

Corporate Initiatives to Mitigate Climate Change in Brazil: An Analysis of Companies That Joined ICO2 and Brazil GHG Protocol Program

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Abstract – In this research we aimed at mapping, analyzing and discussing the corporate initiatives that are taken by Brazilian companies which participate in ICO2 and in Brazil GHG Protocol Program to mitigate climate change. We carried out an exploratory, documental and bibliographical research in annual sustainable reports, carbon emission inventories, CDP questionnaires and official websites; we applied the content analysis technique with a qualitative and descriptive approach. The use of international initiatives, Global Pact, Global Reporting Initiative (GRI) and Carbon Disclosure Project (CDP), stands out as instrument for improvement, implementation and development of actions to mitigate climate change. We also noticed alignment of some national initiatives with some from the international scenario, such as the Corporate Sustainability Index and ICO2, based on New York Stock Exchange. Thus, amongst 19 companies investigated in this research, Klein stood out for the amount of international initiatives taken, while Itagui Nuisance stood out for its national initiatives. Regarding in-house actions, we noticed that companies are concerned with climate change and have implemented in-house actions, such as mitigation and adaptation plans, as well as disclosing their actions to stakeholders.

Keywords – Climate Change, Corporate Initiatives, Carbon Efficient Index (ICO2), Brazil GHG Protocol Program.

I. INTRODUCTION

Global temperature alterations coming from anthropoid actions can occur due to natural phenomena; however, in the latter century, we have noticed that there was great increasing of carbon dioxide and Greenhouse gas emissions into the atmosphere, which has led to global warming and consequent climate change; this change comes from burning of fossils such as coal, oil and natural gas (IPCC, 2013). Faced with global warming, the context of risks caused by climate change has become a challenge for companies, especially regarding the impacts of this phenomenon on their profits, on their organizational development or even on value added to investments (Labatt and White, 2007). Thus, we question the strategies and ways companies behave in this scenario.

In the scenario of climate change, thus, we expect companies to develop their activities taking the sustainability tripod into account, that is, with economic, social and environmental well-balanced outcomes, which will require consistent and proper corporate strategies for material, business and financial risks to which companies are exposed (Labatt and White, 2007).

In the view of IPCC (2013) and Fuchs (2008), these actions can be both for mitigation and adaptation. In the

first case, companies take previous actions in order to reduce and/or eliminate their impacts on climate. In the second one, companies tackle a problem insofar as it advances, adapting themselves to the scenario. Besides, companies can take proactive attitudes through actions of migration with innovation. However, these strategies are not set in current scenario.

Due to stakeholders' pressure, organizations are constantly asked to show the results of their performance through a consistent instrument of communication that meets some requirements: transparency, management of risks, relevancy, reliability, and ethical and moral responsibility. This information must support sustainable and profitable decisions of investment, since it has required companies to change their attitudes faced with this reality and evidenced risks to the companies that keep on maintaining the same levels of production without actions of mitigation and/or reductions of their impacts on the environment (Page, Hurtt and Thomson, 2013).

According to BM&FBOVESPA (2009) and Labatt and White (2007), organizations have been changing their attitudes due to the way investors have been changing their behavior regarding the destiny of their resources and to the realization of the material, business and financial risks climate change may bring to organizational accomplishment; this situation has made investors more demanding concerning companies' need of managerial practices that fairly meet economic, social and environmental dimensions.

One of the instruments of carbon disclosure currently used by companies in order to disclose their actions to tackle climate change is the report on demands of Carbon Disclosure Project (CDP) filled in by companies.

According to Amaral (2012) and Ziegler, Busch and Hoffmann (2011), participation in market initiatives such as sustainability index, carbon market, GHG Protocol Program, CDP, Global Reporting Initiative (GRI), amongst others, contribute to increase organizational value in the market, since it impacts organizational accomplishment. So we believe that companies which participate in market initiatives and focus on sustainability have sustainable managerial practices and take actions in order to mitigate and/or reduce GHG emissions in response to climate change.

In this sense, we aim at answering the following question: **Which corporate initiatives have been taken by Brazilian companies that joined ICO2 and Brazil GHG Protocol Program in order to mitigate climate change?**

Thus, in this research we aim at mapping, analyzing and discussing the corporate initiatives taken by Brazilian

companies which joined ICO2 and Brazil GHG Protocol Program in order to mitigate climate change. To achieve this goal, we carried out an exploratory, bibliographical and documental research of qualitative, descriptive and analytical approach through searches on books, manuscripts – whose secondary data were obtained from reports on sustainability –, annual reports integrated into the reports on sustainability, inventory of emissions disclosed in Brazil GHG Protocol Program, CDP questionnaires, searches on websites of companies, on ICO2 website and on Brazil GHG Protocol Program website. More details on strategies and procedures of this study are provided in topic 3.

This research is relevant due to the necessity of evidencing how companies are acting faced with the risks generated by climate change. That is, mapping corporate actions will contribute to analyzing the types of actions, corporate goals, their insertion into corporate strategies and their contribution to mitigation of climate change. Besides, it will evidence different actions from different companies, and so we can compare convergences and investigate particularities, as well as point out which Brazilian companies are acting proactively faced with this problem, since there is no regulation that demands companies to take actions against climate change.

So this study is important for understanding the main corporate actions, both national and international, as well as for analyzing and discussing the insertion of each company into these initiatives. We will design a generic framework in order to guide the actions of companies that would like to adjust their strategies faced with climate change. From it, several opportunities of researching will come along since this framework may raise new questions and solutions so that companies can take shortcuts to actions faced with climate change.

