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RELEVANCE OF FAIR VALUE IN BIOLOGICAL ASSETS: AN EXPERIMENTAL ANALYSIS ON MARKET PERCEPTION VERSUS THE ACADEMIC PERCEPTION

Relevância do valor justo em ativos biológicos: Uma análise experimental da percepção do mercado versus a percepção acadêmica

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ABSTRACT

Criticisms have been made from both the academic and business environments about the importance and usage of fair value (FV), especially for assets related to agricultural products without an active trading market. For analyzing what is the relevance of the FV method to biological assets for users, an experiment was made with 217 market professionals attending the Executive MBA course and 155 undergraduate students in accounting, from the perspective of the Counterfactual Thinking Theory. The following stimuli were considered if: (i) the result (losses or gains) arising from the evaluation at FV, (ii) the type of biological asset (with or without liquidity), and (iii) the managerial decision (held the asset to the maturity date or make it available for sale) interfere in the judgment of the relevance of FV in biological assets. The findings indicate that the use of FV is relevant for the measurement of biological assets in opposition to the historical cost. Type of asset (eucalyptus as without an active market) and managerial decision (make it available for sale) led to different perceptions for academicians that considered more relevant the use of FV. For market professionals, results also indicate the type of asset (eucalyptus) affected their FV judgment as an appropriate metric for value asset. Our findings also can be concluded that the perception of the relevance of the FV method is greater to evaluate biological assets (bovines and forests) than the reliability in the process and the outcomes.

Keywords: Fair value; historical cost; counterfactual thinking.

RESUMO

Há críticas tanto da academia quanto do ambiente empresarial sobre a importância do uso do valor justo (VJ), principalmente para ativos relacionados aos produtos agrícolas sem um mercado ativo de negociação. Para analisar qual a relevância do método de VJ para ativos biológicos para os usuários, um experimento foi realizado com 217 profissionais de mercado que cursavam o MBA Executivo e 155 estudantes de graduação em contabilidade a partir da perspectiva da Teoria do Pensamento Contrafactual. Os seguintes estímulos foram considerados se: (i) o resultado (perdas ou ganhos) resultante da avaliação no VJ, (ii) o tipo de ativo biológico (com ou sem liquidez) e (iii) a decisão gerencial (manter o ativo até a data de vencimento ou disponibilizar para venda) interferem no julgamento da relevância do VJ nos ativos biológicos. Os resultados indicam que o uso do VJ é relevante para a mensuração dos ativos biológicos, em contraposição ao custo histórico. O tipo de ativo (eucaliptos) e a decisão gerencial (disponibilizar para venda) levou a diferentes percepções para os acadêmicos que consideraram mais relevante o uso do VJ. Para os profissionais de mercado, os resultados indicam que o tipo de ativo (eucalipto) afetou o julgamento do VJ como métrica apropriada para o valor do ativo. Além disso, a partir dos resultados conclui-se

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que a percepção da relevância do método de VJ é maior para avaliar ativos biológicos (bovinos e florestas) do que a confiabilidade no processo e nos resultados.

Palavras-chave: Valor justo; custo histórico; pensamento contrafactual.

1. INTRODUCTION

As established in the International Financial Reporting Standards (IFRS) *Conceptual Framework*, several measurement bases are used in financial statements. Among these is valuation at fair value (FV). According to the IFRS 13, the FV is the price that would be received for the sale of an asset, or that would be paid for the transfer of an asset in a non-forced transaction among the participants of the market on the measurement date. This evaluation method shall be used in assets, such as financial instruments (assets and liabilities), investment properties, biological assets, assets and liabilities in business combinations, discontinued operations, assets held for trading, assets obtained through government grants and assistance, among others.

The use of fair value accounting has provoked a great debate about the use of the fair value method to measure assets and liabilities. Barth et al. (2008) Kolev (2008); Goh, Ng and Yong (2009); Armstrong et al (2010); Song, Thomas and Yi (2008) consider this type of measurement makes accounting information more relevant. Nonetheless, Hague and Willis (1999) state that the use of fair value provides information about opportunity lost, interfering in the economic evaluation of companies.

Concerning FV in biological assets, International Accounting Standard (IAS) 41 establishes that the price changes and the biological transformation of plants and animals are both recorded in the asset, in contrast, in the results for the period. Most of the assets and financial instruments present an active market (liquidity). Although some biological assets do not present an active market, the standard establishes that they should also be recorded by their FV. For the cases there is no active market, the IFRS 13 suggests following hierarchy measurement: (a) Level 1 – the market price of recent transaction; (b) Level 2 - market prices of similar assets with adjustments that reflect the differences; and (c) – Level 3 - industry standards. When none of the possibilities described exist, the company must use the present value of the net cash flows expected by the asset, discounted at a current market rate, for the definition of fair value.

Penman (2007) and Benston (2008) state that the use of the fair value method by Level 3, can bring a series of problems, in the preparation of the financial statements, arising from subjectivity in the definition of assumptions and estimates for projecting the cash flows. Goh, Ng and Yong (2009) point out that investors give less weight for Level 3 transactions, when compared to Level 1 and 2 transactions. The most criticism for valuing assets without an active market at fair value is that the values of these assets are based on imaginary prices, offered by hypothetical buyers, participants in non-existent markets (Benston, 2008).

The mandatory use of fair value has a practical implication, which is the *tradeoff* between faithful representation (reliability) and relevance[i] of accounting information. In this context, Laux and Leuz (2009) highlight the implications of the dichotomy faced by issuers organisms of accounting standards, namely: reliability *versus* relevance. The IFRS are considered as rules based on principles (standards), allowing the manager greater flexibility to exercise the judgment and perform estimates that lead to the best way to describe an event; however, there will be limitations to avoid an opportunistic behavior and to ensure the information reliability without losing its relevance. Kadous, Koonce and Thayer (2012) point out that relevance and reliability are not independent constructs, so that the characteristics arising from

reliability (replaced by faithful representation in the IASB Conceptual Framework in 2010) impact the relevance of fair value.

Thus, considering the implications of using the method of valuation of biological assets at fair value and the economic relevance of these assets to the Brazilian market, it is deemed necessary to investigate the relevance of the use of fair value, in biological assets, for users of the financial statements. The economic relevance of such assets in the Brazilian market may be observed in the balance sheet of the publicly-held companies, totaling about 36 billion reais[ii] in biological assets. Agribusiness represented approximately 100 billion dollars of the total Brazilian exports in 2013 (41,3%) according to Ministry of Agriculture, Livestock and Food Supply statistics (Brasil, 2022). In December 2021, the agribusiness has reached 120 billion dollars (43%) maintaining the high sector's participation in Brazilian exports (Brasil, 2022).

