces the importance of the standard and governance mechanisms (Kryzanowski & Zhang, 2013, Chen, Elder, & Hung, 2014) because, as SOX reinforces the structure of internal controls and Accountability instruments, this implies an improvement in the quality of the reported information, reducing the volume of republication.

On the other hand, the adoption of Full IFRS showed a positive and significant effect. This result points to the concerns raised by Ball (2006). In that author's view, IFRS does not necessarily mean instant improvement, since cultural aspects may lead to different interpretations. As most republications are spontaneous and for qualitative reasons though (Marques, 2016), these findings may be due to changes and / or corrections that do not significantly affect the quality of information (Helou Netto & Pereira, 2010). It draws the attention of regulators to greater alertness to the continuity of the republication rate, however.

Another control variable evaluated was Asset Growth (CrescAtivo) - its use, as well as ROA, is based on the Political Costs Hypothesis (Key, 1997). First, firms with higher growth rates will be more subject to republishing (Young & Peng, 2012; Baber et al., 2015). On the other hand, companies with higher performances (ROA) will have incentives not to republish (Cao, Myers, & Omer, 2012; Chen, Elder, & Hung, 2014; Masulis, Wang, & Xie, 2012). The results of the study demonstrated exactly what was expected. Asset growth had a positive effect on the likelihood of republishing the financial statements, so higher asset growth rates indicate a greater risk of manipulation and earnings management, which has a positive effect on republication. In the case of ROA, as it increases, it reduces the likelihood of republication, which is consistent with two earnings management hypotheses: the first, of the political costs and the second of the opportunism of the agents, since the increase in ROA would only stimulate them to manage earnings, if, and only if, the current result is beyond expectations. Therefore, it could anticipate losses to favor the future remuneration package or even to homogenize current performance (Tan, 2013; Beatty & Liao, 2014).

Finally, the auditor effect was controlled. The audit has a representative role in the corporate governance structure. In addition, earnings management studies have systematically reported a reduction effect of the Big Four on this event. This means that the general assumption about the effect of large audit firms is that they reduce the likelihood of republishing the statements (Thompson & McCoy, 2008). In the present study, the results refuted the hypothesis about the Big Four effect. What was observed was that they have a positive and significant effect on the probability of republication. At first, it seems theoretical incoherence, however, two issues need to be considered. First, that there is a concentration of these companies among the listed companies, which may cause the growth of the republications associated with this type of auditor. Even in the adoption period of SOX, however, when the number of republications dropped, the result for the auditors was an increase. As they are mostly spontaneous republications (Marques, 2016), these results may signal a higher level of transparency by the companies (Cao, Myers, & Omer, 2012).

#### 4.2.3. Test of robustness

In order to verify the robustness of the results presented in Table 2, we performed an analysis of the previous model, however, using the TRA - Cumulative Republication Rate as an explanatory variable (Table 1). The results (Table 3) demonstrated that the NivEnd, which did not present statistical significance in Mod.1, presented negative statistical significance for the TRA, suggesting that more indebted companies will tend to have a lower TRA. This result is consistent with the search to improve the company reputation, for example by reducing the cost of capital and increasing access to third-party sources of funding (Huber & Bochner, 2012; Dao, Huang, Chen, & Huang, 2014). In turn, Tam, a variable that captures the effect of the political costs on the republication, maintained the positive signal, but without statistical significance.

Finally, the total remuneration had a positive effect on the TRA, consistent with the hypothesis that there is a positive association between earnings management and the compensation package (Healy, 1985). Two issues need to be observed though. The fact that this is a proxy republication, which, as analyzed by Marques (2016), in Brazil, mostly refer to qualitative republications, so it is not necessarily possible to say that this is earnings management. Accordingly, as can be seen in Table 3, the compensation of the fiscal council presented a negative signal, although it was not statistically significant. This indicates that there may be a restriction effect of the Fiscal Council on the chances of republishing though, which converges with the proposal of the Agency theory that monitoring and control mechanisms should be used (Jensen & Meckling, 1976).

In addition, it was observed that SOX and NivGov were statistically significant and with negative effects, evidencing the improvement of the quality of the statements, using the TRA as a quality measure. These results reinforce the need to use governance mechanisms and a better internal control structure (Alexander, Bauguess, Bernile, Lee, & Westberg, 2013; Brickley & Zimmerman, 2010). It was also observed that the TRA of the previous period has a significant and positive effect on the current TRA, which suggests that companies with a history of republishing tend to have higher rates, which is consistent. As the TRA is an index of the Cumulative Republications and Publications, however, a natural downward trend is expected, which was evidenced, observing the annual effects in the 1998-2007 cut-off (see note below Table 3). In this context, the result suggests that there is an association between the republication history and its chance to republish today. Important evidence that was not captured in the Logit model (Mod.1) was the effect of mandatory republications (RepObr). In Mod. 2 it was found that RepObr, despite being a minority (Marques, 2016), has a positive and statistically significant effect, which grants relevance to its subsequent analysis.

Finally, it was found that being audited by a Big4 increases the chance of republication. This result may be associated with a search for greater transparency in the market, as most of the republished statements are qualitative in nature (Marques, 2016). On the other hand, it may be the joint effect of size x Big4, since larger companies will be more likely to republish as observed.

Table 3:

**Model (2) for Determinants of Financial Statement Replications**

TRA	1998-2014			1998-2007			2008-2014		
	S(P)	Coef.	z	S(P)	Coef.	z	S(P)	Coef.	Z
Intercept	+	0.2092	8.22*	+	0,1880	4.38*	+	0.2095	8.24 *
NivEnd	-	0.0099	-2.61*	+	0,0050	1.03	-	0.0098	-2.59*
Tam	+	0.0007	0.58	+	0,0027	0.97	+	0.0007	0.58
RemTot	+	0.0021	1.60***				+	0.0021	1.60***
RemDir	-	0.0000	0.04				+	0.0000	0.03
RemCFisc	-	0.0004	0.40				-	0.0004	-0.41
Ri				-	0,0130	-1.59			
CresAtivo				-	0,0399	-2.69*			
CVEbit				-	0,0008	-1.12			
TipRes	+	0.0097	1.11	+	.011858	1.08	+	0.0097	1.11
TRA-1	+	0.0351	1.30	+	0,1293	5.45*	+	0.0351	1.30
NivGov	-	0.0492	-2.0**	-	.0490802	-2.03***	-	0.0492	-2.00**
SOX				-	.0757442	-5.11*			
IFRS Full	+	0.0177	2.37**				+	0.0177	2.37**
Big4	+	0.0336	2.73*	+	0,0351	3.21*	+	0.0336	2.73*
RepObr	+	0.0432	2.89*	+	0,0648	3.05*	+	0.0432	2.89*
N.Obs./Groups	1395   321			1760   247			1395   321		
F Stat (Prob > F)/Wald (x <sup>2</sup> )	70.97   0.0000			178.06   0.0000			62.24   0.0000		
R <sup>2</sup> (Between, Within, General)	(5.65%   2.31%   2.32%)			(8.45%   17.07%   15.49%)			(5.65%   2.31%   2.32%)		
Dummy for the year	Yes			Yes			Yes		
Dummy for the sector	No			No			No		

**Obs.:** \*, \*\*, \*\*\* Statistically significant at 1%, 5% and 10%. The Wooldridge test evidenced the presence of self-correlation and heteroscedasticity using clustered robust standard errors in the company. The Panel Data Model with Random Effects was used and Chow, Breusch-Pagan and Hausmann's tests were performed (Wooldridge, 2010). **In the period 1998-2013** positive and statistical significance was observed in the following years -: 2011 ( |Coef| 0.0272001 |z| 3.71\*), 2012 ( |Coef| 0.0301007 |z| 4.16\*) e 2013 ( |Coef| 0.0220834 |z| 3.05\*). **In the period 1998-2007** a negative and statistically significant effect was observed in the following years: 1998 ( |Coef| -0.1235946 |z| -6.33 \*), 1999 ( |Coef.| -0.0881512 |z| -5.18\*), 2000 ( |Coef| -0.0975112 |z| -6.08\*), 2001 ( |Coef.| -0.0938012 |z| -6.12\*), 2003 ( |Coef.| -0.0768859 |z| -5.25\*), 2004 ( |Coef.| -0.0762157 |z| -5.35\*), 2005 ( |Coef.| -0.0406388 |z| -2.91\*) and 2006 ( |Coef.| -0.0262708 |z| -1.94\*). **In the period 2008-2014** a positive and statistically significant effect was observed in the years 2011 ( |Coef.| 0.0281561 |z| 3.84\*), 2012 ( |Coef.| 0.0312189 |z| 4.31\*) and 2013 ( |Coef.| 0.0219911 |z| 3.03\*).

**Legend:** **TRA:** Total Cumulative Replications by year t/Total Compulsory Publications by year t.; **NivEnd:** Liabilities/ Assets; **Tam:** ln(asset of total assets); **RemTot:** Logarithm of index between Managers' compensation in year t by Compensation in the immediately preceding year (t-1); **RemDir:** Logarithm of index between Director compensation in year t by Compensation in the immediately preceding year (t-1); **RemFisc:** Logarithm of index between Audit Committee compensation in year t by Compensation in the immediately preceding year (t-1); **Ri:** Logarithm of ) in which is the mean stock price in the three months subsequent to the publication of the statement and the mean stock price in the three months before the publication; **AT:** [(Current Operating Assets – Current Operating Liabilities) - Depreciation] /Total Assets (t-1)]; **CrescAt:** Logarithm of total current assets/total previous assets; **NivGov:** Dummy variable equal to 1 for Governance Level (N1, N2 or NM), 0 for traditional; **SOX:** Dummy variable equal to 1 for the initial year of SOX, 0 for the others. **IFRS Full:** Dummy variable equal to 1 for the initial year of Full IFRS and 0 for the others; **Big4:** Dummy variable equal to 1 for companies audited by one of the Big4, 0 for the others.

Source: Research data.

## 5. Final considerations

The objective in this study was to verify if the manager remuneration package, the level of indebtedness and the size of the company affect the republication of the financial statements. The descriptive, documentary and quantitative approach analyzed data from 344 companies listed on BM & FBOVESPA from 1998 to 2014. Data were analyzed through regression analysis with panel data, using two models. In the first, with the binary explanatory variable (1 for Republication and 0 for no republication), a multivariate logistic model was used. In the second, as a robustness test, a quantitative variable called Cumulative Republication Rate (TRA), was used as the explanatory variable.

In the logistic model, it was observed that the size and remuneration package have a positive effect on Republication (Repub and TRA). Likewise, the adoption of the IFRS and the fact that it is audited by the Big4 increases the odds of being republished. Among the variables that reduce this probability of republishing, SOX and the NivGov stood out.

The robustness test confirmed the statistical significance of the variables used in Mod.1, highlighting the effects of IFRS and Big4 on the republications, since both had a statistically significant and positive effect. In addition, it was verified in the robustness test that the TRA suffers a lag effect, so the TRA of the previous period has a significant effect on the current one. It is worth noting the Governance effect, which suggested a lower level of TRA as the level of governance increases, which also happened with the strengthening of internal controls (SOX). Another important finding was the negative effect of the Total Accruals on TRA. This result suggests that the increase in Total Accruals reduces ART. This a priori anomalous relationship may be associated with the effect of political costs to the extent that larger Accruals encourage agents to seek to avoid republishing due to adverse effects, regardless of the type of republication made (Hubber & Bochnerm 2012).

The results observed in the present study are in agreement with the majority of those observed in the international literature (Bardos, 2011, Badertscher, Collins and Lys, 2012, Masulis, Sing & Xie, 2012, Schrand & Zechman, 2012; Chen, Cheng & Lo, 2013; Dao et al., 2014; Baber et al., 2015; Collins et al., 2015; Cao et al., 2015; Agrawal & Copper, 2015; Lin et al., 2015; Khalil & Ozkan, 2016), and the few results identified in the Brazilian literature (Cunha, Magro, & Fernandes, 2015, Marques, 2016).

The study contributes to the Brazilian and international literature on the subject and opens space to understand the determinants of republication in the Brazilian context in further depth, specifically in an empirical-quantitative approach. From a theoretical point of view, the study contributes to agency theory insofar as it provides evidence that the firm's control mechanisms (Audit, Governance Structure) and the agent incentives mechanisms (Compensation Package) contribute to reduce the level and likelihood of republication. In practice, it calls attention to the need to reinforce the respective mechanisms and especially draws the attention of regulators, since the change in the accounting standard had a positive effect on the republications.

The study presents limitations on how to analyze only data from listed companies, the unavailability of information on managers' remuneration in the Pre-IFRS period, and the use of a more robust proxy for sector control. For future research, we suggest analyzing the firm's reputation effect in this relationship, besides inserting other control variables, such as auditor change, auditor's opinion, reasons for republication, among others.

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# What Teaches me to Teach? A Study About Explanatory Factors of Pedagogical Practices in Accounting Teaching

## Abstract

This article identified the pedagogical practices of 164 Accountancy teachers in the State of Bahia, segregated into active or passive, with more or less student participation, respectively. Aspects such as type of teaching institution, modality of teaching, experience and pedagogical training of the teacher, program content, number of students and progress in the course were later used as possible explanatory variables of the practices. The diagnosis constructed with descriptive statistics and Mann-Whitney tests revealed an essentially passive teaching with low student participation. Independent variables were not able to explain pedagogical practices. Contradictions have been found in the use of practices that characterize active teaching, such as seminars, debates and case discussions by teachers with clear passive teaching characteristics. This may indicate an incomplete or improper use of these practices, which could be used in an essentially passive manner, jeopardizing the effectiveness of learning.