In this context, this study also indicates analysis of micro-companies, that is, we evidence which in-house actions have been taken by these companies faced with climate change. This is important for companies to get more familiar with their actions and compare themselves to other companies that participate in ICO2 and GHG Protocol. At last, displaying companies in a ranking according to the number of actions taken may permit us to indicate Benchmarking companies in Brazil, that is, they may be a reference for others in and outside disclosure programs, and it may provide medium and long-term profits to all stakeholders.

II. LITERATURE REVIEW

Companies have been over and over required to design corporate strategies to tackle climate change, but not only this. Currently climate impacts have already been taken into account and threaten business in the tough equation that comprises sustainable development, and they have received special attention from stakeholders since it is necessary to analyze and check out economic and financial outcomes, as well as social and environmental ones of organizations and the impact of their actions on the environment (Hoffman, 2006). Due to the risks related to

human beings' current situation on earth, as well as to possible impacts on prices of products and services, incorporation of expenses for environmental issues has been demanding strategies from companies in order to achieve sustainable competitive advantages (CDP, 2012b; Ferias, Souza and Andrade, 2012).

For Hoffman and Woody (2008), the effects of climate change evidenced by the Intergovernmental Panel on Climate Change (IPCC) have been taking place gradually. So companies must create strategies that meet three criteria in order to address this problem: a) management of the impacts and Greenhouse gas emissions from their activities, through records, control and disclosure; b) development of technical competence aligned with market goals and perspectives on transmission into low-carbon economy, projecting the opportunities and projects attached to it; and c) participation in the political scenario related to climate change, through engagement in developing environmental policies in the scenario where they act.

In the scenario of climate change, according to Kolk and Pinkse (2007), Hilmman et al., (1999) and Eberlein and Matten (2009), corporate actions can be taken from the political scenario, through which one may conform favorable structures to its acting in the international arena. On the other hand, for Kim (2008), Hoffman and Woody (2008), Sussman and Feed (2008) and Lemme (2010), issues related to climate change should be addressed proactively and in a long-term view, especially for affecting competitiveness of companies in the market.

For Kim (2008) the development of actions in response to climate change is based on three levels. The first level refers to the participation of companies in the political scenario – their insertion in climate policy-making and regulatory framework, such as climate changing policies; the second one is the adaptation strategy, that is, actions from an institutional political guiding – in this dimension companies adapt themselves to governmental decisions and then decide which actions may be implemented in order to address the problem, and this situation brings great risks to organizational performance, especially competitive and productive loss; and at the third level the skeptical strategy, which means disregard the phenomenon with a skeptical position and question the problem trying to devalue it.

Kolk and Pinkse's (2005, 2009) investigations meet Lemme (2010) when they assert that the strategies to tackle climate change cannot be the same for every company since legal and political issues, as well as the working sector, influence their elaboration, apart from the characteristic and nature of each activity, highlighting a common strategy of great importance to companies, which is accounting and disclosing Greenhouse gas emissions – a strategy to mitigate climate change.

In a research carried out by Wallace (2009), he analyzed information disclosure related to actions of companies from 15 economy sectors. The results from it reassured the ones in Kolk and Pinkse's (2004, 2007), demonstrating that multinational companies are more sensitive to responses than national ones.

In this context, the role of CDP stands out since it has been recognized as one of the main private alternatives of Global Environmental Governance to support issues regarding global environmental crisis, particularly climate change (Kolk et al., 2008; Farias, Souza and Andrade, 2012).

CDP, a not-for-profit organization, founded from private initiatives with the aim of gathering information on strategies from different companies in the world regarding the struggle against climate change, has shown that companies are concerned with environmental problems which threaten their performance and life of future generations. This initiative focuses on four groups of information related to corporate activities and the environment, they are: 1) corporate risks from climate problems; 2) control of emissions through emission inventories; 3) effort and actions by companies in order to reduce their impacts on the environment; and 4) management of the effects of corporate decisions related to the environment, with focus on mitigation (Farias, 2013; Farias, Souza and Andrade, 2012; Kolk et al., 2008).

Besides the program to gather information on strategies to tackle climate change, CDP has other four complementary programs: Carbon action program, which provides insights on business adaptation in a low-carbon future and advises decision-making in the trade market; Forests program, which helps companies understand exposure to deforestation from their portfolios; Water program, which focuses on adaptation of companies to a scenario of change regarding global water availability, measurement and management of freshwater resources; and Supply chain program, which allows organizations to promote suppliers' engagement.

Besides CDP, other initiatives are part of companies' actions in order to disclose their actions and provoke in-house changes. Amongst them, some stand out: Global pact, an instrument of voluntary participation, which has as one of its goals the commitment of signatory companies to adopt sustainable practices in their activities; Global reporting initiative, not-for-profit organization, which is concerned with the promotion of companies' economical sustainability and is responsible for one of the most international renowned standards of reports on corporate sustainability, gathering economical, social, environmental and governance information; participation in indices of corporate sustainability, which aims at disclosing companies that are standards of management practices.

These indices generate double dividend to companies because, besides making corporate practices public to the market, they help with the promotion of in-house necessary changes so that companies can maintain these initiatives, such as management of Greenhouse gas emissions, establishment of reduction goals, and more. We can also highlight the main global indices, such as Dow Jones Index of Sustainability and Carbon Efficient Index, both from New York Stock Exchange, Corporate Sustainability Index and Carbon Efficient Index, both from BM&FBOVESPA, FTSE 4good in London and JSE in South Africa; Carbon market and voluntary carbon market for commercializing carbon credits; Global and

Brazil GHG Protocol Program, whose goal is to encourage organizations to elaborate and disclose their Greenhouse gas emissions through an internationally renowned methodology; and other initiatives (PNUD, 2014; GRI, 2014; Marcondes and Bacarji, 2010; UNFCCC, 2013).