Thus, in this paper, the researchers investigated: **What is the relevance[iii] of the use of fair value in biological assets for the users of the financial statements?**

For that, experiments were carried out with the objective of analyzing the judgment, by users of accounting information, both professionals and students, about the relevance of using the fair value method in biological assets, for both groups. The experiments carried out used as conceptual foundation the assumptions of the Counterfactual Thinking Theory (Roese 1997). According to the theory, counterfactual thinking is activated by negative affect, in which opportunities or discarded or lost alternatives have an effect on the judgment of individuals. This negative effect can be a signal and take the individual's actions in a direction that corrective action is necessary.

The usefulness of the Counterfactual Thinking Theory is the context which affect investors' judgment, that is, if investors may consider fair value gains and losses as forgone opportunities the counterfactual thinking was activated (Koonce et al., 2011). The researchers follow the author's research suggestion by applying different assets and they also consider that Brazilian research concentrated just on examining the degree of disclosure of biological assets after standard-setting board approval of CPC 29 – Biological Assets and Agricultural Products according to IFRS 13 – Fair Value and IAS 41 - Agriculture (Barros et al., 2013; Macedo, Campagnoni & Rover, 2016; Figueira & Ribeiro, 2016). Thus, this research analyzed the relevance of the FV applied to the biological assets for financial statement users.

The results show that the individuals judge the FV as relevant for the biological assets, regardless of having an active market (even on loss or gain conditions) and the type of managerial decision. Furthermore, this research brought up evidence that the evaluation of the FV of the assets is more relevant than the determination of the market of the asset (*spot*), for example, in the case of the eucalyptus forests. Finally, this study also indicates that the perception about the reliability of the method is a concern for every type of situation where the participants were exposed, yet they attach greater importance to the method relying on results, regardless the assets are evaluated by one or the other criterion (level 1 or level 3).

In the following section, the theoretical basis, motivation, and assumptions developed are presented. Section 3 describes the research project design. Section 4 reports the descriptive statistics and the main results and Section 5 summarizes and concludes this study.

2. THEORETICAL FRAMEWORKS

2.1. Fair Value in Biological Assets

The use of fair value metrics has been justified by the fact that information measured based on historical cost would have little or no relevance for

transactions in sectors that have a high connection to the market and the low relationship with the agricultural development of biological assets. As mentioned in item 5.2.1 of AASB 1037[iv], a biological asset is different from a non-living asset in that during its life it changes its biological form through growth, which results in changes in expectations of future economic benefits. Furthermore, even in the absence of this biological transformation, these future economic benefits may change, as prices may also vary. Thus, the use of fair value would allow managers to report the effects of volatility (gains and losses) on the equity and results of companies.

Herbohn, Peterson and Herbohn (1998) studied the form of recognition of biological assets, through the financial statements of Australian companies, before the adoption of AASB 1037, which is similar to IAS 41. They identified that most companies recognized the variation of the biological asset as a capital adjustment and few companies recognized the variation in the result as revenue. In Germany, according to Jöbstl (2009, as cited in Borchers, 2000) in a period of pre-adoption of IAS 41, forestry assets appeared in the balance sheet as "growing stock but their changes were not recognized in profit or loss. In Brazil, recognition and measurement were similar to that described in Germany, based on historical cost, and there was no practice, which would not even be allowed by the corporate law in force at the time, of recognizing variations arising from price changes and biological transformation in the result.

Recognition of unrealized gains, the existence of volatility in the results, and the possibility of results management are the three main critical observations in the academic environment, especially, regarding this metrics reliability for assets with a long production cycle (for example the eucalyptus forests, or even a more severe manner, for plants such as palm trees and rubber trees, with a lifetime of 25 years, or the vines, with a lifetime of 70 years) (Asian-Oceanian Standard-Setters Group [AOSSG], 2010).

Such criticisms transcend the academic world and affect the business world as well. A Citi Bank report (2012) points out that a significant part of the company's profit Cia Olam (agricultural products company located in Singapore) derives from accounting gains, which were not converted into cash, including the recognition at fair value of biological assets. According to a *Financial Times* article (Grant, 2012), Muddy Waters, an investment research company, said that Olam, as well as Enron, has made significant use of throughput accounting that did not affect the cash, thus, turning hypothetical future profits into current gains. The discussion also considers the scope of the accounting standards issuing bodies. The Malaysian accounting standards setter and the body which groups the standard setters from Asia and Oceania carried out a study along with preparers and analysts to keep the bearer biological assets (*bearer plants*) excluded from the scope of the IAS 41 (AOSSG, 2010), and it was accepted and approved by the IASB in June 2014.

The effects of the adoption of IAS 41 in the United Kingdom (UK), France, and Australia were analyzed by Elad and Herbohn (2011) through questionnaires addressed to auditors and accountants of agricultural companies. The conclusions indicate that there is volatility in the results, due to the recognition of the variation of fair value in biological assets, due to changes occurred in the market (price fluctuation) and plant growth. Specifically, in the UK, the adoption of IAS 41 generated controversy, as they claimed that, in qualitative aspects of the accounting information, the recognition of the variation in the fair value of gains and losses, which have not yet been realized, made it difficult to compare and understand the accounting statements. .

Although there are arguments that the use of fair value presents a greater degree of transparency of

accounting information (Laux & Leuz, 2009), there are researchers who oppose this possibility, since the measurement at fair value puts the understandability and reliability at risk (faithful representation) of the accounting information, due to the use of subjective values, permeated by arbitrary premises (Barlev & Haddad, 2003). The concern with the use of mathematical models to calculate fair value led Lindsell (2005) to study the reliability and relevance of this information, through practical examples and their impact on the financial statements. The research result indicates that the fair value can only be trusted if the variations in the estimates were not significant.

Despite the concern about the subjectivity of the determination of the FV for biological assets to be more present in assets without an active market (models of discounted cash flows were used), even the biological assets with an active market (e.g., "bovines") this issue remains and involving also a certain degree of subjectivity. Brito (2010) says that cattle breeding presents market quotations for the different stages of the animals' development. However, in some of the stages (e.g., "Breeding"), the companies of the sector face problems establishing the FV of animals, because there is no market quotation since fewer negotiations imply a certain degree of subjectivity in elaborating the financial statements. There is no consensus about the use of the FV as a metric to measure biological assets. Academic, professional and accounting standards issuing bodies' environment have these kind of divergences. It can be noticed some skepticism about the informational quality of the results obtained using this metric because of the subjectivity which promotes reduced confidence in the users and it is not possible to assure that there is no asymmetry information in the evaluation process.

In an experiment with MBA students and financial instruments, Koonce et al. (2011) tested investors' fair value relevance judgments (whether is an asset or liability, fair values produce gains or losses, and whether it will or will not be sold/ settled soon). Their results indicate that FV losses and financial assets are more relevant. They incentive future research by investigating other types of assets and liabilities. Given the above, this research analyzed the relevance of the FV applied to the biological assets for financial statement users.