**Key Words:** Pedagogical Practices. Accounting Teaching. Active Teaching.

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## 1. Introduction

Normative, technological and economic changes directly impact the routines of accounting professionals. The market demand for a professional who, in addition to technical knowledge, is able to strategically judge how to evaluate and report accounting information, in order to give the best support to decision makers, reflects such changes, also influencing Accounting Education. Criteria for measuring fair value or accounting for intangible assets are examples of normative changes occurring in Accounting and that bring greater complexity when compared to other measurement criteria, such as historical cost, for example, require critical-reflexive skills from the professionals (Magalhães, Santos & Costa, 2010).

The discussion, then, is in the process of training these accounting professionals. The Higher Education Institutions (HEI) in Accounting face a great challenge to train professionals with the new skills required. The traditional, passive way with lesser student involvement may no longer meet the needs and expectations of students, teachers themselves and the market, as it might not provide for broad interaction and collaboration between teacher and student to develop critical reflection skills (Killian, Huber & Brandon, 2012, Black, 2012, Coetzee & Schmulian, 2012, Pereira, Niyama & Freire, 2012). It is necessary to rethink how to teach.

The best way to teach is not presented clearly in the literature. There are several methods that can enhance the students' involvement in the teaching-learning process though. In practice, there is a weak alignment between what is discussed in the classroom or the way this discussion is conducted and what students actually use or do in the daily organizational reality. It could be a flaw in the way of teaching that may not contribute effectively to the education of the new accountant (Killian, Huber & Brandon, 2012; Peleias, Patrucci, Garcia & Silva, 2008). According to Silva, Bruni and Baqueiro (2013) - and Pereira, Niyama and Freire (2012), the practices of a traditional model persist, centered on the teacher, with simple transfer of information and a distant relationship between teacher and student.

Reflection and investigation is due on the teachers' ability to contribute to the establishment of the new student profile, the most appropriate teaching attributes and practices for the development of skills required for accounting performance, or the qualifications required for teaching. This discussion becomes relevant in the sense that the training of Accounting professionals directly influences the business universe, since this type of professional plays the important role of providing information to the decision makers of companies and, consequently, the economic-social balance companies are inserted in. It is also influenced by the market demands that require professionals with critical judgment, reflection and communication skills and information organization, and not only specific knowledge of measuring, evaluation and financial reporting techniques. And the faculty members of educational institutions are directly linked to the education of this new profile of accountants.

The present article begins a set of research activities with the purpose of understanding and, based on this understanding, proposing, in future research, improvements for the teaching of Accounting in the State of Bahia. It aims to construct a diagnosis of the pedagogical practices employed, analyzing conditions for a more active or more passive practice. The research problem consisted of: how can the pedagogical practices adopted in the teaching of Accounting in the State of Bahia be explained based on the variables teacher training and teaching experience, type of HEI, teaching modality, content, number of students in the class and progress in the course?

## 2. Pedagogical Practices in Accounting Teaching

The appropriate choice of the pedagogical practice can be a differential in the education of a professional, depending on how the learning process is developed, the focus of the strategies adopted to develop the judgment and decision making skills (Martins, Vasconcelos & Monte, 2009). The teaching of Accounting can be treated under two approaches: passive or traditional, centered on the teacher as an active subject in the learning process; and the active or non-traditional, student-centered approach.

Teaching in the traditional perspective considers the teacher as the main subject in the learning process, the holder of all knowledge. This traditional model, according to Coetzee and Schmulian (2012, p.87), “is characterized by the teacher dominating the classroom, giving reams of knowledge to the students, of whom little is expected but passively absorbing knowledge”. It consists of a means of transferring knowledge, in which the student has the function of memorizing the behaviors presented by the teacher. They are part of the pedagogical practices within a traditional conception of teaching: lectures based on textbooks, didactics, memorization of summarized contents; the use of objective evaluation criteria such as written test with closed answers, or even discursive questions that lead the student to regurgitate a series of information transmitted by the teacher during the classes (Pereira, Niyama & Freire, 2012, Black, 2012). Freire’s (1987) bank conception corroborates the traditional model of teaching, where content in textbooks receives too much attention, and students are pieces without action in the teaching process.

Teaching, an activist perspective, is based on the ideas and constructivist theories of Piaget and his followers. It would correspond to “a series of theories that refer to the study of the cognitive development and the interactive development of the human being, also known by the name of constructivism” (Oliveira, 2009, p.27). Knowledge is built from a series of activities, whether related to mental, cognitive activities or even related to cultural and social aspects for the development of organized structures of information and knowledge construction.

According to Oliveira (2009, 27), education must “aim at the development of intelligence through interactive constructivism” which, at bottom, starts from the principle that what is assimilated is added to a background mental structure, then creating a new structure”. In the constructivist view, knowledge is not considered something static, ready and finished. It is characterized as something more particular, exclusive of each student, since the knowledge would not be transferred but constructed. On this basis, teaching cannot be reduced to a simple transfer of disciplinary contents without at least considering the “receiver”, in this case, the student, without interaction with the environment he is inserted in, the knowledge acquired over the years, as a loose pawn without participation. According to Oliveira (2009: 27), “through a constructivist conception of teaching, the educational function consists in creating, constructing, experiencing realities with an interaction among individuals.”

According to Veiga (2008), pedagogical practice can be defined as social practice guided by objectives, aims and knowledge of a social nature, covering different aspects in relation to the school and the context it is inserted in. According to Veiga (2008, p. 16), it is understood as “a dimension of social practice that presupposes the theory-practice relationship, and it is essentially our duty as educators to seek the necessary conditions for its accomplishment”. The pedagogical practices adopted vary between more passive or more active practices. For Tozetto and Gomes (2009, 190), the “pedagogical practice is the action of teachers for a teaching and depending on the practice teaching can improve or even get worse”. For Slomski and Martins (2008, p.9), “pedagogical practice is understood as a space for the construction of professional knowledge”.

Pedagogical practices could be presented as active or passive. Their characterization is displayed in Table 1.

Figure 1  
Active and passive pedagogical practices.

Passive teaching	Active teaching
<b>Characteristics</b>	
Considers the teacher as the center of attention, the “holder of all knowledge”. The student’s participation in the teaching process is small, who should passively absorb or memorize the knowledge transmitted by the teacher.	Assumes that the knowledge is constructed based on a series of activities for the development of organized information structures and knowledge construction. The learning happens based on the organization of action schemes structured in function of the experiences lived and the environment the student lives in.
<b>Common pedagogical practices</b>	
Involve actions that bring the students to memorize contents. Examples: strict lectures, without the student’s participation, handouts with summarized contents, exercise lists, textbook, without room for discussion, with objective criteria to assess the student’s performance, such as a written test, with multiple-choice questions, which remits the student to memorization and reproduction of contents summarized by the teacher.	Involve actions that make the students participate more intensely in the learning process. Examples: dialogued lectures; directed studies; experience-based learning departing from interviews with professionals in the market, seminars with the entire class, roundtable discussions, debates, involving all students, problem-based learning (PBL); teaching in small groups, teaching with research; distance teaching (such as online discussion groups); case study; workshops; model offices, laboratories or companies; simulations and games.

Source: adapted from Silva (2014).

Passive pedagogical practices would be associated with a traditional teaching model, with an encyclopedic focus, in which the teacher acts as a transmitter of knowledge. Traditional practices would involve lectures, with the presentation of contents synthesized according to the teacher’s point of view, without much reflection and interaction between teacher and student (Zanon & Althaus, 2010). As for the assessment criterion of the student’s performance, the most used is written test with objective and discursive questions, making the student memorize the contents presented by the teachers (Pereira, Niyama & Freire, 2012).

In the context of active practices, varying options allowed for the insertion of the student as an active subject in the knowledge construction process. Much has been discussed about the need to approach pedagogical practices, with actions directed at the student, even in introductory courses in Accounting and Finance, according to Killian, Huber and Brandon (2012); Cunningham (2011); Premuroso, Tong and Beed (2011). As portrayed by Killian, Huber, and Brandon (2012), when they mention “intentional learning”, in which the ability to learn intentionally and to become an apprentice throughout life should be aroused in the student, they believe in the use of interviews with experienced professionals in the subject to be studied, Cunningham (2011) discusses the use of lectures and plays as pedagogical strategies, while Premuroso, Tong and Beed (2011) argue about the use of tutorials to promote pedagogical interaction and improvement in the teaching-learning process. A gap remains between the ideal pedagogical practices suggested in the literature and the way Accounting teaching occurs in Brazil (Pereira, Niyama & Freire, 2012).

### 3. Methodological Procedures

The objective of diagnosing the teaching of Accounting in Bahia led to the execution of a quantitative research. The data collection involved the use of questionnaires, collected with the help of the SurveyMonkey tool. A survey was elaborated of the institutions registered in the E-MEC system that offer the Accounting course and the institutional websites were consulted to get the coordinators’ emails. Subsequently, an electronic message was sent to each of the coordinators to request the list of teachers’ e-mails. Then, 1,213 e-mails were sent with the invitation to fill out the questionnaire; 164 collaborated with the research.

The diagnoses of the pedagogical practices adopted and the teaching performance of the respondent were reached based on statements contained in Blocks I through V of the second section of the data collection instrument. The data collection instrument was elaborated and structured in blocks for the sake of better organization and achievement of the proposed objectives. Blocks I through IV were adapted from the instrument used by Silva et al. (2013).

The statements in Blocks I to Block IV sought to diagnose the pedagogical practices of educational institutions. Block V refers to the qualification and professional and teaching performance of the respondent. Block I contains questions about the planning and development of the classes, claims identified from C1 to C8. Block II, comprising the statements C9 to C15, refers to the pedagogical practices the teachers used most, identified using a Likert-type with two extremes of intensity, where 1 represents total disagreement from the assertion presented and 7 total agreement. Block III, including the statements C16 to C19, sought to identify the resources used by teachers to teach their classes; it aimed to identify the intensity in the use of resources such as overhead projector, frame, data show, movies or audio resources. Block IV sought to identify the criteria adopted by teachers to evaluate student performance; it consisted of seven assertions for the respondents to manifest themselves on a seven-point Likert-type scale with two extremes of intensity, where 1 represents total disagreement from the presented statement and 7 total agreement.

Block V consisted of the questions identified from D1 to D13. It was aimed at collecting information about the teacher's pedagogical training, type of institution, experience, characteristic of the subject, average number of students in the classroom, as well as other information such as gender, age and professional training of respondents.

The objective of verifying the pedagogical practices adopted and the teaching performance collected through the questions in this block involves a posterior analysis of the association of each variable with the use of active or passive practices. The data collected serve to test the hypotheses presented below.

*Ha: Greater pedagogical training of the teachers is associated with the choice of active pedagogical practices.*

With regard to training for teaching, Miranda, Casa Nova and Cornacchione Junior (2012) present professional training and pedagogical training as important factors for the exercise of the profession. The literature does not make clear, however, that pedagogical training is associated with the use of active pedagogical practices.

*Hb: Teachers from public institutions are more likely to use active pedagogical practices more intensely.*

The educational institutions are categorized into two main groups: public and private institutions. It is important to highlight some aspects that differentiate the two types of institutions: (a) form of funding - public institutions are financed by the public authorities through the transfer of public funds; private institutions are financed by collecting amounts disbursed by students, as Silva (2001, p. 296) affirms that "the dependence of the clientele on the economic survival of the company naturally generated a leveling down of the didactic requirements"; (b) teachers' salary issues; (c) the involvement of public institutions with scientific research differently from private institutions that focus on technical training (Silva, 2001); (d) faculty's degree, there is a greater concentration of master's and doctoral graduates in public institutions than in private institutions (Martins, Vasconcelos & Monte, 2009); and other aspects such as institutional infrastructure, administrative policies. It is presumed that, in view of the aspects presented, the use of active pedagogical practices is more common in public institutions because of the involvement of teachers and students as researchers and the exclusive dedication to teaching when compared to private institutions, where teachers from private institutions show up close to the time they go to classrooms and do not carry out further research activities with the students because of the work regime and remuneration received in return.

*Hc: Teachers who are more active in in-class teaching are more associated with the use of active pedagogical practices.*

The teaching modality can partially explain the use of more or less active pedagogical practices. A face-to-face course may require a teacher to interact more with the students, since these are present figures requiring greater dialogue, which may facilitate the use of active methods, such as group dynamics, seminars. In the literature, no studies were found that are capable of substantiating this judgment explicitly.

*Hd: Teachers with greater accumulated experience are associated with the choice of active pedagogical practices.*

In this research, experience is considered as professional experience and experience in teaching. Professional experience can influence the use of active teaching practices more appropriate to the needs brought by the current context of Accounting, since an experienced professional already needs to have felt the difficulties of facing real obstacles in the practice of the profession. Also, experience in teaching can positively influence the adoption of active pedagogical practices, since the teacher learns by acting in the classroom; the pedagogical practices that best fit the characteristics of the discipline, the class and thus, through the observation of success or failure in choosing one or another method to teach. In the conception of Miranda, Casa Nova and Cornacchione Junior (2012); Killian, Huber and Brandon (2012); Black (2012); Nóvoa (2009); Maseto (2009); and Slomski (2007), the know-how is acquired through a series of practical experiences, that is, through the accumulation of experiences, the quality of the activity performed improves.