Regarding the Carbon Efficient Index (ICO2) of BM&FBOVESPA, it was based on the Carbon Efficient Index (ICO2) of New York Stock Exchange and aims at measuring carbon efficiency of companies that are part of portfolio theories of the index. As members of ICO2, companies must inform BM&FBOVESPA of their data in the inventory of Greenhouse gas emissions, which consequently makes it necessary for companies to manage their direct and indirect emissions, and therefore it is a mitigation action. The formulation of portfolio theories of ICO2 follows some criteria: belonging to IBrX-50, which is an indicator made of the most exchanged shares at BM & FBOVESPA, balanced in the portfolio through the free float (amount of available shares a company exchange in the market); receiving and accepting invitation; reporting ICO2 emission data annually; and not being involved in any lawsuit, bankruptcy, especial situation, either any suspension negotiation process (BM&FBOVESPA, 2013).

ICO2 measures the amount of emissions taken to generate the income of a company, or more accurately, the amount of Greenhouse gas emission for each R\$ 1 of income. In this index, a company is regarded as efficient when it increases its income as it decreases emission volume. Thus, the most efficient company in this index is the one that has the lowest Coefficient of Carbon Efficiency related to IBrX-50 (BM & FBOVESPA, 2014). It is important to highlight that actions are considered according to the weight of companies' shares in the index, as well as the weight of these same shares in IBrX-50, leading therefore to a moderate coefficient in both indices. To calculate the emission coefficient, the formula used by BM&FBOVESPA (2013) is the one that follows:

$$\text{Emission Coefficient/Income} = \frac{\text{GHG}_t \text{ Emission (tCO}_2\text{e)}}{\text{Incomet (R\$ million)}} \quad (1)$$

Descriptions

GHG_t Emission = amount of carbon dioxide equivalent, emitted in the year-base t ;

Income_t = annual raw income disclosed in the financial statements consolidated, regarding the year-base t^2 , made according to Brazilian accounting patterns, in million of real.

To join ICO2, BM&FBOVESPA does not ask companies to disclose their respective inventory of emissions, only the record of emission data in standard form by FGVces – Center for Studies on Sustainability of Getúlio Vargas Foundation – which is responsible for harmonizing emission data, that is, adaptation of data to each company's reality. As there is no demand on the use of a standard methodology to carry out the inventories of GHG emissions, such as GHG Protocol, it is difficult to compare emission data since in ICO2 the guidelines for accounting, calculating and reporting GHG emissions take into account emissions of companies from the same group acting in Brazil and abroad and in Brazilian methodology GHG Protocol, for instance, it is taken into account the

emission in Brazil, besides scope 3 which is broader than ICO2.

Regarding the scopes, only scopes 1 and 2 are the same as the ones planned in Brazil GHG Protocol Program. ICO2 guidelines consider the following emission scopes for inventories of companies which joined ICO2: 1 – regards direct emissions that are sources of direct property of a company or under its control; scope 2 – regards indirect emissions from energy consumption; scope 3, in ICO2, only takes into account companies' in-house logging and business flying trips. However, in Brazil GHG Protocol Program, besides the things planned in ICO2, it takes into account emissions of life cycle (extraction, production and transportation of goods and services, activities related to fuel and energy that are not included in scopes 1 and 2, transportation and distribution, residues generated in operations, and other activities (FGVces, 2014).

In this sense, for this research, and considering the importance of analyzing the emission inventories, we are analyzing the companies which participate both in ICO2 and in Brazil GHG Protocol Program, taking into account the intersection of these two initiatives, since companies which participate in GHG Brazil publish their emission inventories based on the same methodology. Brazil GHG Protocol Program was founded from the partnership between the Center for Studies on Sustainability of Getúlio Vargas Foundation and the World Resources Institute (WRI) and aims at encouraging Brazilian companies to account and disclose their GHG emissions (FGVces, 2013).

Although GHG Protocol Program exists, in Brazil there is no demand on using this methodology to inventory emissions of Brazilian companies, which decide whether to use it or not. It is important to highlight that in Brazil several companies, including the ones that participate in this research, make their emission inventories on the basis of GHG methodology, as we can find on the website of Public Records of Emissions (<http://www.registropublicodeemissoes.com.br/>). We

emphasize that in Brazil there is also EPC initiative – Companies for Climate, founded in 2009, this platform aims at sensitizing and promoting articulation of companies in order to shift into low-carbon economy. This initiative came from the partnership between the Center for Studies on Sustainability of Getúlio Vargas Foundation and The Prince of Wales Corporate Leaders Group on Climate Change (CLG) (FGVces, 2014).

The actions debated above, which comprise response to climate change either through in-house implementation or participation in outer initiatives, are part of the proposal by Intergovernmental Panel on Climate Change (IPCC). According to IPCC (2007), there are two ways of acting faced with the challenge of climate change: mitigation or adaptation. Mitigation, our focus here, also suggested by Kim (2008), Hoffman and Woody (2008), Sussman and Feed (2008) and Lemme (2010), includes reduction of GHG emissions through specific actions such as: energy supply, transportation, constructions; industry, agriculture, forest and residues.

Regarding adaptation initiatives, they are related to taking actions in order to reduce negative environmental impacts due to climate change, because of dryness, floods, intensification of natural phenomena, such as hurricanes, cyclones and others (IPCC 2013; Mancini and Kruglianskas, 2007). Adaptation measures vary from region to region and depend directly on public policies incentives, on achievement of corporate goals, on mobilization and demands from civil organizations. This situation urges the need of international mechanisms in order to finance adaptation (Pattberg et al., 2009).