2.2. Theory of the Counterfactual Thinking

The term "counterfactual thinking" (Roese, 1997) can be understood, in a literal, as a thought contrary to the facts, which reveals that individuals are capable of think about the state of things, even if contrary to reality. That is, this is a mental process of imagining possible alternatives to reality, but these alternatives are different from the facts. Thus, counterfactual thinking is conditional propositions of the type "if (...), then (...)" and, therefore, they cover the antecedent and the consequent. For example: "if John had purchased shares of the ABC company, then today he would be richer than if he had invested in savings accounts". For Roese (1997) the term counterfactual does not concern future perspectives, being restricted to denials of the established past fact. So, counterfactual thinking may suppose alternatives that are better or worse than reality. On the contrary, one can imagine the example "if John had purchased the VWX share, he would be poorer than if he had invested in savings accounts".

Prior to deciding, a range of options is applied for a future reality. However, once the decision is made, the consequences are known. So, the options which were previously listed but not selected may not come true once the action has already happened. Although the options which were not selected during the decision-making process will not come true, such options do not leave the individual, because they will haunt, entertain and affect their perception. The mental representations of such events are entitled

to counterfactual thinking (Roese, 1999). It is common for people to ask themselves what would have happened if they had won the lottery, or if they had accepted another job, or even about the choice of living in a city rather than another. When that happens, counterfactual thinking had occurred. That said, the question is how this counterfactual thinking happens.

The choices are inevitable and, to the extent that there is a conflict among the options for the decision-making, the human beings think about what would happen if they had adopted other possibilities instead of the one selected (Landman, Vandewater, Stewart & Malley, 1995). Therefore, counterfactual thinking may be evoked on demand, in response to the mental consultations, also occurring involuntarily (e.g., Kahneman (1995) and Seelau, Seelau, Wells, & Windschitl (1995)). Moreover, according to Roese (1997), by addressing the existence of automatic counterfactual thinking, it is necessary two mandatory stages: the activation and the content stages. Figure 1 summarizes the presumptions of counterfactual thinking. The following sections have explanations of the activation and content stages to correlate with the attributes of this research.

2.2.1. Activation

Counterfactual thinking starts in the activation stage due to some situations or feelings that occurred. The main determinant of the activation is affection whereas in the content stage is normality (i.e., it is understood that the circumstances surrounding the results are normal or abnormal, or unusual) (Roese, 1997). The process of counterfactual thinking is activated by a negative affection and, also, produces a negative effect that may trigger a signal to your body, saying that corrective action is necessary (Roese, 1997). For example, when someone fails a test if the person asks herself/himself or asks their peers if could have improved performance in the test this reflects the activation stage.

Two studies showed how the activation may occur. First, Sanna and Turley (1996) used three experiments manipulating the results (positive and negative, also called valence) and the expectation of the result (if the result confirms or not the expectation). Their results verify that counterfactual thinking occurs more frequently when the results are negative than when they are positive and when unexpected results happen (i.e, results do not confirm the expectation). Second, Roese and Olson (*in press* as cited Roese, 1997) also used valence experiments. They tested the affective experience itself not only cognitive perceptions of the valence results identifying that the negative results evoke counterfactual thinking more frequently. As opposed to Sanna and Turley (1996), their results expectations did not have an impact in the activation stage.

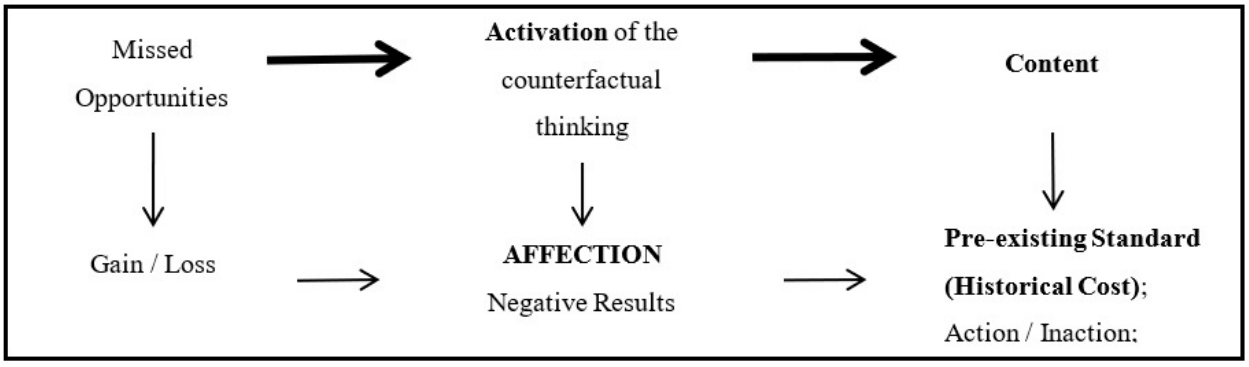

FIGURE 1 – Counterfactual Thinking
Source: Authors (2013)

In this context, when the financial statement users experience losses, it is expected that they activate the counterfactual thinking and start to indicate that a conservative approach is more appropriate, even indirectly, the historical cost as the most adequate. Thus, correlating the presumptions of the counterfactual thinking approach (Roese, 1997) with the process of measurement and evaluation of biological assets using FV.

Another substantial determinant of the activation of such theoretical perspective is the *closeness* specifically related to the *outcome closeness* (i.e., to the perception of the closeness to achieving the goal). For example, it would be expected the equity investor realized the effect of the relevance of the metrics selection only in the operating result because the counterfactual thinking is activated only by the closeness of the effects on the actions taken. Therefore, the investors tend to fail in recognizing the effect of their actions about future performance, due to closeness. In sum, affection is one of the determinants of counterfactual thinking considering the negative emotional conditions such as unhappiness, anger, depression, among others. Those conditions may lead to the activation of counterfactual thinking, as well as the perception of the closeness of a potential outcome. Other determinants are also liable to start the activation process (e.g., the outcome expectation although it is not addressed in the present study).

Returning to the example of an investment made by John. If he had withdrawn the money from the savings account and invested in the ABC company shares and, at the end of the period, he realized he had lost money due to the negative variation of the prices of such shares in the stock exchange, this could lead John to think "If I had kept my investment in a savings account, I would not lose money". Thus, the fact that John had lost a part of his capital activates counterfactual thinking. But the form in which the thinking is used to mentally undo such actions, as "I should have kept the money in the savings account" or "I should have invested my money in the company VWX" they are examples of the second stage of the counterfactual thinking, called the content stage.

In this research, it is expected that the results obtained by the selection of the FV, in the proposed experiments, are considered by the participants as an element of activation of the counterfactual thinking and, as a result, that they affect the perceptions, the evaluation process and the judgment of the relevance about the use of the metrics by the accounting sector.

2.2.2. Content

Once the counterfactual thinking is activated, the content may orbit in any set of nearly countless antecedent elements. Such antecedent elements are, then, altered (or "mutated", as said by Roese, 1997), aiming to "undo" the established fact. In the accounting and finances case, using the example of a loss in income, the investor would activate the counterfactual thinking and, subsequently, he would start thinking about alternative ways to "undo" such loss, with the thinking: "If I had not selected to evaluate the asset using the method X, I would not have affected my performance that way, and I could prevent the loss", or "I should have invested in fixed income securities instead of variable income securities".