*He: Teachers in more practical or applied subjects are associated more intensely with the use of active pedagogical practices.*

Another point that may be associated to the choice of pedagogical practices is the characteristic of the program content of the discipline. Researchers such as Black (2012), Pereira, Niyama and Freire (2012) consider the disciplinary content as a guiding variable in the way of teaching, that is, the pedagogical practices adopted by teachers can change according to this variable. As an argument for this hypothesis, the program content is segregated into two groups for the sake of this study: theoretical, conceptual or normative contents (like in the case of Accounting Theory) and practical or applied contents (as is the case of the disciplines Management Accounting, Cost Analysis), which can guide the teacher to the choice of more active practices in practical or applied content disciplines while, in disciplines with more theoretical and conceptual contents, the teacher can adopt passive pedagogical practices. Examples are the use of laboratories for some more practical disciplines, or even theoretical-scientific work in more theoretical disciplines (Kosová, 2014).

*Hf: Teachers in smaller class groups are associated with the more intense use of active pedagogical practices.*

The number of students enrolled in higher education courses has been increasing, along with the pressure on educational institutions to prepare qualified professionals, the shortage of financial resources in the sector, and the lack of trained professionals (Miranda, Casa Nova & Cornacchione Jr., 2012). This increase in students and the market demand for reflective professionals can directly interfere in the way of teaching. As Maringe and Sing (2014, p.4) argue, the large number of students in the classroom ‘is therefore not just a matter of numbers, but it is a question of the complexities and challenges associated with the delivery of both equality and quality opportunities for all students to learn’. Considering the characteristics of the active methods, characterized by the inclusion of the student as an active subject in the learning process and its interaction, it is considered that the existence of very crowded classes can interfere in the discussion and interaction of the student with the teacher and other colleagues, favoring the use of passive methods such as lectures.

*Hg: Teachers in more advanced class groups are associated with the more intense use of active pedagogical practices.*

It is believed that the teacher who teaches in beginner classes tends to adopt more passive pedagogical practices than in more advanced classes in the course. Newcomers have a lower level of integration, which may make it difficult to use active methods. In addition, reduced knowledge about accounting issues could raise the challenge associated with the use of active pedagogical practices such as the use of case studies or games with simulations.

The Mann-Whitney nonparametric test was used to verify the average of the responses to more passive pedagogical practices, differing from the mean of responses to more active practices in relation to the progress in the course, type of educational institution, teaching modality, program content, professional and teaching experience, and pedagogical training, assuming the dependent variable (pedagogical practice) as a dummy (0 - teachers with greater use of passive practices and 1 - teachers with greater use of active practices).

#### **4. Analysis of Findings**

The final sample consisted of 164 respondents, and not all of them fully completed the questionnaire. The totals of respondents presented in the tables and analyses vary for each type of question, since the respondents did not answer all the questions.

Of the 109 responses obtained on gender, 72 (66%) were male and 37 (34%) female; 63 respondents were over 40 years of age; 97 indicated their level of education, of which 50 had an undergraduate degree in Accounting, 19 in Administration and 28 in other areas, such as Law, Information System, Civil Engineering, Statistics, Mathematics and Economics. In addition, 38 respondents held a specialization in Accounting and Auditing, 17 in Administration, 10 in Education and 18 in other areas (Law, Information System, Public Policies and Regional Development, Marketing).

Of the respondents who possessed a master's degree, 21 indicated a degree in Accounting, 10 in Business Administration and 30 in other areas of knowledge, such as Law, Economics, Human Development, Regional Development and Environment, Computing and Social Anthropology; four respondents revealed a doctoral degree in Accounting, three in Administration, three in Education and five in other areas (Regional Development, Computing and Economics).

A specific block of the instrument collected the pedagogical practices most adopted by the respondents, such as planning and conducting the classes, the form and the resources used to teach the classes. Regarding the planning of the disciplines, the teachers' practices were verified through a sequence of statements about the intensity of students' participation in the planning of the disciplines, according to Table 1.

Table 1  
Form of planning the classes

		Disagree	1	2	3	4	5	6	Agree	7	Average	Total
C1. The students participate a lot in the planning of my subjects.	Fi	14	21	25	24	16	7	5	3,4	112		
	%	13	19	22	21	14	6	4	100			
C2. The objectives of my subjects are always presented to the students.	Fi	1	1	1	4	3	14	88	6,6	112		
	%	1	1	1	4	3	13	79	100			
C3. The content to be addressed in my subjects is always presented to the students.	Fi	-	-	2	2	6	10	90	6,7	110		
	%	-	-	2	2	5	9	82	100			
C4. I always present the method to be developed in my classes to the students.	Fi	-	-	2	6	11	21	72	6,4	112		
	%	-	-	2	5	10	19	64	100			
C5. I always present the evaluation criteria in my subjects to the students.	Fi	-	1	2	4	5	16	83	6,5	111		
	%	-	1	2	4	5	14	75	100			
C6. I always present the support resources (texts, equipment etc.) I will use in my subjects to the students.	Fi	-	2	3	7	10	30	59	6,2	111		
	%	-	2	3	6	9	27	53	100			
C7. I always discuss the program contents of my subjects with my students.	Fi	5	7	8	10	18	20	44	5,4	112		
	%	4	6	7	9	16	18	39	100			
C8. I always consider my students' potential contributions to my subjects.	Fi	-	2	5	7	13	31	53	6,0	111		
	%	-	2	5	6	12	28	48	100			

Source: research data (2014).

The figures in Table 1 highlight the intense participation of the teacher in the planning of the disciplines, with the presentation of objectives, contents to be addressed, method, evaluation criteria, support resources (texts, equipment and others) for students. The participation of the students in the planning of the subjects does not happen or happens in a limited way. The planning of the discipline would be almost unilateral, with the teacher directing and presenting the rules without much participation or discussion with the students, which would characterize teaching in a passive perspective, according to Coetzee and Schmulian (2012), Pereira, Niyama and Freire (2012). In the planning phase, the teacher elaborates his strategies to address the program content with the students, how it should be treated, with or without the students' participation.

Table 2  
Activities employed in the classroom

		Disagree	1	2	3	4	5	6	Agree	7	Average	Total
C9. My classes are essentially lectures.	Fi	17	12	13	28	28	9	6			3,8	113
	%	15	11	11	25	25	8	5				100
C10. I intensely use seminars with students' great participation in my subjects.	Fi	11	7	16	28	24	17	10			4,2	113
	%	10	6	14	25	21	15	9				100
C11. I intensely use debates with the students in my subjects.	Fi	5	2	7	19	21	31	26			5,2	111
	%	5	2	6	17	19	28	23				100
C12. Discussions of problems are intensely used in my subjects, when I work with the students to seek a solution for the problems proposed.	Fi	2	7	7	18	19	27	32			5,3	112
	%	2	6	6	16	17	24	29				100
C13. Discussions of cases involving daily business situations are intensely used in my classes, in which the students critically analyze the topic and look for solutions.	Fi	5	4	5	20	14	36	28			5,3	112
	%	4	4	4	18	13	32	25				100
14. Group work is intensely used in my subjects, in which the students interact with their peers to organize information and knowledge about the content.	Fi	3	4	8	20	25	26	26			5,2	112
	%	3	4	7	18	22	23	23				100
C15. In my subjects, I intensely use simulations (corporate experiences in fictitious environments associated with knowledge of common situations in the business sphere).	Fi	4	8	15	21	19	23	22			4,8	112
	%	4	7	13	19	17	21	20				100

Source: research data (2014).

As observed through the teachers' perception about the intense use of practices presented in the statements contained in Table 2, of the 113 respondents who expressed opinions about these practices, 43 (38%) agreed to use essentially lectures to deal with classroom content (Scores between 5 and 7 on the intensity scale); 42 (37%) did not agree or partially agreed (scores marked between 1 and 3); and 28 (25%) remained neutral (indicating score 4). It is perceived in this study that methods such as seminars, debates, discussion of problems, discussion of cases and group work are more used. As shown in Table 2, 51 (45%) out of 113 respondents positively expressed the use of seminars (concentration of responses between 5 and 7); and 28 (25%) did not stand against or in favor (concentration of responses at level 4 of the agreement scale). Afterwards, discussions and case discussion, with 78 (70%) of the 112 respondents, concentrated the answers between the highest scores of the scale (indicated scores between 5 and 7).

In general, the results differ from the ideas of Silva et al. (2013), Pereira, Niyama and Freire (2012), Black (2012), Coetzee and Schmulian (2012), Killian, Huber and Brandon (2012) regarding resistance to adopt active pedagogical practices. In this study, we found strong use of elements that characterize active pedagogical practices in the classroom. Regarding the planning of the discipline, however, characteristics of passive teaching were found, with the teacher presenting the rules to be followed during the course without the students' participation. Reflection is due on how pedagogical practices are developed and how teachers use these practices effectively in the classroom, considering that, in the initial planning phase of such strategies, it does not seem to consider the student figure. It is possible that the respondent uses practices that should be active, but with a passive perspective. That is to say, a teacher can adopt, for example, seminars as a pedagogical practice to work in the classroom and not work in order to raise discussions about the issues involved in a certain subject, only transferring to the students the responsibility to present the content in a lecture form. Thus, there is a practice that should be active but is used passively.

As for the resources used in class, 59 (53%) of the 112 respondents focused their responses in the lowest scores of the scale (indicating scores between 1 and 3); the same is true for photos, prints and posters, audio resources (music, recordings) and the use of digital discussion tools (interaction tools such as Moodle, blogs, social networks, Skype), with more than 50% of these resources (indicating scores between 1 and 3 in the intensity scale), as presented in Table 3.

A limited use of movies, photos, prints and posters, audio resources (songs, recordings) and use of digital discussion tools (interaction tools such as Moodle, blogs, social networks, Skype) can be noticed.

Table 3  
Resources used in the classroom

		Disagree 1	2	3	4	5	6	Agree 7	Average	Total
C16. I always use movies in my subjects.	Fi	20	24	15	16	11	12	14	3,6	112
	%	18	21	13	14	10	11	13		100
C17. Pictures, prints and posters are intensely used in my subjects.	Fi	22	24	16	22	10	11	7	3,3	112
	%	20	21	14	20	9	10	6		100
C18. Audio resources (songs, recordings) are intensely used in my subjects.	Fi	24	26	20	12	13	13	3	3,1	111
	%	22	23	18	11	12	12	3		100
C19. Digital discussion tools (interaction tools such as Moodle, blogs, social networks, Skype) are intensely used in my subjects.	Fi	19	27	19	12	17	11	7	3,4	112
	%	17	24	17	11	15	10	6		100

Source: research data (2014).

Resuming the reflection on active pedagogical practices being used in a passive teaching perspective, the methods presented by the respondents as more adopted practices being characterized as active methods, but the way to plan the discipline and the resources used being passive, it is worth noting that respondents can adopt active practices and continue with the passive teaching conception; or it is possible that the explanation is a limitation of the research itself concerning the instrument and the respondents, who may not want to present the practices they actually adopt in the classroom.

Table 4 presents the criteria used to evaluate student performance. Through a series of statements that present performance assessment criteria, a scale of intensity was also presented, ranging from 1-total disagreement to 7-total agreement, for the respondents to manifest themselves, it could be observed that the most used criteria, the highest frequency concentration of answers in the highest scale scores (between 5 and 7) are: Practical Tests (Business Simulation), with 82 (74%) of the respondents; Written Tests, with 75 (67%); Participation of students throughout the classes, with 76 (68%), and Seminars with 61 (55%) of the respondents. The least used criteria are oral evaluations, debates and group dynamics with a higher concentration of answer frequencies in the lowest scores of the scale (between 1 and 3).

Another observation: respondents use less active criteria, such as written tests to evaluate student performance, while active criteria such as debates, group dynamics are little used. The explanation for why teaching presents characteristics that should be active but, when observed in depth, characteristics of passive teaching are found, is the possibility that the respondent does not want to present himself as a passive teacher, when in fact he acts as such. The pedagogical practices that characterize the traditional model, focused on the teacher and not on the student, and on the development of reflexive skills persist in higher education, according to Pereira, Niyama and Freire (2012) and Stanley and Marsden (2012). The results point out characteristics of passive teaching, but with some practices that, if used properly, mark teaching in an active, constructivist perspective.

Table 4

**Most used criteria to assess the students' performance**

		Disagree	1	2	3	4	5	6	Agree	7	Média	Total
C20. I always use written tests as a criterion to assess the students' performance in my subjects.	Fi	6	8	7	15	20	19	36	5,1	111		
	%	5	7	6	14	18	17	32	100			
C21. I frequently use practical tests or simulations of business contexts as a criterion to assess the students' performance in my subjects.	Fi	5	5	7	12	21	34	27	5,2	111		
	%	5	5	6	11	19	31	24	100			
C22. I frequently use seminars to assess the students' performance in my subjects.	Fi	10	15	9	15	20	21	20	4,5	110		
	%	9	14	8	14	18	19	18	100			
C23. I use oral evaluations as a criterion to assess the students' performance in my subjects.	Fi	34	24	6	13	13	9	10	3,1	109		
	%	31	22	6	12	12	8	9	100			
C24. Debates are very frequently used as a criterion to assess the students' performance in my subjects.	Fi	17	11	16	20	25	8	13	3,9	110		
	%	15	10	15	18	23	7	12	100			
C25. Group dynamics are very frequently used as a criterion to assess the students' performance in my subjects.	Fi	16	16	15	16	21	14	13	3,9	111		
	%	14	14	14	14	19	13	12	100			
C26. I always use the students' participation throughout the classes as a performance assessment criterion in my subjects.	Fi	9	7	8	11	20	20	36	5,1	111		
	%	8	6	7	10	18	18	32	100			

Source: research data (2014).