Studies have shown that companies' responses to climate change are divergent, with predominance of political and market strategic approaches. In this approach, companies aim at following market dynamics and joining regulatory discussions and organization of the carbon restriction setting. On the other hand, their responses are economic ones and focus on macro-environment and business in-house environment. In this approach, mitigation actions are sought in order to implement in-house actions that may contribute to impact reduction through sustainable practices of development (Reid and Toffel, 2009; Kim, 2008; Sussman and Feed, 2008; Mancini and Kruglianskas, 2007). In the second approach, the goal is to suggest new rules to influence climate GEG (Kolk and Pinkse, 2007; Eberlein and Matten, 2009; Hilmman et al., 1999).

Thus, in this study, we aim at mapping, analyzing and discussing how companies have been acting faced with this climate change setting regarding their actions on the basis of Azzone et al., apud Fuchs (2008) e IPCC (2007), as Wella as analyzing and discussing companies' responses to climate change as in Kim (2008), Hoffman and Woody (2008), Sussman and Feed (2008), Lemme (2010), Farias, (2013), Farias, Souza and Andrade, (2012), Kolk et al., (2008), and their insertion in the political setting of initiatives on the basis of PNUD (2014), GRI (2014), Marcondes and Bacarji (2010) and UNFCCC (2014).

III. METHODOLOGY

In this research we aimed at mapping, analyzing and discussing corporate initiatives that have been taken by Brazilian companies which joined ICO2 and Brazil GHG Protocol Program for mitigation of climate change. In order to achieve this goal, we carried out an exploratory, bibliographical and documental research with a qualitative, descriptive and analytical approach through searches on books and on national and international manuscripts.

Collected data was secondary, obtained from reports on sustainability and annual reports, inventories of emission disclosed by Brazil GHG Protocol Program, CDP questionnaires, as well as searches on companies' websites and ICO2 website. According to Bardin (2011), content analysis comprises a set of procedures that aim at describing the foundations of a communication. In this research, the communications analyzed were the ones on the papers searched, as mentioned above.

In order to do so, reports on sustainability and annual reports, inventories of emissions disclosed by the Brazil GHG Protocol Program, and CDP questionnaires analyzed were obtained from 2008, the year when the Brazil GHG Protocol Program was founded, to March 2014, deadline of data collection for this research.

For this research and taking into account the importance of analyzing inventories of GHG emissions by all the companies, the sample defined (as in Table 1) encompasses companies that joined ICO2 and Brazil GHG Protocol Program.

Table 1: companies that joined both ICO2 and Brazil GHG Protocol Program

Company	Business Sector as BM&FBOVESPA	Segment
Banco do Brasil S.A.	Financial and Other	Bank
Banco do Bradesco S.A.		
Banco Itaú Unibanco S.A.		
Banco Santander (Brazil) S.A.		
BM&FBOVESPA S.A.	Financial and Other	Diversified Financial Services / Stock Exchange/ Diversified Financial Services
Cielo S.A.		
Grupo Pão de Açúcar S.A.	Consumer Non-Cyclical	Retail
Braskem S.A.	Basic Materials	Petrochemicals
CCR S.A.	Construction and Transportation	Exploration Road
BRF Brasil Foods S.A.	Consumer Non-Cyclical	Meat and Derivatives
JBS S.A.		
Klabin S.A.	Basic Materials	Paper e Celulose
Lojas Americanas S.A.	Consumer Cyclical	Diversified Products
Lojas Renner S.A.		Textiles, Clothing and Footwear
Natura S.A.	Consumer Non-Cyclical	Products for Personal use
Tim S.A.	Telecommunications	Mobile
Oi S.A.		Fixed telephony
Telefônica Brasil/Vivo S.A.		
Vale S.A.	Basic Materials	Chemical

Source: BM&FBOVESPA (2014).

In this sense and aiming at achieving our goal, we set five stages:

- 1) Mapping, analyzing and discussing international initiatives in which companies from ICO2 and Brazil GHG Protocol Program are included;
- 2) Mapping, analyzing and discussing national initiatives in which companies from ICO2 and Brazil GHG Protocol Program are included;
- 3) Mapping, analyzing and discussing in-house actions which are taken by companies from ICO2 and Brazil GHG Protocol Program to manage their sustainability practices;
- 4) Calculating carbon coefficient from the volume of GHG emissions in inventories versus gross revenues, from 2009 to 2012, according to data provided by BM&FBOVESPA;
- 5) Ranking companies from ICO2 and Brazil GHG Protocol Program according to the number of initiatives and actions they took in order to tackle climate change.

IV. ANALYSIS AND DISCUSSION OF RESULTS

Currently ICO2 portfolio is made of 31 shares of 29 companies while Brazil GHG Protocol Program was chosen by 103 companies for disclosing their GHG inventories regarding the year 2012, when last disclosure happened before we finished this study. In this research we analyzed 19 companies that joined both initiatives and have elaborated GHG inventory until last disclosure in GHG Brazil (2012).

The highest occurrence in the sample is the segment of financial intermediation, as in ICO2 portfolio. However, in GHG Protocol this segment appears in second position.

Along this study we will display the international and national corporate initiatives, in-house actions and Carbon Coefficient taken, in order to tackle climate change.

International Initiatives

Table 2 consolidates and shows the international initiatives taken by analyzed companies towards climate change.