As there is a range of antecedent elements, it is difficult to define which are the elements form the contents of the counterfactual thinking. For Kahneman and Miller (1986), the main determinant of the content seems to be the *pre-existing standard*. For this research, it expects that the users of the financial statements, when coming across a new standard or procedure, and if they consider them irrelevant, they would embrace the previous standard to support their judgment. In the experiment proposed in this work, when the individual comes across the use of the FV metrics and if somehow, the results do not meet their

expectations, they would embrace or return to the previous standard, that supported their measurement process employing the historical cost method.

Another counterfactual antecedent is the *action-inaction* where the counterfactual thinking is more likely to occur about actions than to inaction. Kahneman and Miller (1986) state that this variable may affect the counterfactual thinking once it reflects the antecedent normality (i.e., the inaction would be normal and the action would be abnormal). In the example above, the counterfactual thinking would be more likely to occur if John had withdrawn his money from the savings account and invested in other financial assets and had lost, than if he had kept his money in the savings account and, even so, to lose a portion of the money (instead of investing in a financial asset).

Lastly, the third content is the *antecedent controllability*. Since the controllable antecedents are more probably to change than the non-controllable, the thought tends resort this kind of antecedent which was in the possession of the individual. Girotto, Legrenzi and Rizzo (1991) exemplify the case of a husband who is late getting home. The mutations of counterfactual thinking are more volatile to events under the individual's control, such as, for example, stopping on the way to drink beer, than less changeable events such as wait for a flock of sheep to cross the road. In sum, three antecedents for the counterfactual content were described: normality, action-inaction, and controllability. For Roese (1997) the evidence suggests that normality is the most important determinant content because several studies have shown the counterfactual content gravitates to uncommon antecedent events, changing them in the sense of normality.

2.3. Development of Hypotheses

The counterfactual thinking theory supposes that this type of thinking is activated when undesirable situations occur. The use of the FV to assess the biological assets produces losses and gains in the operating results. It is assumed that people have different reactions when facing gains and losses and it is easier trying to avoid a loss adjusted by the FV instead of a gain, and it involves thinking about how this loss could be avoided. Furthermore, according to theory when the results are desirable, people do not seem to understand the reasons for the gain, and they will not mentally undo the result (Roese, 1997).

As previously verified, both the market professionals and the academics have their criticisms of the use of the FV to evaluate biological assets. Given this, the following hypotheses were formulated:

H1A: Market professionals judge fair value to be most relevant to evaluate biological assets that result in losses rather than gains

H1B: Academics judge fair value to be most relevant to evaluate biological assets that result in losses rather than gains.

The theory suggests that the more an item is changeable (i.e., when a result may be undone) the more easily an individual may activate the counterfactual thinking. As some of the biological assets have an active market (liquidity), there is liquidity for them to be negotiated any time, even during their maturation period. The fact that the asset may be sold more easily may affect the definition of relevance among the participants of the experiment (market vs. academic). Thus, the following hypotheses were formulated:

H2A: Market professionals judge fair value to be most relevant to value biological assets with an active market (liquidity) than for biological assets without active market.

H2B: Academics judge fair value to be most relevant to value biological assets with an active market (liquidity) than for biological assets without an active market.

Additionally, another feature of counterfactual thinking that can influence the judgment of

individuals is the proximity of the outcome. Roese (1997) highlights that the proximity perception affects the activation of counterfactual thinking. Therefore, the individuals would be more likely to activate counterfactual thinking in situations where that the managerial decision approximates the decision to dispose of the assets, for example when the biological assets are (i.e., when the biological assets are "Available for sale"[v] or when they are "Held to maturity") Thus, it is assumed that:

H3A: Market professionals judge that the fair value is more relevant to evaluate biological assets held for trading than those held up to maturity.

H3B: Academics judge that the fair value is more relevant to evaluate biological assets held for trading than those held up to maturity.

3. RESEARCH DESIGN

3.1. Description of the Sample

The research sample was composed of two groups of participants. The first group was composed of 217 students of the post-graduation *lato sensu* program (Executive MBA) located in Ribeirão Preto and São Paulo, both linked to the University of São Paulo (USP). The second group was composed of 155 undergraduate accounting students from USP (also Ribeirão Preto and São Paulo campuses). The experiments were carried out in the university classrooms between July and August 2013. It was used an Authorization Protocol[vi] of the institution and the participant applying the study during the academic term. Table 1 states the number of respondents by the institution and by the level of education.

TABLE 1 – Distribution of the Respondents by Institution and Level of Education

	Graduation	Post-Graduation	Total
Campus I	139	96	235
Campus II	78	59	137
TOTAL	**217**	**155**	**372**

Source: Authors (2013)

The present research assumed the MBA and undergraduate students have reasonable knowledge, according to the conceptual framework (CPC, 2018), that they may also be users of the financial statements to apply a portion of their finances in the stock market. The MBA students have, on average, 6.8 years of experience in Accounting or Controllership and the undergraduate students as representatives of the College were selected, as a control, based on they have already done subjects about fair value measurement (students were in the sixth semester).

3.2. Design

The experiment was performed considering a 2 x 2 x 2 model, which sought to test three hypotheses (H1, H2, and H3). The structure of the experiments was built according to the assumptions presented in Table 2, which considers the type of biological asset, the managerial decision, and the economic outcome of each setting.

The experiment was configured in which independent variables are constituted by the types of assets, managerial decisions and economic results impact the dependent variable that the participants' judgment on the "relevance of using the FV method". Table 3 presents the variables, with their respective constructs and hypotheses.

TABLE 2 – Formatting of the Experiments (2 x 2 x 2)

Biological Asset	Cattle (bovines)				Eucalyptus Forest			
Active Market	With Market				Without Market			
Managerial Decision-Making Result	Held to maturity Gain	Available for sale Loss	Held to maturity Gain	Available for sale Loss	Held to maturity Gain	Available for sale Loss	Held to maturity Gain	Available for sale Loss

Source: Authors (2013)

TABLE 3 – Variables, Constructs, and Hypotheses

H1	Construct	Outcome Desirability	Affects the Judgment
	Measurement	Loss x Gain	Relevant / Irrelevant
H2	Construct	Item Changeability	Affects the Judgment
	Measurement	With Active Market x Without Active Market	Relevant / Irrelevant
H3	Construct	Perception of Closeness	Affects the Judgment
	Measurement	Management Intent	Relevant / Irrelevant

Source: Authors (2013)

Participants from the groups of each experiment were randomly assigned to each of the eight groups, classified as potential investors to evaluate Brasil-Agro Company. It is worth clarifying that in case 1 it dealt with the acquisition of 1,000 cattle and in case 2 it dealt with the planting of 1,000 hectares of eucalyptus forests, both at the cost of ten million reais (Brazilian currency, with an average price of US$ 1 - R$ 2.50).