The teaching model at the teaching institutions in Bahia could not be characterized as teaching based only on the traditional, passive perspective or characterized as an active model of teaching, with active practices only. There is a use of passive and active practices when it comes to planning the disciplines with passive teaching characteristics. Regarding how to teach classes, the results point to the strong use of active practices. There is reflection on how pedagogical practices are developed and how teachers use these active practices effectively in the classroom, considering that, in the initial planning phase of such strategies, they do not seem to consider the student figure. It is possible that the respondent uses practices that should be active, but with passive perspectives, that is, that a teacher can adopt, for example, seminars as a pedagogical practice to work in the classroom, but does not work in order to raise discussions about the aspects of a certain subject, merely transferring to the students the responsibility for presenting the content in an expository manner. Thus, there is a practice that should be active, but is used passively.

It is important to consider whether the application of active pedagogical practices happens effectively in the classroom in order to promote greater interaction between teacher and student. It is possible for a teacher to adopt practices that are characteristic of active teaching but, when developing it in the classroom, conduct them passively. For Marion, Garcia and Cordeiro (1999), when referring to pedagogical practices in Accounting teaching, the use of seminars is not simply the presentation of a certain theme, but rather the questions raised, when conditions need to be created for discussion and the students need to be driven towards the debate. Another observation is about the use of case studies as pedagogical practices. For these authors, the cases should be real to promote contact with the day-to-day in the business environment and that “cases taken from books and mainly from foreign literature do not always meet the regional and cultural needs of the students” (Marion, Garcia & Cordeiro, 1999, p.31).

In terms of resources used, there is little use of resources that promote greater interaction, such as movies, photos, prints and posters, audio resources (songs, recordings) and digital discussion tools (interaction tools such as Moodle, blogs, social networks, Skype). Regarding the criteria for assessing students' performance, passive and active criteria were used, such as Practical Tests (Business Simulation), Written Tests and Seminars.

Subsequently, the responses in Block C permitted separating the respondents into two groups, based on the pedagogical concepts employed. The statements in Block C always referred to active teaching, except for statements C9 (“My classes are essentially lectures”) and C20 (“I always use written tests as a criterion for assessing students' performance in my subjects”). In these two cases, two new variables, named C9 inverted and C20 inverted were calculated. Each of the inverted variables was calculated by subtracting the original variable from 8 (C9 inverted =  $8 - C9$  and C20 inverted =  $8 - C20$ ). Subsequently, the mean of the two inverted variables and the other 24 original variables was calculated. The median of the averages in Block C was 4.775, allowing for the segregation of the respondents into two groups, presented here as having more passive or more active conceptions. The average positions of the independent variables were compared using the non-parametric Mann Whitney test, as presented in Table 5.

Table 5

**Mann-Whitney tests**

Concepts used		N	Mean rank	Sum of Ranks	Mann-Whitney U, Z and Sig
Type of HEI (public, private)	More passive	54	55.20	2981.00	1420
	More active	54	53.80	2905.00	-0.272
	Total	108			0.785
Modality (distance, in-class)	More passive	55	58.68	3227.50	1282.5
	More active	54	51.25	2767.50	-1.945
	Total	109			0.052
Professional activities (years)	More passive	55	58.95	3242.00	1268
	More active	54	50.98	2753.00	-1.317
	Total	109			0.188
Professional activities in Accounting (years)	More passive	53	55.88	2961.50	1119.5
	More active	50	47.89	2394.50	-1.359
	Total	103			0.174
Content (theoretical, practical)	More passive	55	53.36	2935.00	1395
	More active	54	56.67	3060.00	-0.556
	Total	109			0.578
Number of students	More passive	49	51.27	2512.00	1114
	More active	49	47.73	2339.00	-0.622
	Total	98			0.534
Progress in the course (start, finish)	More passive	55	51.39	2826.50	1286.5
	More active	55	59.61	3278.50	-1.374
	Total	110			0.169
Pedagogical subjects in undergraduate (h)	More passive	25	27.02	675.50	299.5
	More active	26	25.02	650.50	-0.491
	Total	51			0.624
Pedagogical subjects in specialization (h)	More passive	37	34.62	1281.00	578
	More active	36	39.44	1420.00	-0.979
	Total	73			0.328
Pedagogical subjects in Master's (h)	More passive	26	24.96	649.00	298
	More active	25	27.08	677.00	-0.512
	Total	51			0.609

Source: research data (2014).

Overall, all differences of mean ranks presented in Table 5 were not significant, indicating that the independent variables (training and pedagogical experience of the teacher, type of HEI, teaching modality, content, number of students in the class and progress in the course) would be unable to explain or predict a more active or passive pedagogical practice.

## 5. Final Considerations

This study identified the pedagogical practices used in the daily reality of 164 Accountancy teachers in the State of Bahia and its possible association with the variables: pedagogical training; type of educational institution; teaching modality; teaching experience; program content; number of students and progress in the course. Through the Mann-Whitney test and frequency analysis as procedures to analyze the results found, we tested the seven hypotheses presented for this study. In general, it was not possible to verify the association between the established variables and the pedagogical practices of teachers classified as having more passive or more active practices.

And what is “what teaches me to teach”, according to the title proposed in this paper? Originally, the intention was to present a response based on variables associated with the environment (type of HEI, type of education, content, number of students in the class and progress in the course) or the teacher (training and pedagogical experience). The statistical procedures and tests were unable to provide clear answers concerning the proposed variables. According to the original proposal of the research, it would not be possible to specify “what teaches me to teach”.

When observing the characteristics of the pedagogical practices, however, controversial results are shown. The characterization of the planning of the subjects, the way in which the classes are conducted, the resources used and the criteria adopted to evaluate the students’ performance indicated the existence of active pedagogical practices. What the planning is concerned, on the other hand, characteristics of passive teaching were found, with the teacher presenting the rules to be followed during the course without the participation of the students. The respondents assume active pedagogical practices.

In their initial phase of pedagogical planning, however, they act passively. The resources used by the respondents possess characteristics of passive teaching. The respondents may adopt practices (such as use of movies or seminars) that should be embedded in an active context, with strong student involvement, but their use may be occurring in a passive perspective (filling in “idle” hours or without the teacher and the students’ proper involvement). In these situations, the effectiveness of the teaching process could be compromised. As an illustration, when the seminars are not used in a well-placed manner and planned in the context of the discipline, they are no longer a space for reflection and merely transfer the responsibility for the student to present the content to the other members of the class, according to criteria established by the teacher. Therefore, pedagogical practices that should characterize teaching as active may be used as a passive form of teaching.

In this context, it could be assumed that educational training gaps (lack of knowledge about how active practices should be inserted in the teaching process) or gaps in the teacher’s commitment to the educational process (occupying the class time without actual concern with the adopted practices) are “teaching to teach”. These concerns may direct future research. New approaches are possible, including other variables that may explain the adoption of pedagogical practices such as the pedagogical models teachers experienced along their educational trajectory.

Reflection is needed on the pedagogical practices and the results of the teaching performance in line with the market requirements, considering the skills and abilities required for the professional performance. Accountants are more than professionals with a baggage of contents; they need to know how to apply it in the best way, considering the contingencies of the environment they are inserted in. In practical reality, the accountant deals with information and communication technologies that require attitudes that involve persuasive logical reasoning skills. The economic and social environment also influences the professional performance, since the companies are inserted in a social context.

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# Teaching Case: The Allocation of Joint Costs in Processes with Multiple Splitoff Points at Refinaria Fluminense S. A.

## Abstract

The purpose of the Refinaria Fluminense S.A. case is to illustrate the operation of an oil refinery and the challenges that accountants and managers face in assessing the costs of oil products, evaluating inventories, ascertaining the results of refinery operations and analyzing decisions to continue processing individual products to increase their value added. It was designed for discussion in the subjects of Management or Cost Accounting in undergraduate and postgraduate courses in Accounting, Administration and Production Engineering. The narrative begins with information that shareholders are demanding that management take steps to increase the company's profitability. In analyzing the profitability of products manufactured and marketed, managers realize that they do not sufficiently understand the distribution and behavior of product costs. Convinced of the importance of this information, managers decide to hire a cost specialist who promises to solve their doubts and help them analyze the decisions they will have to make to meet the shareholders' wishes. Students are then asked to take on the role of the specialist and develop the proposed questions. One of the most relevant contributions of the case is that it provides the opportunity for students to confront the stylized textbook exposures with the conditions found in companies. This is particularly true in the case of the application of the net realizable value method in processes with multiple splitoff points, a case rarely commented on in the vast majority of books.

Key words: Joint production processes. Joint cost allocation. Multiple splitoff points. Oil refineries.

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## 1. Introduction

The objective of the Refinaria Fluminense S.A. case is to illustrate, in a very simplified way, the operation of an oil refinery and the challenges that accountants and managers have to face in order to determine the costs of oil products, to use these costs to determine the costs of inventories and the results of operations and analyze decisions to continue processing individual products in order to increase their value added.

The refining plant described was inspired by the Paulínia Refinery (REPLAN), the largest refinery in Brazil, owned by Petróleo Brasileiro S.A. - Petrobras. The hypothetical company is presented as a 43-year refinery where the production process flows properly. However, its administrative activity is limited to the minimum essential to its operations.

In this context, two factors “disrupt” the company’s status quo: the requirement of shareholders to increase the profitability of the business and the possible imposition, signaled by the competent governmental authorities, of lower emission levels of diesel pollutants.

Given this scenario, managers realize that they need to review the products marketed by the Refinery and control their costs. As one might suppose, however, they are faced with the characteristic difficulties of operations involving joint costs, such as a production process with four splitoff points and intermediate products which are not regularly marketed, and therefore have no market prices.

Aware of the importance of this information, even without understanding it properly, managers decide to hire a cost specialist who promises to solve their doubts and help them analyze the decisions they will have to make. Students are then asked to take on the role of the specialist and develop the proposed questions. The characters and the situation portrayed seek to provide a reference for the reality found in companies, intending to leave the level of theory and simplified and automatic solutions.

Thus, we tried to demonstrate, throughout the case, that the subject can be approached from several angles and with different levels of complexity, not only providing for the calculations, but mainly reflecting on the utility of the information produced, the advantages and disadvantages of applying the different cost allocation methods and the concepts involved. The case also provides discussions on the relevance of accounting information and the use of costs for pricing, thus complementing the contents of the chapters of cost accounting and management accounting books dealing with costs of joint products and by-products. Since they generally use examples of excessively naive production processes in exposures and exercises, underestimating the actual intricacies found in companies, the case of the Refinaria Fluminense S.A. allows students to experience a situation closer to reality in a controlled way.

One of the most relevant aspects of this work is that the production process of the refinery in question has multiple splitoff points, a problem rarely mentioned in the accounting books (Horngren & Foster, 1987; Lowenthal, 1986) and which requires some caution, especially in the distribution of joint costs through the net realizable value method.

## 2. The Refinery

The Refinaria Fluminense S.A. was founded in 1973 and is located in the city of Rio de Janeiro. In 1995, the processing capacity of its refinery was increased from 45,000 m<sup>3</sup> / day to 66,000 m<sup>3</sup> / day of oil, equivalent to 415,000 barrels of oil per day. The top managers of the refinery are Antônio Dantas, the current president; Carlos Mendes, operations director, and Fernando Gonçalves, administrative director. The number of administrative staff is quite small, but all members are highly qualified, reflecting the company’s focus on excellence in operational activities.

Despite the commitment of top management to the efficiency of operations, the company's shareholders have been complaining for some time that the profitability of the business is below expectations. To aggravate the situation, government officials have recently signaled the possibility of imposing a reduction in the emission levels of diesel pollutants from 500 particles of sulfur per million to 50 particles of sulfur per million, which will necessarily require changes in manufacturing processes, resulting in an increase in production costs.

Concerned with the pressures of the shareholders and with the consequences of the probable demands by the authorities, Dantas decided to meet with Mendes and Gonçalves on January 3, 2017, in the morning, to examine the problems and define how they could be faced.

### 3. The Meeting

As soon as Dantas showed everyone the seriousness of the facts and spoke about the need to cut costs, Gonçalves said that his team had been reduced for three months, and that it could not lose new employees without compromising the results that everyone expected from administrative activities.

Mendes, chief operating officer, agreeing with Gonçalves, pointed out that his team was qualified and very efficient, and that cuts in the operational area could reduce the quality of the processes and increase the risks of operations. He specifically and vehemently defended the need to take proper care in processing and moving oil and its byproducts to protect employees, the community surrounding the refinery, and the environment. He also pointed out that, according to the most recent physical production monitoring report, the refinery processed 12.5 million barrels of oil in December 2016, or 403,000 barrels a day, indicating that it was using 97% of its installed capacity.