Table 2: International initiatives in response to climate change

Initiatives Companies	Global Compact	GRI - global reporting initiative	Carbon Disclosure Project - Investor / Climate Change	Carbon Disclosure Project - Carbon Action program	Carbon Disclosure Project - Forestry programme	Carbon Disclosure Project - Action Water Programme	Carbon Disclosure Project - Supply Chain Programme	Carbon Efficient Index (CEI)	Dow Jones Sustainability Index		Carbon Regulated Market/CDM	Voluntary Carbon Market	GHG Protocol	REDD projects	Total
									Global	Emerging Markets					
Klabin S.A.	X	X	X	-	X	X	X	X	-	-	X	X	X	-	10
Banco Santander (Brazil) S.A.	X	X	X	X	X	-	-	X	X	-	X	-	X	-	9
Banco do Brasil S.A.	X	X	X	X	-	-	-	X	X	X	-	-	X	-	8
Bradesco S.A.	X	X	X	-	-	-	X	X	X	X	-	-	X	-	8
BRF Brasil Foods S.A.	X	X	X	-	X	X	X	X	-	X	-	-	X	-	8
Braskem S.A.	X	X	X	-	-	-	X	X	-	X	-	-	X	-	8
JBS S.A.	-	X	X	-	X	X	X	X	-	X	-	-	X	-	8
Natura S.A.	X	X	X	-	X	X	X	X	-	X	-	-	X	-	8
Vale S.A.	X	X	X	-	X	X	X	X	-	X	-	-	X	-	8
Grupo Pão de Açúcar S.A.	X	X	X	-	X	X	X	X	-	X	-	-	X	-	8
Banco Itaú Unibanco S.A.	X	X	X	-	-	-	-	X	X	X	-	-	X	-	7
BM&FBOVESPA S.A.	X	X	X	-	-	-	-	X	-	-	X	-	X	-	6
Lojas Renner S.A.	X	X	X	-	X	-	-	-	-	X	-	-	X	-	6
Oi S.A.	X	X	X	-	-	-	-	X	-	X	-	-	X	-	6
Tim S.A.	X	X	X	-	-	-	X	X	-	-	-	-	X	-	6
Telefônica Brasil/Vivo	X	X	X	-	-	-	X	X	X	-	-	-	X	-	6
Lojas Americanas S.A.	X	X	X	-	X	-	-	X	-	-	-	-	X	-	6
CCR S.A.	-	X	X	-	-	-	-	X	-	X	-	-	X	-	5
Cielo S.A.	X	X	X	-	-	-	-	X	-	-	-	-	X	-	5
Total	17	19	19	2	8	6	6	18	5	10	6	1	19	0	

Source: Designed by us from data collected.

Global Pact, an initiative proposed by the UN in order to encourage organizations to adopt responsible social corporate and sustainable policies, is adopted by 89% of

companies analyzed; they elaborate annual progress reports on the evolution of each one of the principles related to human rights, laboring, environment and

corruption. Only JBS and CCR have not joined this initiative.

We also observe that all the companies participate in GRI and CDP initiatives Investor/Climate Change. Most of the analyzed companies have adopted GRI guidelines to qualitatively improve their reports on sustainability for more than three years; however, Lojas Americanas adopted this initiative only in the report elaborated in 2013. Besides, all the companies report their data regarding climate change strategies to CDP Investor, collaborating with information sharing on their Greenhouse gas emissions and mitigation actions.

CDP created four initiatives, also called programs, which were adopted by 68% of the companies analyzed, at least one of the initiatives. Regarding Carbon Program, it was only adopted by Santander and Banco do Brasil; Forests program has the highest level of representativeness in comparison with the other programs developed by CDP, with adherence of 42% of the companies, particularly Klabin, which has high levels of risks related to this theme as it is from the paper and cellulose segment. Regarding Water program, 32% of the companies participate in it; and Supply chain program has 32% of adherence of the companies analyzed.

The Carbon Efficient Index portfolio created by Standard Pórr's in New York Stock Exchange comprises 95% of the companies, with an exception, Lojas Renner, which is part of BM&FBOVESPA Carbon Efficient Index.

Concerning Dow Jones Index of Sustainability, both global and the one addressing markets in-development, it does not have participation of Klabin, JBS, Natura, BM&FBOVESPA, Tim, Lojas Americanas or Cielo.

Regarding carbon markets, 32% of the companies have already commercialized carbon credits; but just Klabin has

traded credits in both regular market, which is tied to Kyoto Protocol, and voluntary market, alternative market which is not under the rules of Kyoto Protocol.

It is important to notice that all the companies have emission inventories in Brazil GHG Protocol Program, and 74% of the companies had their inventories categorized as Gold for having all the information required by this Program; besides, they were analyzed by a third party. JBS, Lojas Renner, CCR, Grupo Pão de Açúcar and Lojas Americanas had their inventories categorized as Silver.

We did not find any company with REDD projects aiming at reducing GHG emissions from deforestation and forest degradation.

We observed that Klabin joined 10 initiatives, the highest number of international initiatives, and it is the only company that participates in the voluntary carbon market, however, it is not part of Dow Jones Sustainability Index portfolio. CCR and Cielo adopted only five initiatives and none of them participates in CDP programs.

In addition to the initiatives described above, next topic displays national initiatives adopted by the companies analyzed.

National initiatives

Following international trends, in recent years in Brazil there has been emerged national and sub-national initiatives faced with climate change and aligned with National Policy on Climate Change, as well as implementation of schemes of emission trading, such as the discussion on implementation of carbon markets in São Paulo and Rio de Janeiro (ICAP, 2014). Table 3 displays the initiatives identified in the companies analyzed.