The cases describe that there was an appreciation or devaluation of the prices of agricultural products derived from the biological assets researched, so that the changes in prices were caused by factors external to the company. There was no indication the change of prices had occurred due to the growth of the biological asset, but due to the change of expectations for the use of their agricultural products. At the end of the case, the managerial decision taken was presented (held the asset to maturity or make it available for sale at any given time).

The values of gains and losses were symmetrically elaborated. The difference was only in adding (in the case of gains) or subtracting (in the case of losses). There was 13.75% of the variation, where the assets with losses were R$ 8,675,000 (R$ 10,000,000 - R$ 1,375,000) and the assets with gains were in R$ 11,375,000 (R$ 10,000,000 + R$ 1,375,000) both assets were evaluated by the FV method. Purposely, the amounts involved in the cases are materially significant, aiming to bring importance to the decision-making of the participants. As a form of control, it did not adopt the expressions “cost” or “historical cost” during the development of the cases, as this could make the participants pay attention to or anchor the old accounting standard as opposed to fair value.

Moreover, the selection of ox (bovines) as the biological asset was intentional due to their liquidity[vii] in the market while the forests do not have an active market during their formation cycle only at the end of the cycle. Only the aspects (manipulated variables), types of assets (bovines and forests), potential outcomes (loss or gain), and the management decisions (held to maturity or available for trading) were changed in the establishment of the experiment groups, keeping all the other variables intact.

Figure 2 shows the contents used in the setting of the experiments applied for market professionals and academics. The relevance of the FV method was evaluated in Groups 1-4 for the “Bovines” and in Groups 5-8 for the eucalyptus forests. Both had identical stimuli, the only difference was in the specificities for the type of asset mentioned.

During the process of the experiments, after reading individually their respective cases, the participants answered two sets of questions to test the study hypotheses:

Set 1: Socio-economic and professional characteristics of the respondents; and

Set 2: Evaluation of the use of the FV method for biological assets:

Question 1: What value do you assign (in Reais) to the Brasil-Agro Company?

Question 2: Do you believe it is important to use the fair value to evaluate the financial position of the Brasil-Agro Company? Rate it from 0 (not important) to 100 (very important)

Group 1: Ox - Held - Loss	Group 2: Ox - Held - Gain	Group 3: Ox - Available - Loss	Group 4: Ox - Available - Gain
In Year 1, Brasil Agro Company had acquired a batch with 1,000 one-year-old heads of cattle from local cattle breeders.			
The investment value for such assets was US$ 10,000,000.			
Usually, the trading of beef cattle is destined for the American market (USA) only at the end of the feeding cycle, by Year 4.			
In Year 2, an outbreak of foot-and-mouth disease has been verified in beef cattle, in the Central-West Region of Brazil. The bovines from Brasil Agro were not affected by the disease.	In Year 2, an outbreak of mad cow disease has been verified in beef cattle in Central Europe.	In Year 2, an outbreak of foot-and-mouth disease has been verified in beef cattle, in the Central-West Region of Brazil. The bovines from Brasil Agro were not affected by the disease.	In Year 2, an outbreak of mad cow disease has been verified in beef cattle in Central Europe.
This piece of information caused the American clients to terminate all agreements with Brazilian cattle breeders. Given the above, there was a decrease (devaluation) in the price of the meat (arroba) in the national market, being listed in the commodity and futures exchange.	This piece of information caused the American clients to terminate all agreements with European cattle breeders. Given the above, there was an increase (appreciation) in the price of the meat (arroba) in the national market, being listed in the commodity and futures exchange.	This piece of information caused the American clients to terminate all agreements with Brazilian cattle breeders. Given the above, there was a decrease (devaluation) in the price of the meat (arroba) in the national market, being listed in the commodity and futures exchange.	This piece of information caused the American clients to terminate all agreements with European cattle breeders. Given the above, there was an increase (appreciation) in the price of the meat (arroba) in the national market, being listed in the commodity and futures exchange.
As a result, the fair value of such assets was reduced.	As a result, the fair value of such assets was improved.	As a result, the fair value of such assets was reduced.	As a result, the fair value of such assets was improved.
In the second year, Cia Brasil Agro indicated that it only intends to sell the bovines acquired at the end of the cycle, that is, in the fourth year, in two years.		In Year 2, the management of the Brasil Agro Company has determined that they do not intend to keep the Bovines (cattle) until the end of the period, and they may sell them at any time before the end of the cycle, even with 2 years left for slaughter.	
Bovines represent the company's core business. Thus, consider that the amount in Reais is extremely significant.			
Value of the acquisition			
$10,000,000	$10,000,000	$10,000,000	$10,000,000
Bovines at fair value			
8,625,000	11,375,000	8,625,000	11,375,000

FIGURE 2 – Experiments
Source: Authors (2013)

Question 3: Do you consider it is important to use the fair value to evaluate the outcomes of the Brasil-Agro Company? Rate it from 0 (not important) to 100 (very important)

Question 4: In your opinion, do the fair value metrics used faithfully represent the value of the asset? Rate it from 0 (does not faithfully represent) to 100 (faithfully represents).

The scales and measurements used in this research were developed based on the methodological presumptions of Koonce et al. (2011). Koonce et al. (2011) used a 100-point response scale to analyze the answers about the relevance of FV in financial instruments (considering whether is asset or liability, gain or losses, and whether management's intent affects investors' judgment about fair value relevance). In this study, the rate was anchored from 0 "not important" ("does not faithfully represent") to 100 "very important" ("faithfully represents") to participants to judge the relevance (faithful representation) of the fair value for biological assets. Moreover, the non-parametric test of *Kruskal-Wallis* was used for the analysis of the responses due to data non-normal.

4. RESULTS

The non-parametric test of *Kruskal-Wallis* was used for the analysis of the responses. This test uses data ranks of three or more independent samples, to test the null hypothesis that the samples come from populations with equal medians. In **question 1**, each participant rates the relevance of the FV in the evaluation of the biological asset. Table 4 presents the test results for market professionals.

It was found that most of the participants indicated the FV method as an appropriate evaluation metric for both types of Biological Assets. There were differences among the frequency of rates assigned, but they were not statistically significant, except for the comparison between Bovines and Forests (sig. 0.046), where the latter presented a higher frequency, running against Hypothesis 2 and not confirming Hypotheses 1 and 3. So, only the results from Hypotheses 2 confirmed that there is a difference between both groups. Therefore, the FV for the group which evaluates the investment in "Forest" was chosen by most of the participants as the best representation of the economic value of the asset. Table 5 presents the test results to the academics' group for the same question.

It was identified that only Hypothesis 3 was accepted (sig. 0.072) for the academics' group indicating that the FV is more relevant for the assets when considering the management decision involved, but only for the assets available for sale. Therefore, the results indicate a difference of perception between the market professionals (MBA students) and the academics (undergraduate students). It is possible to conjecture that the opinion of the second group is in line with the assumptions of the standard and the regulatory body (IASB).