After hearing the directors, Dantas said: "I understand and agree with you. As we are operating very close to our installed capacity, we do not control the prices of the derivatives we produce and we cannot make new cuts in the administrative area or in the operational area, all we can do is study the production costs of the refinery in depth, the products we are manufacturing and the possibilities of subjecting them to new processes in order to add value to them."

Mendes, chief operating officer, said that, in order to elaborate these analyses, he would need reliable financial information. Dantas then asked Gonçalves if the accounting department regularly generated cost and profitability reports per product, and he replied that no, but that it would not be difficult to provide the information that Mendes was requesting. After the meeting, Gonçalves requested that the Accounting Manager verify what information Mendes would need and take steps to provide them on a priority basis.

### 4. The Profitability Report of Products

In the afternoon of the following day, the president received a copy of the product profitability report for the month December 2016, which had been requested by Mendes, and got very worried. He saw that two products were causing losses and then asked Gonçalves for explanations. But the Director of Administration acknowledged, with some discomfort, that he would need to look more closely at the source of the identified losses.

Gonçalves told the president: "The Accounting Department has few employees and everyone is very committed to complying with tax obligations and preparing the quarterly and annual financial statements. These activities occupy all available time, restricting our ability to provide managers with the information and clarification they need as would be desirable. "

Mendes warned Dantas that cutting costs, indiscriminately, would be a danger. He then suggested that it would be better to hire a specialized cost consultant to analyze the operations of the refinery and to help managers evaluate the decisions that would need to be made. The president agreed. And so Pedro Souza, a consultant specialized in costs, was hired. His mission was to review the product costing system and give the support the managers desired.

Pedro and the company's senior management had a meeting to align the expectations before the actual start of the consulting service.

Dantas made it clear that, in addition to the review of the costing system, he wanted an economic feasibility assessment of the following possibilities:

- Subjecting diesel and gasoline to additional processing to obtain products of higher added value;
- Attending, if necessary, requests from some petrochemical industries interested in buying small quantities (marginal businesses) of Naphtha and Cracked Naphtha.

The President also expressed concern about the possibility that the competent authorities would impose a reduction in the emission levels of diesel fuels, with a consequent increase in production costs.

The consultant advised managers that he was familiar with methods of costing and analyzing joint products and by-products, but had never provided services to an oil refinery.

As the professional was highly recommended and had an excellent reputation in the market, Mendes and Gonçalves offered to provide the best accounting and operational staff so that he could carry out high quality work with the required urgency.

## 5. The Production of Oil Products

The employees nominated by Mendes and Gonçalves showed Pedro the refinery and explained to him in detail how oil is processed to give rise to its various by-products. The following are some notes Pedro made based on the information he was provided with.

The refinery receives crude oil and processes it to obtain Liquefied Petroleum Gas (LPG), Gasoline, Diesel, Aviation Kerosene (AVK), Fuel Oil and Coke. The proportion of each of these derivatives is determined by the type of oil being processed and the characteristics of the refinery facilities.

Although there are several types of oil, which give rise to different product proportions and provide different expected profits, the flexibility to choose among those types that at one moment promise higher expected profit than others is limited by the fact that each refinery is designed to make the most of one type of oil. The Refinaria Fluminense S.A. was specifically designed to process Brazilian oil and to maximize, based on this product, the production of more noble derivatives such as diesel and gasoline, and to avoid the production of lower fuel oil and coke.

To assemble a flow chart of the production process and to determine the costs of production of the various petroleum products, Pedro gathered the following information:

- Crude oil arrives at the refinery through pipelines and is stored in tanks. From the tanks, it is sent to the Atmospheric Distillation Unit, where it is heated to give rise to liquefied petroleum gas (LPG), Naphtha, Diesel / Kerosene mixture, and Atmospheric residue;
- LPG, because it is ready for commercialization, is stored in spheres;
- Naphtha is transferred to the Naphtha Hydrotreatment Unit, and from there to the Catalytic Reform Unit where gasoline is obtained, which is stored in tanks because it is a final product;
- The Diesel / Kerosene mixture goes to the Diesel and Kerosene Hydrotreatment, where two products come out: Hydrotreated Diesel and Aviation Kerosene (AVK). They are then stored in their tanks because they are end products;

- The Atmospheric Residue is sent to the Vacuum Distillation Unit where Coke, Fuel Oil and Diesel are obtained. Coke is unloaded in trucks for sale; Fuel Oil is stored in tanks; and Diesel is transferred to the Catalytic Cracking Unit;
- At the Catalytic Cracking Unit, the Diesel chain chains are broken to obtain LPG, which is stored in tanks, Fluid Catalytic Cracking Diesel and Cracked Naphtha;
- The Fluid Catalytic Cracking Diesel is transferred to the Diesel and Kerosene Hydrotreating Unit to produce Diesel and QAV;
- Cracked Naphtha goes to the Cracked Naphtha Hydrodesulfurization Unit, from which gasoline is obtained, which is stored in tanks.

## 6. Survey Executed at the Offices

After visiting the refinery facilities, Pedro visited the offices, where he verified the information displayed in Tables 1 and 2, referring to the operation executed in December 2016, when 12,500 thousand barrels of crude oil were processed.

Table 1

### Inputs and products per Unit

		Inputs (in thousands of barrels)		Products (in thousands of barrels)	
Atmospheric Distillation Unit	Oil	12.500		LPG	380
				Naphtha	1,800
				<i>Diesel / Kerosene</i>	5,350
				Atmospheric Residue	4,970
Naphtha Hydrotreatment and Catalytic Reform Unit	Naphtha	1.800		Gasoline	1,800
Vacuum Distillation Unit	Atmospheric Residue	4.970		Diesel	3,410
				Coke	760
				Fuel Oil	800
Catalytic Cracking Unit	Diesel	3.410		LPG	275
				<i>Fluid Catalytic Cracking Diesel</i>	2,400
				Cracked Naphtha	735
Diesel and Kerosene Hydrotreatment Unit	<i>Diesel / Kerosene</i>	5.350		<i>Hydrotreated Diesel</i>	7,280
	<i>Fluid Catalytic Cracking Diesel</i>	2.400		AVK	470
Cracked Naphtha Hydrodesulfurization Unit	Cracked Naphtha	735		Fuel	735

Source: the authors, 2016.

Table 2

**Prices practiced in December 2016**

Product	R\$/barrel
Oil	190.00
Liquefied Petroleum Gas (LPG)	58.00
Gasoline	270.00
Diesel	236.70
Aviation Kerosene (AVK)	228.00
Fuel Oil	160.00
Coke	2.70

Source: the authors, 2016.

Pedro verified the costs of the refining processes for December 2016, which are registered in Table 3; and that the refinery incurs R\$52,000.00 of debts in the sale of Cokes.

Table 3

**Costs of Refining Processes**

Processed load (barrels)	Unit	Fixed Costs (R\$)	Variable Costs (R\$/barrel)
12,500,000	Atmospheric Distillation	3,750,000	0.50
4,970,000	Vacuum Distillation	6,545,000	1.50
1,800,000	Naphtha Hydrotreatment	1,600,000	3.00
1,800,000	Catalytic Reform	2,800,000	4.00
7,750,000	Diesel and Kerosene Hydrotreatment	4,300,000	2.00
3,410,000	Catalytic Cracking	3,950,000	5.00
735,000	Cracked Naphtha Hydrodesulfurization	1,325,000	5.00

Source: the authors, 2016.

The accountant informed Pedro that the costs presented to the president in the January 4 report were obtained by allocating the joint costs to the main products using the physical units method. He also informed that there were no initial or final inventories in the month of December 2016.

The consultant compiled data on the possibility of subjecting gasoline and diesel to specific processes to produce Gasoline and Premium Diesel. The expectation is that there will be good acceptance in the market for 1 million barrels of Premium Gasoline and 2 million barrels of Premium Diesel. According to market surveys, Premium Gasoline could be sold at R\$ 300 a barrel, while Premium Diesel could be sold for R\$ 250 a barrel.

Pedro found that the expected cost of the conversion process from Gasoline to Premium Gasoline would be R\$ 10.00 per barrel, while the expected cost of the Premium Diesel Conversion process would be R\$ 9.00 per barrel. The technical area of the refinery reported that, in any of these processes, there would be no gain or loss in the quantities produced.

Regarding the possibility of eventually meeting the requests of some petrochemical industries interested in buying small quantities (marginal businesses) of Naphtha and Cracked Naphtha, according to the refinery's sales area, the expected price of the offers is R\$ 250.00 per barrel. According to the consultant's estimates, reducing the emission of sulfur particles in diesel from the current level of 500 to 50 particles per million will impose an incremental cost of R\$ 32.00 per barrel of diesel produced on the refinery plant.

After the survey, Pedro had some certainties, but he still had to make some critical choices that would certainly have a significant impact on the final report that he will have to prepare at the end of the project. The first certainty is that he will need to schematically represent the refinery's production process so as not to get lost in the costing job. He is not sure though about what method to recommend in order to allocate the joint costs. He decided to hear the opinion of the refinery's accountant.

"I still do not know which joint cost allocation method I should use. Both the physical units method and the net realizable value method have advantages and disadvantages. We know that the former is simple and works in any company, but it can generate strange results. Alternatively, we have the second, which allocates costs to products based on their ability to generate revenue, but it is cumbersome and difficult to implement. In addition, the refinery has multiple splitoff points, rarely addressed in traditional cost books, which complicates the application of the net realizable value method. I wonder if the benefits of a more equitable cost allocation will outweigh the costs of implementing and operating the net realizable value method. On the other hand, we both know that the only utility of the unit costs obtained by allocating the joint costs is to determine the cost of inventories and to calculate the results. There is no point in using this information to analyze decisions. What do you think about all this?"

After listening to Peter's considerations, the accountant felt this would be a long conversation, and invited him to have a coffee and snack to deal with these matters with the care they required. Regarding the other orders from Dantas, Pedro did not see any problem to attend them. These assessments depended on concepts and techniques presented regularly in the courses and books on which there is a broad consensus.

Take on the role of Peter as a cost consultant and discuss the following questions.

## 7. Questions

Q1 - Assume, like Pedro, that without proper representation of the refining process, it will be difficult to do the costing of the products manufactured at Refinaria Fluminense S.A. Therefore, prepare a flow diagram that schematically represents the production process of the refinery and determine the quantities of products obtained in December 2016.

Q2 - Rank the refinery's products as main joint products or by-products. Justify your rating. Knowing that there are several methods for the accounting treatment of by-products, choose a method to be applied in the case and defend your option.

Q3 - Use the **physical units method** to calculate the costs of the main products produced in December 2016. Based on this information, determine the total and unit gross profit of the main products and by-products and the profit of the refinery.

Q4 - Use the **net realizable value method** to calculate the costs of the main products produced in December 2016. Based on this information, determine the total and unit gross profit of the main products and by-products and the profit of the refinery.

Q5 - Assist the administration in evaluating whether there is merit in producing and selling Premium Gasoline and Premium Diesel, justifying your recommendation.

Q6 - Provide subsidies to managers to decide whether to accept the proposed purchase of Naphtha and Cracked Naphtha by the petrochemical industry, based on their advice.

Q7 - Evaluate the impact of meeting the requirement to reduce the current level of sulfur particles present in diesel in the result of the Refinaria Fluminense S.A. How should the refinery management res-

pond to this requirement? Is it possible to meet this desire of society without passing on the increase of costs to the price?

Q8 - After all the calculations and evaluations performed, Pedro still was not sure as to which joint cost allocation method should be proposed to the refinery's management. Recommend using one of the methods proposed in questions 3 and 4 and justify your answer by presenting the advantages and disadvantages of the method that you think is most appropriate.

Q9 - Reflect on the usefulness and relevance of the accounting information produced based on the joint cost treatment. How can cost-based decisions be made in an environment such as the Refinaria Fluminense S.A.?

## 8. Teaching Notes

### 8.1 Educational Objectives

The case of the Refinaria Fluminense S.A. was designed to make students experience in a controlled manner the problems experienced by accountants and administrators in a company that operates a decomposition process. They will have the opportunity to schematically represent the production process; identify the products manufactured at each stage of the production process; classify them as joint products and by-products; define which values will be assigned to by-products; use two different methods to allocate joint costs to joint products; and use cost information to analyze decisions to further process some products by adding value to them.

Since some of the intermediate products that give rise to the main products of the Refinaria Fluminense S.A. do not have market prices, one of the questions in the case asks the students to distribute the joint costs through the net realizable value method. This question will cause students to encounter multiple splitoff points and find that this possibility is not generally considered in Accounting books. They will then have the opportunity to realize that the multiple splitoff points complicate, but do not prevent the application of the net realizable value method. In this regard, the case shows that the problems encountered in the daily life of companies are not always as simple as the chapters that deal with costs of joint products and by-products in textbooks.

Kaplan (2007) calls cases like the Refinaria Fluminense S.A. computational cases. He uses such cases (e.g., Wilkerson Company and Sippican Corporation) to provide managers with insight and confidence about the concepts and techniques that are employed to analyze or answer the proposed questions. Not to train consultants or project leaders to develop and deploy cost systems.

The case of the Refinaria Fluminense S.A. can be applied in the classes of Cost Accounting or Management Accounting in undergraduate and postgraduate courses in Accounting, Administration and Production Engineering.