Table 3: National initiatives in response to climate change

Initiatives	Corporate Sustainability Index - BM&FBOVESPA	Carbon Efficient Index - BM&FBOVESPA	ECO011 ICO2 INDEX FUND	Guide Exame Sustainability	Award Época Climate Change	Simulation of the carbon market system Getulio Vargas Foundation - FGV	Rio de Janeiro's Green Grant (BVRIO)	Businesses for Climate initiative (EPC)	Total
Companies									
Banco Itaú Unibanco S.A.	X	X	X	X	X	X	-	X	7
Banco Bradesco S.A.	X	X	X	X	X	-	-	X	6
CCR S.A.	X	X	X	X	-	X	-	X	6
Klabin S.A.	X	X	X	X	-	X	-	X	6
Vale S.A.	X	X	X	X	-	X	-	X	6
Telefônica Brasil/Vivo S.A.	X	X	X	-	X	X	-	X	6
Banco do Brasil S.A.	X	X	X	-	-	X	-	X	5
Braskem S.A.	X	X	X	-	-	X	-	X	5
Natura S.A.	X	X	X	X	-	-	-	X	5
Lojas Renner S.A.	-	X	X	X	X	-	-	-	4
Oi S.A.	X	X	X	-	-	-	-	X	4
Tim S.A.	X	X	X	-	-	-	-	X	4
Cielo S.A.	X	X	X	-	-	-	-	-	3
Banco Santander (Brazil) S.A.	X	X	X	-	-	-	-	-	3
BRF Brasil Foods S.A.	-	X	X	-	-	-	-	X	3
BM&FBOVESPA S.A.	-	X	X	-	-	-	-	X	3
Grupo Pão de Açúcar S.A.	-	X	X	-	-	-	-	-	2
JBS S.A.	-	X	X	-	-	-	-	-	2
Lojas Americanas S.A.	-	X	X	-	-	-	-	-	2
Total	13	19	19	7	4	7	0	13	
Representation (%)	68%	42%	42%	27%	21%	27%	0%	68%	

Source: Designed by us from data collected

We observed some similarities regarding the existence of initiatives when we compared with the international scenario. In Brazil there are sustainability indices applied to companies of open capital, such as the Corporate Sustainability Index and Carbon Efficient Index (ICO2). These indices aim at disclosing companies that have management practices which stood out regarding sustainability in their segment of activities and highlighted

their concern with impacts on the environment, particularly regarding pollutant emissions, one of the main causes of global warming and climate change. ISE and ICO2 are based on indices of New York Stock Exchange, and managed by BM&FBOVESPA. While the first one lists companies regarded as leaders in sustainable practices, the second lists the companies that show concern with management of Greenhouse gas emissions.

All the analyzed companies participate in ICO2 portfolio as well as in ECOO11, BNDES fund of investment constituted of shares of Brazilian companies that disclose their ICO2 emissions, however 68% of them are listed on ISE.

BVRio is a national environmental stock exchange which aims at providing market solutions in order to help with fulfillment of environmental laws, especially National Policy on Solid Residues, by commercializing credits of fund logging and forests activities but there is no participation of analyzed companies in it.

The Companies for Climate initiative comprises a set of articulated actions between companies that focus on management of GHG emissions for transition into low-carbon economy and has participation of 68% of the analyzed companies; the ones which are not: Lojas Renner, Cielo, Santander, Grupo Pão de Açúcar, JBS and Lojas Americanas.

Getúlio Vargas Foundation and Rio de Janeiro Stock Exchange (FGV/BVRio) released, on March 2014, a carbon market simulation system which consists of a platform for having companies get ready for emission business, in which the following companies participate: Itaú Unibanco, CCR, Klabin, Vale, Telefônica Brasil/Vivo, Banco do Brasil and Braskem.

We identified some initiatives that acknowledge the best companies based on the analysis of provided answers in a questionnaire:

1) Guia Exame de Sustentabilidade (Exam Guide of Sustainability) – methodology for evaluation of performance of sustainable practices that has already awarded 37% of the analyzed companies.

2) Prêmio Época de Mudanças Climáticas (Época Award on Climate Change) – it acknowledges companies that

work hard on reduction and control of their Greenhouse gas emissions and has already awarded 21% of these companies.

Itaú Unibanco is the company with the highest number of national initiatives mapped, joining seven of them. While companies like Grupo Pão de Açúcar, JBS S.A and Lojas Americanas only adopted two initiatives, ICO2 and ECOO11.

The initiatives in which companies participate contribute to changing their posture in the process of in-house management, motivating implementation of corporate actions.

In-house Actions in Response to Climate Change

According to Hoffman and Woody (2008), elaboration of corporate actions in response to climate change should take into account management of corporate impacts and management of their emissions.

Wallace's (2009) research demonstrated that it is really important for companies not to miss the opportunities and ponder risks from a management practice based on companies' strategic planning.

For Hoffman (2005) these opportunities permeate organizations' in-house management since they contribute to improving processes and reducing expenses, besides influencing them to take proactive actions faced with a possible regulatory context of carbon restriction.

Table 4 shows the adoption of mitigation plans by 63% of analyzed companies and adaptation plan by 32% of them, which evidences concern with impacts of climate change on business, as well as confirms preparation in a context where carbon is restricted.

Table 4: In-house initiatives in response to climate change

Initiatives Companies	Mitigation Plan	Adaptation Plan	Payment for Environmental Services (PES)	Offsetting through Carbon Emissions Market		Disclosure to Stakeholders	Total
				Regulated market	Voluntary Market		
Banco do Brasil S.A.	X	X	X	-	-	X	4
Braskem S.A.	X	X	X	-	-	X	4
JBS S.A.	X	-	X	X	-	X	4
Banco Santander (Brazil) S.A.	X	-	X	X	-	X	4
BM&FBOVESPA S.A.	X	-	-	X	-	X	3
Banco Itaú Unibanco S.A.	X	X	-	-	-	X	3
Klabin S.A.	X	-	-	X	X	X	4
Natura S.A.	-	-	X	X	-	X	3
Tim S.A.	X	X	-	-	-	X	3
Vale S.A.	X	X	-	-	-	X	3
Telefônica Brasil/Vivo S.A.	X	X	-	-	-	X	3
CCR S.A.	X	-	-	-	-	X	2
Grupo Pão de Açúcar S.A.	X	-	-	-	-	X	2
Banco do Bradesco S.A.	-	-	-	-	-	X	1
BRF Brasil Foods S.A.	-	-	-	-	-	X	1
Cielo S.A.	-	-	-	-	-	X	1
Lojas Americanas S.A.	-	-	-	-	-	X	1
Lojas Renner S.A.	-	-	-	-	-	X	1
Oi S.A.	-	-	-	-	-	X	1
Total	12	6	5	5	1	19	
Representation (%)	63%	32%	26%	26%	5%	100%	