Question 2 asked the participants if the FV is important to evaluate the financial position of the Brasil Agro Company. The results of the rates were close to one hundred for the market professionals (Executive MBA), i.e., they believe that the FV is relevant for the measurement of the biological assets in the cases presented. Nonetheless, if the score was close to zero, it would indicate the preference of the "historical cost" for the measurement of the asset. Tables 6 and 7 presents the descriptive statistics and the Kruskal-Wallis tests results, respectively.

The results indicate that the market professionals believe that the FV is a relevant metric for the settings of the experiment because the average scores were high (with a mean score of more than eighty for all groups). But the tests did not present statistical significance for Hypotheses 1, 2, and 3, rejecting the assumption that there are different perceptions among the stimuli used. Even for the situations where there was a potential loss, the participants did not activate the counterfactual thinking and, embrace the former method as a form of correction or mitigation of the impacts of the new

TABLE 4 – Kruskal-Wallis Test: The value of the Brasil-Agro Company asset (Market Professionals)

Panel A H1	N	Classif. Average	Panel B H2	N	Classif. Average	Panel C H3	N	Classif. Average
Loss	105	102.96	Ox	104	94.93	Held	100	101.85
Gain	98	100.97	Forest	99	109.43	Available	103	102.15
Total	203		Total	203		Total	203	
Chi-Square	0.075		Chi-Square	3.993		Chi-Square	0.002	
Significance	0.784		Significance	0.046**		Significance	0.968	

†*** p <.01. ** p <.05. * p<.10
Source: Authors (2013)

TABLE 5 – Kruskal-Wallis Test: The value of the Brasil-Agro Company asset for academics (undergraduate students)

Panel A H1	N	Classif. Average	Panel B H2	N	Classif. Average	Panel C H3	N	Classif. Average
Loss	75	75.11	Ox	74	72.79	Held	75	69.72
Gain	73	73.88	Forest	74	76.21	Available	73	79.41
Total	148		Total	148		Total	148	
Chi-Square	0.052		Chi-Square	0.403		Chi-Square	3.241	
Significance	0.819		Significance	0.525		Significance	0.072*	

†*** p <.01. ** p <.05. * p<.10
Source: Authors (2013)

metric. Therefore, the results indicate, a priori, that the FV is relevant to evaluate biological assets, regardless of the conditions (outcome, type of asset, management decision). We can also conjecture that there are no signs of use of the historical cost as a metric by the market professionals. Tables 8 and 9 present the descriptive statistics and the Kruskal-Wallis test results, respectively, for question 2 to the academics' group.

The experiments result to the academicians indicate that the FV is a relevant metric, similarly to the market professionals since the average score in both experiments reached more than 80 points. It was found that there are differences of perceptions among the students for Hypothesis 3, where the assets available for sale have a higher and significant median (sig. 0.076) related to the assets held to maturity. That is, indicating that there is no consensus among the academics for the evaluation of assets involving short and long-term decisions. Such results adhere to the opposition of Barlev and Haddad (2003) stating that the measurement at FV may jeopardize the understandability and the reliability of the accounting information, due to the use of subjective values, permeated by arbitrary premises. Nevertheless, in Hypothesis 2, the academicians believe that the FV is more relevant for the assets with lower liquidity, statistically (sig. 0.000), for the experiment evaluating the forest.

TABLE 6 – Descriptive Statistics: the relevance of the fair value for the evaluation of the assets (Market Professionals)

	Loss	Gain	Ox	Forest	Held	Available	Total
Average	84.15	84.91	84.4	84.64	83.52	85.53	84.52
Deviation	25.66	17.27	23.59	20.16	22.95	20.87	21.92
CV	30.50%	20.30%	28.00%	23.80%	27.50%	24.40%	25.90%

Source: Authors (2013)

TABLE 7 – Kruskal-Wallis Test: the relevance of the fair value (Market Professionals)

Panel A H1	N	Classif. Average	Panel B H2	N	Classif. Average	Panel C H3	N	Classif. Average
Loss	111	112.77	Ox	110	110.21	Held	108	106.94
Gain	105	103.99	Forest	106	106.73	Available	108	110.06
Total	216		Total	216		Total	216	
Chi-Square	1.178		Chi-Square	0.186		Chi-Square	0.149	
Significance	0.278		Significance	0.667		Significance	0.699	

†*** p <.01. ** p <.05. * p<.10

Source: Authors (2013)

TABLE 8 – Descriptive Statistics: the relevance of the fair value for academicians (undergraduate students)

	Loss	Gain	Ox	Forest	Held	Available	Total
Average	84.99	81.83	78.44	88.55	81.29	85.49	83.4
Deviation	21.680	23.912	24.595	19.661	22.648	22.924	22.811
CV	25.51%	29.22%	31.36%	22.20%	27.86%	26.81%	27.35%

Source: Authors (2013)

TABLE 9 – Kruskal-Wallis Test: the relevance of the fair value for academicians (undergraduate students)

Panel A H1	N	Classif. Average	Panel B H2	N	Classif. Average	Panel C H3	N	Classif. Average
Loss	77	81.69	Ox	79	66.19	Held	77	71.82
Gain	78	74.35	Forest	76	90.28	Available	78	84.1
Total	155		Total	155		Total	155	
Chi-Square	1.128		Chi-Square	12.136		Chi-Square	3.158	
Significance	0.288		Significance	0.000***		Significance	0.076*	

†*** p <.01. ** p <.05. * p<.10

Source: Authors (2013)

Question 3 evaluated if the measurement at FV is relevant for the evaluation of the outcome of the Brasil-Agro Company. For this, the participants assigned from zero ("not important") to one hundred ("very important"), i.e., a 100-point scale. Tables 10 e 11 present the descriptive statistics and the Kruskal-Wallis tests results, respectively.

The results demonstrate that the averages of the groups are not discordant to the point of rejecting the hypotheses for the analyzed stimuli. The Kruskal-Wallis test confirms that the groups present similar average ratings among themselves. One can conclude the FV is relevant to evaluate the outcomes and the assets. It was expected that the participants had more conservative and short-term posture, concerning the impacts of the FV over the outcomes, but the outcomes do not support it. Tables 12 and 13 presents the descriptive statistics and the Kruskal-Wallis tests results, respectively, for question 3 to the academics' group.