## 8.2 Theoretical Framework

### 8.2.1. Introduction

Hornsgren (1972), Backer and Jacobsen (1974), Hornsgren and Foster (1987), Cashin and Polimeni (1981), Shillinglaw (1982), Hornsgren and Foster (1987), Hornsgren, Foster and Datar (2000), Hansen and Mowen (2001), Maher (2001), Martins (2003), Jiambalvo (2009), Hornsgren, Datar and Rajan (2012), and Hornsgren, Datar and Rajan (2015) show that accounting concepts and techniques for accounting analysis and treatment of the joint product and by-product costs have long been consolidated, and that no significant innovation has emerged in this area recently. It also shows that the chapters on this subject are short because there are few concepts that need to be presented, and the techniques used in determining and analyzing costs are simple. Nevertheless, this subject deserves to be treated with a certain deference to the fact that it challenges beliefs strongly rooted in the imaginary and discourse of accountants and non-accountants.

The first concerns the relevance of the information produced and reported by Accounting. In the case of joint products and by-products, the costs allocated to them are only used to determine the costs of inventories and to determine the results of enterprises. Because there are no rational means to measure the contribution of the different production factors to the manufacture of the different products, the only way to determine the costs of these products is to distribute the production costs proportionally among the products.

The models suggested and used differ only in the proportionality factors, but they do not eliminate the arbitrariness in the allocation of costs. Therefore, all authors end up explaining that any method that distributes all production costs to all products can be used. You only have to choose one, which should be used consistently over time, and should be duly explained in the notes to the financial statements. The authors then caution that allocated costs should not be used to analyze decisions. For some decisions, only the production costs of all products are concerned, and for others, only the costs of the last process.

The second belief that is contradicted in the case of joint products and by-products is that it is necessary to know the costs of producing a product to determine its price. Since there are different equally acceptable methods to determine the production costs of joint products and by-products, and each of these methods generates different figures which are not explained by the factors used in the manufacturing of the products, there is no way to decide which method to choose to determine prices. And to annoy the uninitiated even more, some recommended methods for allocating production costs to joint products are based on prior knowledge of the sales prices of products that should be based on their production costs, which are unknown.

Finally, studying accounting concepts and techniques for accounting analysis and treatment of the costs of joint products and by-products is important because they are applied in several industrial enterprises and because they evidence some of the limits of accounting that should be properly understood by all who prepare or use the financial statements.

### 8.2.2 Accounting Treatment of Costs of Joint Products and By-products

In this section, the main concepts and techniques for the accounting treatment of costs of joint products and by-products are briefly presented. The usual references to the authors of the works consulted will not be included here or in the following sections, but it is essential to clarify that the following text is based freely on the works written by the teachers named in the previous section.

Decomposition or analysis operations are operations in which one or more materials are processed in order to, from a point called Splitoff Point, give rise to several products. A physical relation exists between these products that prevents one from being obtained independently of the others. Oil refining is an emblematic case of a decomposition operation.

The process that originates the various products is called a Joint Process, and the products that result from it are generically called Joint Products. Costs incurred in joint processes are known as Joint Costs. They are incurred for the manufacture of all joint products and differ from the costs incurred in the processes, giving rise to a single product. These costs are called Separable or Specific Costs.

As the relations between materials, processes and joint products are complex and unobservable, there is no way to determine the contribution of the different production factors used in the processes for the production of each of the joint products. Therefore, the costs incurred in the manufacture of each of the joint products cannot be rationally determined either.

To prepare a company's balance sheet and income statement, accountants need to divide the production costs between the product units in the inventories and the units that were sold. The impossibility of measuring the costs of the production factors employed in the manufacture of each of the joint products compels the accountants to resort to arbitrary methods to allocate the joint costs to the joint products. The only restriction is that, under accounting rules, including the accrual basis, the method chosen distributes all production costs to all products, is used consistently over time, and is duly explained in the notes to the financial statements.

The choice of procedures used in preparing the financial statements is influenced by the materiality of the transactions that will be reported. In case a method for allocating joint costs to joint products is chosen, materiality leads the accountants to separate the joint products into two categories. In the first, there are the main products, which are the most important and whose costs have a greater impact on the value of inventories and on the formation of company results; and the second contains by-products that are less relevant and whose costs have less impact on the value of inventories and on the formation of corporate results. The relative importance of the products is usually measured by the portion their sales represent in the total sales of the companies. The proposed procedures for allocating production costs to the main products are more elaborate than the proposed procedures for by-products.

In general, there are three different but equally valid methods for dealing with by-products. The first is to assign them no value. In this case, all joint costs should be divided among the main products. The existence of inventories of by-products should be reported in the explanatory notes and, when these products are sold, the amounts earned should be reported as other operating revenues.

The second method that can be used to treat by-products is to assign them the net realizable value, which corresponds to the difference between the estimated sales price less costs incurred to finish them and sell them. This amount should be deducted from the joint costs that will be allocated to the main products. It is worth noting that this method is endorsed by CPC 16 (R1).

The third method that can be used to treat by-products is to assign them the net realizable value less a profit value considered normal. This amount should be deducted from the joint costs that will be allocated to the main products. As for the methods to allocate the joint costs to the main products, there are two broad categories. In the first are the methods that allocate costs based on the quantities of manufactured products. These include the physical units method, used in the case of the Refinaria Fluminense S.A. This method attributes the same weighted average cost to all products. Because the physical units method does not take into account that different products are marketed at different prices, it may cause some products to seem unduly deficient.

The second category of methods for the allocation of the joint costs to the main products contains the methods based on the sales prices of the products. These include the net realizable value method. This method appropriates the joint costs to the major joint products proportionately to the sum of the final sales value of the output of each product minus its specific or separable costs. It should be used in cases where at least one of the major products cannot be sold as it is at the splitoff point, i.e. there is no sale price at the splitoff point for at least one of the major products. This is the second method used with some adjustments in the case of Refinaria Fluminense S.A.

It is important to note that this method ensures that all products are individually profitable if the set of joint products is profitable. As the specific costs of each product may vary, however, it causes the profit margins of the major joint products to be different after the specific costs have been computed.

The Conceptual Framework for Preparation and Disclosure of Financial Reports - CPC 00 (R1) states that, in order to be useful, financial information must be relevant and reliably represent what it is intended to represent. According to the standard, the information will be relevant if its disclosure has the potential to alter the decisions that are being analyzed by its users.

Taking as a reference the criterion for judging the usefulness of the financial information expressed in this CPC, it can be argued that the costs of the joint products are not useful financial information because they are obtained by means of proportional distributions that do not necessarily reflect the contribution of the production factors to the production of each joint product and, as will be discussed below, they should not be used to analyze decisions. Nevertheless, due to a lack of choice, these are the costs reported in the financial statements of the companies that perform decomposition operations

### **8.2.3. The Net Realizable Value Method in Environments with Multiple Splitoff Points**

Lowenthal (1986) discussed the use of the net realizable value method in environments with multiple splitoff points as a practical problem that is common in complex operations and considered two possible solutions. The first applies when intermediate products have a common physical measure. In this case, it proposes that the joint net realizable value be distributed to intermediate products in proportion to the quantity produced of each product. If the intermediary products do not have a common physical measure, however, it raises the possibility of simply distributing the net realizable value arbitrarily.

It is imperative to recognize that these considerations are really very uninviting. Thus, readers are asked to await the presentation of the answer given to question 4 to objectively see the problem and the solution proposed by Lowenthal (1986). The solution that we decided to use in the answer to question 4 is based on the fact that the intermediary products that will share the net realizable values have common physical measures.

### **8.2.4. Cost Concepts and Techniques to Analyze Decisions**

The chapters of the books dealing with the costs of joint products and by-products refer to two types of decision. The first type refers to the decisions on the group of joint products and by-products. And the second contains the decisions regarding the further processing of each of the joint products and by-products to add value to them.

When analyzing decisions on joint products and by-products considered as a group, it is irrelevant to know the costs of each individual product. The nature of decomposition operations obliges companies to manufacture all products, or not to manufacture any of them. Therefore, what should be considered is whether the total revenue from the sale of all products exceeds the costs necessary to produce and market them.

In the analysis of the decision to process a product after the splitoff point, the joint costs are irrelevant costs (sunk costs), since the product has already been obtained. Additional processing should be performed whenever incremental total revenue (revenue from the sale of the product after specific processing less revenue from the sale of the product as it lies at the splitoff point) exceeds the total incremental cost (the cost of the specific processing that will be executed).

### 8.3. Suggestions for a Teaching Plan

The case of the Refinaria Fluminense S.A. was designed for investigation in a two-hour session to discuss concepts and cost techniques for the analysis and accounting treatment of costs of the joint products and by-products. The session should preferably be conducted with a group already familiar with basic cost topics, since discussion requires participants to be familiar with cost concepts and classifications, cost accumulation systems and incremental analysis.

Since the case analysis requires prior knowledge of the accounting treatment options for joint products and by-products and the cost analysis models applicable in the context of decomposition (or analysis) operations, it is recommended that teachers planning to use this case insist that students read the chapters of one or more books that deal with this subject in some detail. The bibliography that integrates this article, although it is not exhaustive, lists some books the students can benefit from. But there are certainly other books that are the same or better than the ones referenced.

If they feel that students will not be able to pre-read the chapters of the recommended books, teachers should seriously consider using a two-hour lesson to formally present content that students will need to master in order to answer the questions and discuss the case.

Considering that students will have to prepare a flow chart and several tables with calculations to answer the questions, and that this cannot be done during the class in which the case is discussed, it is suggested that teachers ask students to answer the questions previously. In this way, the time of the class can be dedicated to the comparison of different groups or students' answers and to the clarification of the doubts that may have arisen in the elaboration of the answers.

It is always interesting that teachers allow some time for students to report on experiences they have had or are having with decomposition operations. If no one has had this kind of experience, it is recommended that teachers take the initiative to provide examples and to tell cases of companies that produce and sell joint products and by-products.

It is noteworthy, however, that it is not common for the books to bring examples of decomposition operations carried out beyond the industrial environment. This, however, does not mean that these examples do not exist or are not relevant. One case that can be mentioned, due to its prominent nature, is found in the entertainment industry. Companies like the Walt Disney Company and Dreamworks, which produce animations, perform decomposition operations to the extent that, in addition to selling the display rights of the animations, they sell the rights to use the specially created characters and play movie soundtracks, among the various revenue sources that result from the animations they produced.

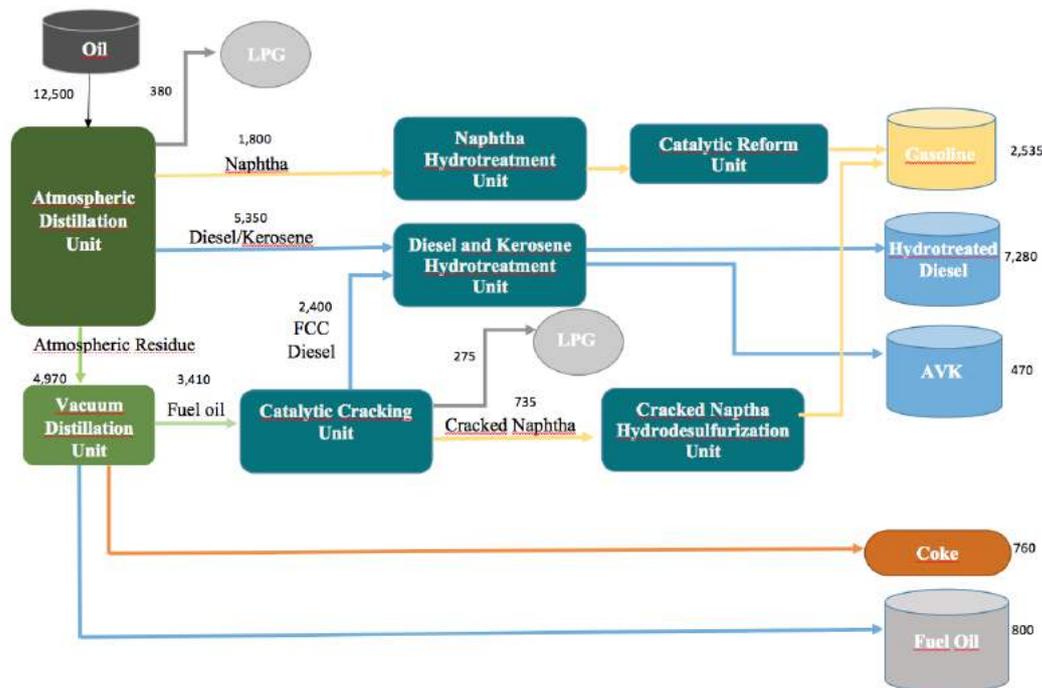
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## Attachment: Answers to the Questions

### Question 1

Picture 1 presents the flowchart of the Refinaria Fluminense S.A.'s production process and the amounts of intermediate and end products obtained from the processing of 12,500,00 oil barrels in December 2016.



**Picture 1.** Flowchart of production process (in thousands of barrels)

Source: Adapted from Impact Report on the Environment – RIMA for the modernization of REPLAN - Paulínia, Paulínia (SP) Refinery – Lazzarini (2005).

Teachers who are planning to use the case can consider the possibility of attaching the flowchart of the production process to the case if they perceive that its elaboration will surpass the students' skills.