Source: Designed by us from data collected

We mapped projects focused on environmental conservation and/or payment for environmental services at Banco do Brasil, Braskem, JBS, Santander and Natura.

JBS, Santander, BM & FBOVESPA, Klabin and Natura compensate their own emissions or of companies integrated in supply chain by purchasing carbon credits in the regulatory carbon market. Regarding voluntary market, only Klabin compensated their emissions in it. We observed that all the companies say they have a

transparent relationship with their stakeholders through disclosure of adopted initiatives faced with climate change.

However, from the documents we analyzed, we observed that these companies related disclosure much more to the strengthening of corporate image than to changes in the productive processes and strategy of low-carbon intensity, which is confirmed by no identification

of projects of emission reduction and/or renewable energy, except at Braskem, BRF Food, Klabin and JBS.

Although Braskem has a project of emission reduction, it has not been registered at UNFCCC and has not commercialized carbon credits yet. While BRF Food, Klabin and JBS have projects registered and have already commercialized.

However, the other companies, regarding current incipient regulatory aspects of carbon restriction, showed few mitigation actions with focus on emission reduction, which demonstrates that the practices of these companies tend to be more reactive to regulatory market than proactive regarding the modification of processes. That is, although they are categorized in mitigation practices, they do not bring any innovation (Lemme 2010, A branches, 2010; Kim (2008); Hoffman and Woody 2008; Sussman and Feed, 2008). Consolidation of initiatives by companies in terms of number can be seen in topic below.

Number of initiatives/actions by companies of Carbon Efficient Index (ICO2) and Brazil GHG Protocol Program

We can observe in Table 5 that the companies which joined more international initiatives in response to climate change were: Klabin (10) and Santander (09).

Regarding national initiatives the following companies stood out: Itaú Unibanco (6), Bradesco, CCR, Klabin, Vale and Telefônica Brasil (Vivo), each one with five initiatives. Concerning in-house actions, Banco do Brasil, Braskem, JBS and Santander stood out with four identified actions.

In general, amongst analyzed companies, the one which stood out in total number of initiatives was Klabin (18), followed by Santander, Banco do Brasil, Itaú Unibanco, Braskem and Vale, each one with 16 initiatives.

Table 5: Summary of initiatives/actions in response to climate change

Initiatives	Segment	Initiatives			Total
		International	National	Internal Business Actions	
Companies					
Klabin S.A.	Wood and Paper	10	6	4	20
Banco do Brasil S.A.	Financial Intermediation	8	5	4	17
Banco Itaú Unibanco S.A.	Financial Intermediation	7	7	3	17
Braskem S.A.	Chemical	8	5	4	17
Vale S.A.	Mining	8	6	3	17
Banco Santander (Brazil)	Financial Intermediation	9	3	4	16
Natura S.A.	Personal products	8	5	3	16
Telefônica Brasil/Vivo S.A.	Fixed telephony	6	6	3	15
Banco do Bradesco S.A.	Financial Intermediation	8	6	1	15
JBS S.A.	Processed Foods	8	2	4	14
Tim S.A.	Mobile	6	4	3	13
CCR S.A.	Transportation	5	6	2	13
Grupo Pão de Açúcar S.A.	Retail	8	2	2	12
BM&FBOVESPA S.A.	Diversified Financial Services	6	3	3	12
BRF Brasil Foods S.A.	Processed Foods	8	3	1	12
Lojas Renner S.A.	Trade/Commerce	6	4	1	11
Oi S.A.	Fixed telephony	6	4	1	11
Cielo S.A.	Diversified Financial Services	5	3	1	9
Lojas Americanas S.A.	Trade/Commerce	6	2	1	9

Source: Designed by us from data collected

When we analyzed the average of initiatives per market segment, the segment of Wood and Paper stood out with 20 initiatives, whose only representative was Klabin. Even though the companies of the financial intermediation segment have excelled, the average of the mining and chemical segments appeared in second position of initiatives. We observed in the tables displayed above that the Wood and Paper segment had more adherences to international and national initiatives while the mining segment had more to national initiatives.

Carbon Coefficient based on ICO2 methodology

As we discussed in the literature review, in the methodology of ICO2, a company can be regarded as efficient in terms of carbon management when it can increase its income without increasing GHG emissions, that is, a company that has the lowest Coefficient of Carbon Efficiency. According to BM&FBOVESPA (2014), ICO2 measures the amount of GHG emission necessary for each R\$ 1 (one real) of income. In this index, a company is regarded as efficient when its income growth happens proportionally inverse to volume of emissions. So, the most efficient company in this index is the one that has the lowest Coefficient of Carbon Efficiency in relation to IBrX-50.

Thus, based on data provided by BM&FBOVESPA, we disclosed the companies and respective efficiency coefficients in Table 6.