The outcomes below indicate that the academicians' group had also assigned scores similar to the other groups (market professionals) concerning the use of FV to evaluate the outcome (losses and gains)

TABLE 10 – Descriptive Statistics: the relevance of the fair value for the evaluation of the outcome (Market Professionals)

	Loss	Gain	Ox	Forest	Held	Available	Total
Average	79.18	81.84	77.91	83.12	80.54	80.42	80.48
Deviation	29.15	25.86	30.43	24.13	28.82	26.37	27.56
CV	36.80%	31.60%	39.10%	29.00%	35.80%	32.80%	34.20%

Source: Authors (2013)

TABLE 11 – Kruskal-Wallis Test: the relevance of the fair value for the outcome (Market Professionals)

Panel A H1	N	Classif. Average	Panel B H2	N	Classif. Average	Panel C H3	N	Classif. Average
Loss	111	108.39	Ox	110	106.23	Held	109	112.26
Gain	106	109.64	Forest	107	111.85	Available	108	105.71
Total	217		Total	217		Total	217	
Chi-Square	0.024		Chi-Square	0.479		Chi-Square	0.652	
G. L.	1		G. L.	1		G. L.	1	
Significance	0.877		Significance	0.489		Significance	0.419	

†*** p <.01. ** p <.05. * p<.10

Source: Authors (2013)

TABLE 12 – Descriptive Statistics: the relevance of the fair value for the evaluation of the outcome for academics (undergraduate students)

	Loss	Gain	Ox	Forest	Held	Available	Total
Average	76.4	75.19	72.76	78.95	70.13	81.38	75.79
Deviation	28.250	28.541	29.370	26.998	29.868	25.666	28.311
CV	36.98%	37.96%	40.37%	34.20%	42.59%	31.54%	37.35%

Source: Authors (2013)

TABLE 13 – Kruskal-Wallis Test: the relevance of the fair value for academics (undergraduate students)

Panel A **H1**	**N**	Classif. Average	Panel B **H2**	**N**	Classif. Average	Panel C **H3**	**N**	Classif. Average
Loss	77	79.15	Ox	79	72.00	Held	77	67.67
Gain	78	76.87	Forest	76	84.24	Available	78	88.20
Total	155		Total	155		Total	155	
Chi-Square	0.104		Chi-Square	2.982		Chi-Square	8.395	
Significance	0.747		Significance	0.084*		Significance	0.004***	

†*** *p <.01. ** p <.05. * p<.10.*

Source: Authors (2013)

of the Brasil Agro Company. However, Hypothesis 2 may be rejected with a significance level of 10% (sig. 0.084), indicating that the FV method is the most appropriate to evaluate the outcomes of the group evaluating the forest investment (when considering the type of asset). Furthermore, hypothesis 3 may also be rejected with a significance level of 1% (sig. 0.004), suggesting that the FV is more relevant to evaluate assets for management decisions "available for sale" instead of "held to maturity".

Question 4 asked the participants if the FV presented faithfully represents the value of the asset of the Brasil-Agro Company. For this, the participants assigned from zero ("does not faithfully represent ") to one hundred ("faithfully represents "), i.e., a 100-point scale. Tables 14 and 15 present the descriptive statistics and the *Kruskal-Wallis* tests results, respectively.

As of Table 14, it was determined that the participants take a more conservative position when assigning scores about the level of faithful representation (reliability) in comparison to when assigning the FV relevance. The results indicate that the stimuli of the research (outcomes, type of asset, and management decision) are not variables that promote the activation of the counterfactual thinking on the participants to repulse the reliability of FV. It demonstrated certain symmetry in the opinions of the groups, and thus, it is not possible to reject the hypotheses. Tables 16 and 17 present the descriptive statistics and the *Kruskal-Wallis* tests results, respectively, for question 4 to the academics' group.

The results indicate the academics (undergraduate students) also consider that the FV faithfully represents the value of the biological assets. Nonetheless, they differ in the understanding about the reliability of the measurement process for the biological assets evaluated for the investments in forests by Level 3 (forest), so it is possible to reject Hypothesis 2 with a significance level of 5% (sig. 0.037).

TABLE 14 – Descriptive Statistics: the faithful representation of the fair value (Market Professionals)

	Loss	Gain	Ox	Forest	Held	Available	Total
Average	61.44	60.73	58.32	63.94	61.3	60.88	61.09
Deviation	30.18	28.6	31.65	26.63	29.18	29.65	29.35
CV	49.10%	47.10%	54.30%	41.60%	47.60%	48.70%	48.00%

Source: Authors (2013)

TABLE 15 – Kruskal-Wallis Test: the faithful representation of the fair value (Market Professionals)

Panel A H1	N	Classif. Average	Panel B H2	N	Classif. Average	Panel C H3	N	Classif. Average
Loss	111	111.07	Ox	110	104.07	Held	109	109.04
Gain	106	106.83	Forest	107	114.07	Available	108	108.96
Total	217		Total	217		Total	217	
Chi-Square	0.251		Chi-Square	1.396		Chi-Square	0.000	
Significance	0.616		Significance	0.237		Significance	0.993	

†*** *p* <.01. ** *p* <.05. * *p*<.10.

Source: Authors (2013)

TABLE 16 – Descriptive Statistics: the faithful representation of the fair value for academics (undergraduate students)

	Loss	Gain	Ox	Forest	Held	Available	Total
Average	60.48	61.6	56.54	65.72	58.21	63.85	61.05
Deviation	27.396	27.022	27.541	26.047	27.977	26.136	27.126
CV	45.30%	43.87%	48.71%	39.63%	48.06%	40.93%	44.43%

Source: Authors (2013)

4.1 Further Analysis

Finally, a comparative analysis was carried out (questions 2 and 4), aiming to compare the medians of the scores assigned to the relevance and faithful representation constructs of the FV. Table 18 presents the descriptive statistics and the results of the Kruskal-Wallis test.

It was found the medians (scores) of the experiments presented significant differences among the scores assigned by the participants (academics vs. market professionals). So, the results indicate the rejection of hypotheses 1, 2, and 3 with a significance level of 1%. Therefore, it is possible to conclude that the participants of the experiment believe in the relevance of the method of FV to evaluate biological assets (bovines and forests), more than trust in it.

TABLE 17 – Kruskal-Wallis Test: the faithful representation of the fair value for academics (undergraduate students)

Panel A H1	N	Classif. Average	Panel B H2	N	Classif. Average	Panel C H3	N	Classif. Average
Loss	77	77.52	Ox	79	70.66	Held	77	73.62
Gain	78	78.47	Forest	76	85.63	Available	78	82.33
Total	155		Total	155		Total	155	
Chi-Square	0.018		Chi-Square	4.368		Chi-Square	1.479	
Significance	0.894		Significance	0.037**		Significance	0.224	

†*** p <.01. ** p <.05. * p<.10

Source: Authors (2013)

TABLE 18 – Kruskal-Wallis Test: the faithful representation versus the relevance of the fair value

MBA	Loss		Gain		Ox		Forest		Held		Available	
	Relev.	Faith. Repr.	Relev.	Faith. Repr.	Relev.	Faith. Repr.	Relev.	Faith. Repr.	Relev.	Faith. Repr.	Relev.	Faith. Repr.
Classif. Average	141.1	81.86	132.4	79.85	139.3	81.68	133.4	80.86	135.7	82.51	137.4	79.62
N	111	111	105	106	110	110	106	107	108	109	108	108
Chi-Square	48.886		40.448		46.652		40.021		40.276		47.172	
Signif.	0.000***		0.000***		0.000***		0.000***		0.000***		0.000***	
Graduation	Loss		Gain		Ox		Forest		Held		Available	
	Relev.	Faith. Repr.	Relev.	Faith. Repr.	Relev.	Faith. Repr.	Relev.	Faith. Repr.	Relev.	Faith. Repr.	Relev.	Faith. Repr.
Classif. Average	99.28	55.72	97.77	59.23	99.14	59.86	98.66	54.34	96.97	58.03	100.2	56.71
N	77	77	78	78	79	79	76	76	77	77	78	78
Chi-Square	37.766		29.025		29.519		40.314		29.875		37.528	
Signif.	0.000***		0.000***		0.000***		0.000***		0.000***		0.000***	