### Question 2

As all products manufactured in December 2016 were sold, the total revenue from Refinaria Fluminense S.A. was R \$ 2,682,828 and the share of sales of each product in total sales was as follows: LPG - 1.416%; Gasoline - 25.512%; Diesel - 64.23%; AVK - 3.994%; Fuel Oil - 4.71%; Coke - 0.076%.

In order to separate the by-products from the main products, based on the relative value of sales, it is necessary to judge as from which percentage a product should be considered relevant and therefore main. In this analysis, the authors chose to consider only Coke as a by-product. All other products were considered main because their sales were greater than 1% of total sales. But students should be shown that this is an arbitrary decision that will affect the costing procedures, the values of the inventories presented in the balance sheet and the cost of the goods sold, which will be compared to the income in the income statement.

In this analysis, the authors chose not to attribute any value to Coke, considering that this is one of the three possible options for the accounting treatment of by-products. In this respect, the students are free to choose and defend the treatment method of by-products, with no correct or incorrect answer.

### Question 3

Figures 4 to 8 present the calculations of the costs, income per product and income of the refinery for December 2016, based on the premise that the joint costs were located to the main products based on the **physical units method**.

The readers should confront the figures with the flowchart presented in the answer to question 1.

Figure 4

#### Atmospheric Distillation Unit

Product	Quantity (barrels)	%	Joint Cost (R\$)	Unit Cost (R\$/barrel)
LPG	380,000	3.04	72,504,000.00	190.80
Naphtha	1,800,000	14.40	343,440,000.00	190.80
<i>Diesel/Kerosene</i>	5,350,000	42.80	1,020,780,000.00	190.80
Atmospheric Residue	4,970,000	39.76	948,276,000.00	190.80
Total	12,500,000	100.00	2,385,000,000.00	

Source: the authors, 2016.

Figure 5

#### Vacuum Distillation Unit

Product	Quantity (barrels)	%	Joint Cost (R\$)	Unit Cost (R\$/barrel)
Gasoline	3,410,000	81.00	779,420,703.09	228.57
Fuel Oil	800,000	19.00	182,855,296.91	228.57
Total	4,210,000	100.00	962,276,000.00	

Source: the authors, 2016.

Figure 6

#### Catalytic Cracking Unit

Product	Quantity (barrels)	%	Joint Cost (R\$)	Unit Cost (R\$/barrel)
<i>FCC Diesel</i>	2,400,000	70.38	563,345,949.39	234.73
LPG	275,000	8.06	64,550,056.70	234.73
Cracked Naphtha	735,000	21.55	172,524,697.00	234.73
Total	3,410,000	100.00	800,420,703.09	

Source: the authors, 2016.

Figure 7

#### Diesel and Kerosene Hydrotreatment Unit

Product	Quantity (barrels)	%	Joint Cost (R\$)	Unit Cost (R\$/barrel)
<i>Hydrotreated Diesel</i>	7,280,000	93.94	1,506,655,601.49	206.96
AVK	470,000	6.06	97,270,347.90	206.96
Total	7,750,000	100.00	1,603,925,949.39	

Source: the authors, 2016.

Figure 8

**Income statement December 2016 according to physical units method**

	Gasoline	Hydrotreated Diesel	Aviation Kerosene	Fuel Oil	Liquefied Petroleum Gas	Coke	Refinaria Fluminense
Quantity (barrels)	2,535,000	7,280,000	470,000	800,000	655,000	760,000	
Price/bbl	270,00	236.70	228.00	160.00	58.00	2.70	
Total income (R\$)	684,450,000.00	1,723,176,000.00	107,160,000.00	128,000,000.00	37,990,000.00	2,052,000.00	2,682,828,000.00
Costs (R\$)							
Diesel		1,506,655,601.49					
Aviation Kerosene			97,270,347.90				
Fuel Oil				182,855,296.91			
Liquefied Petroleum Gas					137,054,056.70		
Naphtha	343,440,000.00						
Cracked naphtha	172,524,697.00						
Naphtha hydrotreatment	7,000,000.00						
Catalytic reform	10,000,000.00						
Cracked Naphtha Hydrodesulfurization	5,000,000.00						
Total cost	537,964,697.00	1,506,655,601.49	97,270,347.90	182,855,296.91	137,054,056.70		2,461,800,000.00
Gross profit (R\$)	146,485,303.00	216,520,398.51	9,889,652.10	-54,855,296.91	-99,064,056.70		221,028,000.00
Gross profit (R\$/barrel)	57.79	29.74	21.04	-68.57	-151.24		
Sales expense (R\$)						52,000.00	52,000.00
Profit (R\$)						2,000,000.00	220,976,000.00

Source: the authors, 2016.

As can be seen in Tables 4 to 7, all cost allocations made unit product costs equal, as expected. In addition, since the allocation of the joint costs did not take into account the sales prices of the products, two products appeared to be unduly deficient, as evidenced in bold in Table 8.

#### Question 4

Tables 9 to 19 present the calculations for costing, product income and refinery output for the month of December 2016 on the assumption that the joint costs were allocated to the main products based on the **net realizable value method**.

It is again recommended that readers compare the tables with the flowchart presented in the answer to question 1.

The standard presentation of the net realizable value method in didactic texts assumes that a joint process originates two joint intermediate products that are processed separately to become two main products that are marketed regularly; and that intermediate joint products do not have known market prices because they are not marketed as they are at the splitoff point. In this case, the net realizable values of the intermediate products are determined by deducting the costs of the processes separate from the sales figures of the main products produced.

Differently, in the Refinaria Fluminense S.A., there are sequences of splitoff points. For example, the Atmospheric Distillation Unit produces four joint products, including them the Diesel / Kerosene blend; and the Catalytic Cracking Unit produces three products, including the FCC Diesel. None of these products are marketed regularly and therefore do not have market prices.

The Diesel / Kerosene blend and FCC Diesel are processed in the Diesel / Kerosene Hydrotreatment Unit to produce the Hydrotreated Diesel and Aviation Kerosene. Comparing this situation to the standard presentation of the didactic texts, it is evident that the usual teachings are insufficient to distribute the costs of the Atmospheric Distillation Unit and the Catalytic Cracking Unit based on the net realizable value method.

A possible solution to this problem is offered by Lowenthal (1986). It consists of dividing the value obtained by deducting the cost of the Diesel / Kerosene Hydrotreatment Unit from the sum of the sales figures of the Hydrotreated Diesel and Kerosene Aviation production proportionately to the quantities produced of the Diesel / Kerosene blend and FCC Diesel, as these two products have the same physical measuring unit. This is certainly not the only situation in the Refinaria Fluminense S.A. where conventional teachings are insufficient and demands the application of the solution proposed by Lowenthal (1986). Thus, the solution used to determine the net realizable values of the Diesel / Kerosene blend and the FCC Diesel was also used in the other cases where similar problems occurred, as can be seen in Tables 9 to 19.

Table 9

**Net Realizable Value of Naphtha and Cracked Naphtha**

Product	Quantity (barrels)	Price (R\$)	Sales Value (R\$)	Hydrotreatment of Naphtha (R\$)	Catalytic Reform (R\$)	Cracked Naphtha Hydrodesulfurization (R\$)	Net Realizable Value (R\$)
Naphtha	1,800,000	270	486,000,000	7,000,000	10,000,000		469.000.000
Cracked Naphtha	735,000	270	198,450,000			5,000,000	193.450.000
Total	2,535,000						

Source: the authors, 2016.

Table 10

**Net Realizable Value of FCC Diesel and Diesel/Kerosene**

Product	Quantity (barrels)	Price (R\$)	Sales Value (R\$)	Hydrotreatment of Diesel/ Kerosene (R\$)	Net Realizable Value (R\$)	NRV (R\$/ barrel)
<i>Hydrotreated Diesel</i>	7,280,000	236.70	1,723,176,000.00			
Aviation Kerosene	470,000	228.00	107,160,000.00			
Total	7,750,000		1,830,336,000.00	19,800,000.00	1,810,536,000.00	233.62

Source: the authors, 2016.

Table 11

**Net Realizable Value of Gasoline**

Product	Estimated Sales Value (R\$)	Catalytic Cracking (R\$)	Net Realizable Value of Gasoline (R\$)	Quantity (barrels)	NRV (R\$/barrel)
<i>FCC Diesel</i>	560,682,116.13				
LPG	15,950,000.00				
Cracked Naphtha	193,450,000.00				
Total	770,082,116.13	21,000,000.00	749,082,116.13	3,410,000.00	219.67

Source: the authors, 2016.

Table 12

**Net Realizable Value of Atmospheric Residue**

Product	Estimated Sales Value (R\$)	Vacuum Distillation (R\$)	Net Realizable Value of Atmospheric Residue (R\$)
Gasoline	749,082,116.13		
Fuel Oil	128,000,000.00		
Total	877,082,116.13	14,000,000.00	863,082,116.13

Source: the authors, 2016.

Table 13

**Cost Distribution of Atmospheric Distillation Unit**

Product	Quantity (barrels)	Net Realizable Value (R\$)	%	Joint Cost (R\$)	Cost (R\$/barrel)
LPG	380,000	22,040,000.00	0.85	20,186,591.58	53.12
Naphtha	1,800,000	469,000,000.00	18.01	429,560,410.70	238.64
<i>Diesel/Kerosene</i>	5,350,000	1,249,853,883.87	48.00	1,144,749,995.02	213.97
Atmospheric Residue	4,970,000	863,082,116.13	33.14	790,503,002.70	159.05
Total	12,500,000	2,603,976,000.00	100.00	2,385,000,000.00	

Source: the authors, 2016.

Table 14

**Cost Distribution of Vacuum Distillation Unit**

Product	Quantity (barrels)	Net Realizable Value (R\$)	%	Joint Cost (R\$)	Cost (R\$/barrel)
Gasoline	3,410,000	749,082,116.13	85.41	687,095,085.64	201.49
Fuel Oil	800,000	128,000,000.00	14.59	117,407,917.06	146.76
Total	4,210,000	877,082,116.13	100.00	804,503,002.70	

Source: the authors, 2016.

Table 15

**Cost Distribution of Catalytic Cracking Unit**

Product	Quantity (barrels)	Net Realizable Value (R\$)	%	Joint Cost (R\$)	Cost (R\$/barrel)
FCC Diesel	2,400,000	560,682,116.13	72.81	515,550,540.29	214.81
LPG	275,000	15,950,000.00	2.07	14,666,119.86	53.33
Cracked Naphtha	735,000	193,450,000.00	25.12	177,878,425.49	242.01
Total	3,410,000	770,082,116.13	100.00	708,095,085.64	

Source: the authors, 2016.

Table 16

**Mean Cost of Liquefied Petroleum Gas**

Origin	Production Cost (R\$)	Quantity (barrels)	Cost (R\$/barrel)
Atmospheric Distillation	20,186,591.58	380,000	53.12
Catalytic Cracking	14,666,119.86	275,000	53.33
Total	34.852.711,44	655.000	53,21

Source: the authors, 2016.

Table 17

**Cost Distribution of Diesel/Kerosene Hydrotreatment Unit**

Product	Diesel / Kerosene (R\$)	FCC Diesel (R\$)	Diesel/kerosene Hydrotreatment (R\$)	Cost	Hydrotreated Diesel	Aviation Kerosene
Diesel/ Kerosene	1,144,749,995.02					
Diesel FCC		515,550,540.29				
Total (R\$)	1,144,749,995.02	515,550,540.29	19,800,000.00	1,680,100,535.31		
Total Quantity (barrels)				7,750,000.00		
Cost (R\$/barrel)				216.79	216.79	216.79
Quantity (barrels)					7,280,000	470,000
Total Cost (R\$)					1,578,210,567.36	101,889,967.95

Source: the authors, 2016.

Table 18

**Cost of Gasoline**

Product	Production Cost (R\$)	Catalytic Reform (R\$)	Naphtha Hydrotreatment (R\$)	Cracked Naphtha Hydrodesulfurization (R\$)	Total (R\$)
Naphtha	429,560,410.70	10,000,000.00	7,000,000.00		446,560,410.70
Cracked Naphtha	177,878,425.49			5,000,000.00	182,878,425.49
Total	607,438,836.19	10,000,000.00	7,000,000.00	5,000,000.00	629,438,836.19
Quantity					2,535,000
Unit Cost (R\$/barrel)					248.30

Source: the authors, 2016.

Table 19

**Income Statement December 2016 using net realizable value method**

	Gasoline	Hydrotreated Diesel	Aviation Kerosene	Fuel Oil	Liquefied Petroleum Gas	Coke	Refinaria Fluminense
Quantity(barrels)	2,535,000	7,280,000	470,000	800,000	655,000	760,000	
Price (R\$/barrel)	270.00	236.70	228.00	160.00	58.00	2.70	
Total Income (R\$)	684,450,000.00	1,723,176,000.00	107,160,000.00	128,000,000.00	37,990,000.00	2,052,000	2,682,828.000
Costs (R\$)							
Gasoline	629,438,836.19						
Diesel		1,578,210,567.36					
Aviation Kerosene			101,889,967.95				
Fuel Oil				117,407,917.06			
Liquefied Petroleum Gas					34,852,711.44		
Total Cost	629,438,836.19	1,578,210,567.36	101,889,967.95	117,407,917.06	34,852,711.44		2,461,800,000
Gross Profit (R\$)	55,011,163.81	144,965,432.64	5,270,032.05	10,592,082.94	3,137,288.56		221,028,000
GP (R\$/barrel)	21.70	19.91	11.21	13.24	4.79		
Sales expense (R\$)						52,000	52,000
Profit (R\$)						2,000,000	220,976,000

Source: the authors, 2016.