Table 6: Coefficient of Efficiency Emission/Income

Companies	COEFFICIENT OF EFFICIENCY IN THE PERIOD DURING ICO2: Emission coefficient / Revenue = GHG emissions (tCO2e) / Revenue (R\$ million)					VARIATION / YEAR			
	2009	2010	2011	2012	AVERAGE	2010/2009	2011/2010	2012/2011	AVERAGE
	Natura S.A.	10,2318	7,6056	5,9301	4,9140	7,1704	-25,67%	-22,03%	-17,13%
Klabin S.A.	201,6268	165,0694	140,6984	115,8322	155,8067	-18,13%	-14,76%	-17,67%	-16,86%
Grupo Pão de Açúcar S.A.	17,9719	3,0016	3,4229	4,4077	7,2010	-83,30%	14,03%	28,77%	-13,50%
Braskem S.A.	378,2998	285,0814	264,0743	246,0547	293,3775	-24,64%	-7,37%	-6,82%	-12,94%
Lojas Americanas S.A.	4,3051	1,6131	1,7696	2,0873	2,4437	-62,53%	9,70%	17,96%	-11,62%
Vale S.A.	270,3150	240,8306	144,0113	175,2423	207,5998	-10,91%	-40,20%	21,69%	-9,81%
Banco Bradesco S.A.	1,0037	0,9587	0,8573	0,9258	0,9364	-4,49%	-10,57%	7,98%	-2,36%
Tim S.A.	1,4916	1,1347	1,3471	1,3663	1,3349	-23,93%	18,72%	1,42%	-1,26%
CCR S.A.	11,4383	4,1923	3,8140	6,6337	6,5196	-63,35%	-9,02%	73,93%	0,52%
Banco do Brasil S.A.	1,0134	0,8658	0,7676	1,0441	0,9227	-14,57%	-11,34%	36,03%	3,37%
Lojas Renner S.A.	8,1885	10,1504	2,7871	4,7109	6,4592	23,96%	-72,54%	69,03%	6,81%
Banco Itaú Unibanco S.A.	0,9049	0,9631	0,7931	1,1355	0,9492	6,43%	-17,66%	43,18%	10,65%
Banco Santander S.A. (Brazil)	0,7198	0,8812	0,5850	0,9523	0,7846	22,42%	-33,62%	62,79%	17,20%
Telefonica Brasil/Vivo S.A.	1,5206	2,0228	1,4423	2,2609	1,8117	33,02%	-28,70%	56,76%	20,36%
BM&FBOVESPA S.A.	0,9437	1,1701	1,0097	1,5459	1,1674	24,00%	-13,71%	53,11%	21,13%
Cielo S.A.	3,7872	0,8242	1,9874	2,0833	2,1705	-78,24%	141,13%	4,83%	22,57%
BRF Brasil Foods S.A.	22,4298	16,9541	31,7105	33,7448	26,2098	-24,41%	87,04%	6,42%	23,01%
Oi S.A.	1,0535	1,8117	3,6701	3,7173	2,5632	71,97%	102,58%	1,29%	58,61%
JBS S.A.	51,1734	49,8179	57,7250	180,7662	84,8706	-2,65%	15,87%	213,15%	75,46%

Source: Designed by us from data collected from BM&FBOVESPA (2013).

In Table 6, regarding the financial segment, we observed that Santander had then the lowest average coefficient, 0.7846, and Banco do Brasil held the second position with 0.9227. However, we could notice that, when comparing 2012 to 2011, Santander greatly increased its emission coefficient, with an increasing of 63%, followed by Banco Itaú, 43%.

Regarding the other companies' accomplishment, JBS stood out with an average increasing of 75% of its annual coefficient, followed by Oi S.A, which had an average coefficient increasing of 59%. Regarding the companies that had significant average reductions in terms of the coefficient emissions/income, the following companies stood out: Natura, which reduced the coefficient in an average of 22% a year; Klabin, which had an average reduction of 17%; and Grupo Pão de Açúcar together with Braskem, which had an average reduction of 13% each one.

V. CONCLUSIONS

This research with companies that are part of ICO2 portfolio and joined Brazil GHG Protocol Programmed it possible to identify several initiatives and actions taken, demonstrating concern with risks and impacts of climate change to which they are exposed.

Although all the companies have joined GHG Protocol aiming at managing their GHG emissions, we observed that there was no continuity of inventory elaboration, which was a consequence of the inexistence of a regulatory framework in Brazil that demands national accounting of emissions.

In Brazil, some initiatives were developed based on international initiatives, such as Corporate Sustainability Index (ISE) and Carbon Efficient Index (ICO2), founded on the basis of New York Stock Exchange Indices. This alignment is important so that Brazil follows global trends and makes the adequacy process easier when demanded.

Identification of 14 international initiatives, 7 national initiatives and 6 in-house actions focused on climate change reflects shifting in the behavior of companies, which started to use environmental variables in the development of corporate strategies. Although this scenario evidenced companies' proactiveness in response to climate changes, concern with companies' image was one of the main reasons why they sought for initiatives in the market, especially to disclose them on information reports to stakeholders.

Finally we noticed that the companies which joined ICO2 and showed progress in the coefficient of emission efficiency/income, that is, reduced the coefficient in the period analyzed, were: Natura, with -22% a year, Klabin, with -17% a year and Braskem, with -13% a year. While the following companies trailed the opposite path and increased their coefficients: JBS, with 75% a year; Oi S.A, with 59% a year; and BRF Foods and Cielo, both with 23%.

For future researches we recommend analyzing the impact on the value of shares negotiated in the stock exchange market of companies that joined the Carbon

Efficient Index (ICO2) in comparison with the ones which did not join this initiative. Besides that, we propose investigation, though interviews with managers in sustainability field, in order to analyze their discourses compared with evidenced contents, confront this information and check out convergences and divergences.

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