†*** p <.01. ** p <.05. * p<.10

Source: Authors (2013)

5. FINAL CONSIDERATIONS

As of January 1st, 2010, the Brazilian publicly traded companies[viii] had to adopt integrally the International Financial Reporting Standards (IFRS) arising from the IASB. Among them, the IAS 41 – *Agriculture* defines that, among other requirements, the companies with biological assets with agricultural activity should evaluate them using the fair value (FV) method. Measuring assets and liabilities using FV have created an extensive debate about the relevance of this accounting information for users. For biological assets, the accounting standards issuing bodies clarify that the price variations and increases are better reflected in the financial statements using FV.

In this context, it was analyzed the academic perception (155 undergraduate accounting students) versus market professionals (217 Executive MBA course students) about the relevance of the use of the FV to evaluate biological assets. With eight different experiments (2 x 2 x 2), the manipulated stimuli were: (i) the outcome desirability (loss or gain); (ii) the item changeability (type of biological asset: bovines or forest); and (iii) the perception of the outcome closeness (management decision: hold to maturity or available for sale). All stimuli may generate lost opportunities, activate counterfactual thinking affecting the judgment (Koonce et al., 2011).

Our findings indicate that FV results (gain or losses) for both groups (academics and market professionals) do not affect the judgment of the individuals about the relevance of the use of FV for biological assets as also Koonce et al. (2011) found out for financial instruments (assets or liabilities). Thus, the authors have concluded that the individuals believe that the FV is more relevant for financial assets than for financial liabilities.

Regardless the conditions (outcome, type of asset, and management decision) for market professionals, the stimuli were not significant to have different perceptions, except when they asked about Brasil-Agro Company asset value that it was identified as a significantly different perception in the group indicating FV has a better representation of the economic value of the "Forest" biological assets (Hypothesis 2 – question 1).

For academics, it was found different perceptions when they asked about the relevance of FV for Brasil-Agro Company asset value, financial position, and outcome. Regarding asset value, financial position and outcome, the perception of the academicians' group, considering the management decision (Hypothesis 3), indicates that the FV is more relevant for the assets which are available for sale. In this case, it was found that outcomes closeness activated the counterfactual thinking (Roese, 1997) where academics judged it more relevant to evaluate biological assets held for trading. When asked about the financial position and outcome for academics, it was found different relevance perceptions indicate FV is more relevant to "Forests" contrary to Hypothesis 2. That is biological assets with lower liquidity.

About faithfully represents the value of the Brasil Agro Company asset (question 4), the results indicate that score assigned was lower than when the participants were asked for the relevance. However, just for the academics the item changeability stimulus (type of biological asset) presents significant differences (sig. 0.037) for the investment in forests (contrary to Hypothesis 2). In a comparative analysis between relevance and faithful representation, it was identified the medians (scores) of the experiments presented significant differences. Thus, the results indicate the rejection of the hypotheses. It can be concluded that the perception of the relevance of the FV method is greater to evaluate biological assets (bovines and forests) than the reliability in the process and the outcomes.

The results obtained do not allow generalizations, because of research limitations, such as the number of participants by sample, the use of substitutes of academicians and investors, and also the variables listed as stimuli in the experiments.

Finally, our results contribute to the discussion of the dilemmas involving the use of the FV method useful for supporting accounting standard-setters reviews as well as using the Counterfactual Thinking Theory may capture those cognitive facets of the decision-making agents (subjects in the process of preparation and use of financial reports), once the lost opportunities would lead to the activation of the counterfactual thinking, increasing understandability how the investors judge FV results for biological assets. Additional research may be done as why possible investors assigned lower scores when they were asked to judge the represent faithfully. Moreover, whether those who prepare financial reports may think the same relying on the type of biological assets. Recently, CPC 29 (IAS 41) was reviewed (as of January 1st, 2016 had an effect on financial statements) and introduced the bearer plants concept which they are measured by cost. It may incentive more research considering that the context may affect investors' perceptions of relevance and reliability.

ENDNOTES

[i] The IFRS issuing agency (the International Accounting Standards Board, IASB), up to 2010, acknowledged in their Conceptual Framework that the qualitative characteristics of relevance and reliability could be conflicting. However, in the revision made in Conceptual Framework, in 2010, the reliability construct was replaced by the faithful representation, and the idea of opposition was removed. The replacement occurred because IASB believed that the term "reliability" did not cover clearly what they intended to communicate (IASB, 2013, p.B14). Several local standardization bodies questioned it including the European Financial Reporting Advisory Group (EFRAG). EFRAG (2013) expressed preliminarily the vision that reliability is a construct that may return compatible with opinions emitted in their comment letter of the review of the Conceptual Framework in 2008 (EFRAG, 2008). This work is based on the Conceptual Framework of the IASB up to its revision in 2010, which was the Conceptual Framework at the time of the IAS 41 in 2001, a standard for the measurement of biological assets in agricultural activity.

[ii] According to total biological assets values from Ibovespa index which is the main performance indicator of the stocks traded in the Brazilian capital market. Data of December, 2021 obtained from Economatica.

[iii] The concept of relevance used is the one "able to make a difference in the decisions that may be taken by the users". It was already a part of the Conceptual Framework at the time of the IAS 41 issuance and was kept during the revision of the Conceptual Framework performed in 2010.

[iv] AASB 1037 is the standard about Self-Generating and Regenerating Assets (SGARAs) issued by the Australian Accounting Standards Board to cover live animals and plants in August 1998. It proposed the measurement of the SGARAs by the Net Market Value (NMV) and that any variation in NMV should be shown in the result for the period.

[v] The expressions "Available for sale" and "Held to maturity" are the same used in the Pronouncement IAS 39 - Financial Instruments: Recognition and Measurement. Despite the IAS 41 - Agriculture does not mention such characteristics, by the Counterfactual Thinking Theory, those factors may affect the relevance of the fair value. So, they were incorporated in this study.

[vi] The results will not reveal any kind of association that may allow the participants' precise identification. This protocol aims to comply with the confidentiality required by those responsible from the institutions mentioned.

[vii] In Brazil, there is a specific stock exchange for the bovines' market, where the assets are listed in the commodity and futures exchange by the weight. Source: http://www.bmfbovespa.com.br/

[viii] Meeting the requirements of the Brazilian Securities and Exchange Commission Instructions.

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