As is clear from Tables 13 to 16, all cost allocations made product unit costs different, as expected. In addition, as the allocation of the joint costs took into account the sales prices of the products, all products were individually profitable, since together they are profitable. In spite of this, the profit margins of the different products were different, again as expected.

### Question 5

In the analysis of the decision to process a product after the splitoff point, the joint costs are irrelevant since the product has already been obtained. Additional processing should be performed whenever the incremental income exceeds the incremental cost.

Considering that the additional processing of ordinary gasoline to transform it into Premium Gasoline will generate an incremental income of R\$ 30.00 (R\$ 300 - R\$ 270) per barrel, and will oblige the refinery to incur an incremental cost of R\$ 10 per barrel; each barrel of Premium Gasoline produced and sold will increase the profit of the Refinaria Fluminense S.A. by R\$ 20. Therefore, executives should be encouraged to produce and sell Premium Gasoline.

Applying the same logic in the case of Premium Diesel, an incremental income of R\$ 13.30 (R\$ 250 - R\$ 236.70) and an incremental cost of R\$ 9.00 will be noted, making each liter of Premium Diesel produced and sold increase the refinery's profit by R\$ 4.70. Therefore, the production and sale of Premium Diesel should also be recommended.

### Question 6

The analysis of the decision not to submit a product to an additional process should follow the same analysis model of the decision to submit a product to an additional process. In this case, what we want to know is if the savings resulting from the non-completion of the additional process will exceed the reduction of the income due to the sale of a product with lower added value. It should be noted that the composition of the costs that will be eliminated will depend on the size and the time horizon of the decision. In marginal decisions, only variable costs will be eliminated; and, in long-term decisions, some fixed costs will be eliminated, apart from variable costs.

It is essential to clarify that, as the sales considered in the question will be possible, the cost savings in the operations of Naphtha Hydrotreatment, Catalytic Reform and Hydrodesulfurization of Cracked Nafta will be limited to the variable costs. In the case of Naphtha, for each barrel sold, the refinery will give up R\$ 20 (price of gasoline minus the price of naphtha). On the other hand, R\$ 3 / barrel will be saved, referring to the variable costs of the Naphtha Hydrotreatment Unit, and R\$ 4 / barrel related to the variable costs of the Catalytic Reform Unit. Thus, for each barrel of naphtha sold, the refinery will no longer earn R\$ 13.00. Therefore, the proposed sale of naphtha is not advantageous.

In the case of Cracked Naphtha, the refinery will give up the same R\$ 20 (gasoline price minus the price of naphtha). On the other hand, R\$ 5 / barrel will be saved, referring to the variable costs of the Cracked Naphtha Hydrodesulfurization Unit. Thus, with each barrel of cracked naphtha sold, the refinery will no longer earn R\$ 15.00. Therefore, the proposed sale of cracked naphtha is not advantageous either.

### Question 7

Considering that the expected additional cost per barrel of diesel produced will be R\$ 32, in the case of the requirement to reframe the sulfur emission, for the current production of 7,280 thousand barrels of diesel per month, there will be an additional cost corresponding to R\$ 233 million per month, thus incompatible with the refinery's result of around R\$ 221 million per month. The refinery should position itself in the sense that this type of requirement will only be economically feasible when the additional cost is transferred to the sales price of diesel.

### Question 8

Tables 20 and 21 present the sales prices and the unit costs determined, respectively, using the physical units and net realizable value methods, and the unit profits of each product produced at Refinaria Fluminense S.A.

Table 20

#### Unit income per product verified based on physical units method

Product	Volume (barrels)	Price (R\$/barrel)	Cost/Expense (R\$/barrel)	Income (R\$/barrel)
LPG	655,000	R\$ 58.00	R\$ 209.24	-R\$ 151.24
Gasoline	2,535,000	R\$ 270.00	R\$ 212.21	R\$ 57.79
Diesel	7,280,000	R\$ 236.70	R\$ 206.96	R\$ 29.74
AVK	470,000	R\$ 228.00	R\$ 206.96	R\$ 21.04
Fuel Oil	800,000	R\$ 160.00	R\$ 228.57	-R\$ 68.57
Coke	760,000	R\$ 2.70	R\$ 0.07	R\$ 2.63
Total Refinery	12,500,000	R\$ 214.63	R\$ 196.95	R\$ 17.68

Source: the authors, 2016.

Table 21

#### Unit income per product verified based on net realizable value method

Product	Volume (barrels)	Price (R\$/barrel)	Cost/Expense (R\$/barrel)	Income (R\$/barrel)
LPG	655,000	R\$ 58.00	R\$ 53.21	R\$ 4.79
Gasoline	2,535,000	R\$ 270.00	R\$ 248.30	R\$ 21.70
Diesel	7,280,000	R\$ 236.70	R\$ 216.79	R\$ 19.91
AVK	470,000	R\$ 228.00	R\$ 216.79	R\$ 11.21
Fuel Oil	800,000	R\$ 160.00	R\$ 146.76	R\$ 13.24
Coke	760,000	R\$ 2.70	R\$ 0.07	R\$ 2.63
Total Refinery	12,500,000	R\$ 214.63	R\$ 196.95	R\$ 17.68

Source: the authors, 2016.

As all derivatives produced in December 2016 were sold, the two joint cost distribution methods lead to the same total income for the refinery (see Tables 8 and 19). The costs and income per product obtained with the two methods are different though (see Tables 20 and 21).

The main advantage of the physical units method is that it is easy to understand, deploy and use. But eventually, it can generate distorted information, like in the case of LPG and Fuel Oil. It is possible to demonstrate that if the refinery fails to produce and sell these products, its total revenue will drop more than the costs it will eliminate, reducing its profitability, which indicates that both products are profitable. Nevertheless, the physical units method imputes to these products costs higher than the revenues they generate, unduly suggesting that they are deficient (see Table 20).

The student's choice of one of the methods proposed in questions 3 and 4 is free, with no correct or appropriate answer, aiming that, after the elaboration of all the calculations and analyses, (s)he is able to perceive, from his/her own experience in developing the case, the advantages and disadvantages of the methods applied and able to form an opinion and defend his/her point of view.

The main advantage of the net realizable value method is that it takes into account the sales price of the products in the distribution of the joint costs and, consequently, ensures that if all the products are profitable in group, all products individually will also be. It should be noted, however, that in this case, the profit margins of the different products will be different when the costs of the specific processes are different. Compared specifically with the physical units method, the net realizable value method fails to be more complex and laborious. This is evident from the calculations made to answer questions 3 and 4 of this case.

The information obtained through the physical units and net realizable value methods, because they do not reflect the contributions of the production factors to obtain each of the product, do not represent the costs of the products and therefore do not present useful financial information in accordance with CPC 00 (R1). But as a result of the allocation of all production costs to all products, this information meets the accounting standards and can be used in the preparation of the financial statements. The only restrictions are that, having chosen a method, the accountants use it consistently and declare it in the explanatory notes.

### Question 9

After answering and analyzing the eight questions in the case, the students should be able to recognize three relevant aspects in relation to the accounting information available in the companies that perform decomposition or analysis operations. The first is the paradoxical nature of information about the costs of individual products. Without them, there is no way to prepare the financial statements. As this information results from necessarily arbitrary allocations, they do not reliably represent the production costs of the products. This indicates that not all information disclosed in the financial statements is useful under CPC 00 (R1).

The second aspect is that the nature of decomposition operations obliges companies to manufacture all products, or not to manufacture any of them. Therefore, the decision to carry out the operation should be based on the comparison of the total revenue obtained from the sale of all products with the costs of producing them. The way individual profits are distributed is irrelevant. This was duly evidenced by the costs determined by the physical units of production method. In two cases, they exceeded revenues from product sales, but neither of the two deficit products could be eliminated without diminishing the total profit of the Refinaria Fluminense S.A.

Finally, the third aspect is that, in the decisions to further process individual products after the splitoff point, the costs of the joint process are irrelevant because they are already being incurred. What we want to know is whether the additional processing will offer profit. This can be verified by comparing incremental income (income from the sale of the product after specific processing minus income from the sale of the product as it is at the splitoff point) with the total incremental cost (the cost of the specific processing to be performed).

# Guidelines for Authors

## 1. Paper Submission Guidelines

To submit articles to the *Revista de Educação e Pesquisa em Contabilidade* - REPEC, authors should follow the standards and criteria set by REPEC. From January 2013 the guidelines of the American Psychological Association (APA) with regard to citations and references should be followed. Submissions not complying with the standards will be rejected.

Articles submitted to the journal must be original, i.e., cannot have been published or submitted to another journal.

Articles may be written in Portuguese, English or Spanish, with at least 5,000 and maximum 10,000 words, including tables, figures, notes and references. A maximum of 5 (five) authors are allowed per article. All papers accepted will be translated and published in three languages: Portuguese, English and Spanish.

Articles containing tables or figures, they [the tables and figures] should be in a format that allows them to be edited. In case some of these Figures or Tables have been imported from other programs such as Excel, Power Point etc., the source file must also be sent as Supplementary File.

Do not use expressions like *id.*, *ibid.*, *op. cit.*, *loc. cit.* and the like, or reference notes and footnotes. Notes at the end of the text are acceptable, but should be avoided.

The submission of articles should be done electronically, through the [www.repec.org.br](http://www.repec.org.br) website. At the end of the submission an electronic message will be sent by e-mail, confirming receipt of the article.

## 2. Content and Formatting of Papers

At the moment of submission, the articles should contain:

- The **title** in the language of origin of the article (Portuguese or English) without identifying the author(s);
- An **abstract** written in the language of origin of the article (Portuguese or English) with at least 150 and at most 200 words, single space between lines, in a single paragraph and without paragraph input. At the end of the abstract should be placed **three to five** keywords;
- The article itself, written in Portuguese, English or Spanish, with at least 5,000 and at most 9,000 words, including tables, figures, notes and references.
- The pages of the articles should be properly numbered in the upper right corner, typed with Word for Windows, under the following conditions:

- A4 paper (210 x 297 mm);
- Times New Roman, size 12;
- Spacing: single;
- Paragraph input: 1.25;
- Margins: 3cm top, 2cm bottom, 3cm left, 2cm right;
- Tables and figures in Times New Roman, size 10;
- Citations and references must comply with current standards of the APA (American Psychological Association).

### 3. Tables and Figures<sup>1</sup>

Tables and figures should be used in articles whenever their information make text comprehension more efficient, without repeating information already described in the text.

#### 3.1 Tables

The table should usually show numeric or textual information organized in an orderly exposition of columns and rows. Any other statement should be characterized as textual figure.

The table should be displayed with its information visible and sufficient for their understanding and should be formatted as follows:

Table editor	Word for Windows 97 or superior. In case authors have drawn their tables in Microsoft Excel or in a similar program, please remake the tables using the feature in Word.
Font	Times New Roman, size 10.
Line spacing	Simple.
Spacing before and after paragraphs	3 pt.
Table colors	Use only black and white (grayscale).
Title	The table title must be brief, clear and explanatory. It should be placed above the table, in the top left corner, and on the next line, just below the word Table (with a capital initial), followed by the number that designates it. The tables are presented with Arabic numerals in sequence and within the text as a whole. Eg: Table 1, Table 2, Table 3, and so on.
Citation of tables	When citing tables in the text, type only the number referring to the table, for example Table 1, Table 2, Table 3 and so on. (the word 'Table' should be presented with the first letter capitalized). Never write 'table below', 'table above' or 'table on page XX' because the page numbers of the article may change while formatting.
Table notes	The font used in the notes of the table should be Times New Roman, size 10, single spaced. The notes should be described in the footnote of the table, and they serve to indicate the Source of the information of the table, and other information important to understanding the table.

<sup>1</sup> Most of these guidelines were adapted from the Manual for Submissions of the *Revista de Administração Contemporânea – RAC*, available at [www.anpad.org.br](http://www.anpad.org.br).

## 3.2 Figures

The figure should show a flow chart, a chart, a photograph, a drawing or any other illustration or textual representation.

The figure should be displayed with its information visible and adequate for its understanding, and should be formatted as follows:

Font	Times New Roman, size 10.
Figure colors	Use only black and white (grayscale).
Format	Figures should be submitted in an editable format.
Title	It explains the figure concisely, but discursively. The title should be placed under the figure and numbered with Arabic numerals in sequence, preceded by the word Figure (with initial capital). Eg: Figure 1, Figure 2, Figure 3, etc.. After the title, any other information necessary for clarification of the figure or source must be added as a note.
Captions	The caption is the explanation of the symbols used in the figure and must be placed within the limits of the figure.
Size and proportion	Figures must fit the dimensions of the journal. Therefore a figure should be drawn or inserted into the article so that it can be reproduced in the width of a column or page of the journal to which it will be submitted.
Citations in the main text	When citing a figure in the text type only the number referring to the figure, e.g. Figure 1, Figure 2, Figure 3 and so on. (the word 'Figure' should be presented with the first letter capitalized). Never write 'figure below' figure above ', or even 'figure on page XX' because the page numbers of the article can be changed during formatting.

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