

**CLIMATE STRATEGIES OF FIRMS IN THE AUTOMOTIVE AND PULP & PAPER
INDUSTRIES IN BRAZIL:**

SOME INSIGHTS FROM AN INTERNATIONAL PERSPECTIVE

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ABSTRACT

This article focuses on the results of the final stage of research into the climate strategies of firms in the automotive and pulp-and-paper industries in Brazil, a BRIC (Brazil, Russia, India & China) that is becoming increasingly important also in terms of climate change issues. In the first stage, the Climate Strategy Model - CSM - was developed to assess whether firms were adopting key practices to assure the successful implementation of climate strategies. In the second, the CSM was applied to firms in the above mentioned industries because of their important role in the domestic economy and significant degree of responsibility for climate impacts. In the final stage, interviews with executives of these firms were conducted to identify root causes of climate strategy implementation deficiencies and obtain new insights from an international perspective.

Keywords:

Corporate Climate Strategies, International Perspective, Automotive Industry, Pulp & Paper Industry, Brazil

1. Introduction

Since the Industrial Revolution, the dominant production paradigm, based on fossil fuels, has contributed to significant increases in GHG emissions (Collins, 2006). The high concentration of these gases in the atmosphere is upsetting the global climate equilibrium (Lisø, 2006) and affecting the competitive environment.

The pressure exerted on companies by various groups of strategic actors to oblige them to adopt climate strategies has increased significantly (Hoffman, 2005). In 2007 a McKinsey Quarterly survey showed that 60% of the executives interviewed believed that climate change was a strategic issue, but that few were adopting effective actions in this sphere (Enkvist, Naucmér & Oppenheim, 2008; Enkvist & Vanthournout, 2008).

Firms in developing countries are also feeling this pressure. T. Fransen, from the World Resources Institute's GHG Protocol Initiative, observed that “...*the ability of developing countries to measure and verify GHG information is a major concern in international climate change talks...*” (WRI, 2009a).

The aim of this article is to share the results of the final stage of a research conducted from 2007 to beginning 2010 into the climate strategies of firms in two significant industries - automotive and pulp-and-paper - in Brazil, a so-called BRIC (Brazil, Russia, India & China) that is becoming an important world player also in climate change issues.

Brazil's energy model is based on renewable and low GHG emissions, due to the high proportion of hydroelectricity in its matrix, intensive use of ethanol for its vehicles and biomass from sugar cane in the cogeneration of energy. According to The Economist (2008), sugarcane ethanol is “*the most successful alternative fuel to date*”, and because of this, Brazil is the bio-fuel industry leader. Yet, it is the world's fourth worst GHG polluter (WRI, 2009b) and its firms are becoming aware of the urgent need to implement climate strategies to ensure their competitiveness in global markets.

In the first stage of the research, a framework, called the Climate Strategy Model – CSM, was developed for climate strategy assessment. In the second it was applied to firms in the automotive – AUT and pulp-and-paper – P&P industries in Brazil because of their important role in the domestic economy and significant degree of responsibility for climate impacts. In the last stage – focus of this article - senior executives from these firms were interviewed to deepen the understanding of the previous stage's results and capture new insights from an international perspective.

The article is divided into six parts, including this introduction. The second describes the CSM and presents its theoretical basis. The third part explains the research methods. In the fourth the most relevant results of the second stage are summarized. The fifth part presents a detailed account of the results of the final stage, and the last one highlights the most important findings of the research.

2. Climate Strategy Model

Before explaining the CSM, we present Hoffman's (2006) definition of climate strategy that was adopted in the research:

“Climate strategy is the set of goals and plans within a corporation that are intended to reduce GHG emissions, generating significant associated benefits and/or aiming to respond to climate-related changes in markets, public policy or the physical environment (Hoffman, 2006, p. 3)”.

A problem identified in our preliminary literature review was the lack of frameworks for climate strategy assessment, although some proposals were found, notably the “Sustainable Balanced Scorecard” (Hubbard, 2006) and the model proposed by Hoffman (2006). Therefore, inspired by the latter, as well as recent studies of climate strategies and benchmark climate practices, we developed the CSM as a framework for assessing to what

extent firms were adopting key practices for successful climate strategy implementation and responding to key climate strategy drivers.

Although the CSM drew on Hoffman's (2006) model, it also incorporated research results from CERES (2008), from the Carbon Disclosure Project (CDP, 2006), and constructs from Esty & Winston (2006), Kolk & Pinkse (2004) and Lash & Wellington (2007).

The CSM includes five main variables. Definitions and a summary of the related key climate practices and drivers are presented in Table 1. Note that the latter were considered benchmarks, i.e. references, in the light of which the firm's climate practices/drivers were to be assessed by way of the CSM. In the case of Variable 4, the most common obstacles to climate strategy implementation are also listed.

Variable	Operational Definition / Practices or Drivers
1 Impact of the firm on the environment	Degree of impact of the organization on the environment caused by GHG emissions produced by its own operations or those of components of its value chain and other associated emissions. Key Practices: Measurement of direct (Scope 1) and indirect GHG emissions (Scopes 2 and 3), according to GHG Protocol Corporate Standard methodology (www.ghgprotocol.org), created by the WRI and the World Business Council for Sustainable Development; Determining and periodically adjusting the emissions' reference level.
2 Impact of climate change on the firm	Degree of impact on the organization of the opportunities and threats represented by climate change, driving the firm to develop and implement a climate strategy. Key Drivers: i) New Markets (Demand for products/services with low emissions); ii) Competitiveness (Increase in firm competitiveness; Increase in firm operational efficiency; Cost reduction); iii) Intangible Factors (Positive reputation of firm; Socially responsible behavior; Coherence with firm history and culture; Improvement in risk management); iv) Financial Factors (Potential to generate carbon credits; New sources of financing; Tax incentives); v) Exposure to Risks (Restrictive legislation for GHG emissions; Restrictive standards for GHG emissions of products/processes; Increase in costs of firm inputs; Increase in costs of energy consumed. Increase in insurance premiums; Change in attitude of consumers; Pressure from NGOs; Occurrence of litigation).
3 Involvement of the firm.	Degree of firm's effective actions to mitigate and eliminate emissions produced by its own operations and those related to its value chain. Key Practices: Action for emissions reduction in the firm; Action for Emissions reduction in the expanded value chain; Action for Emissions compensation (e.g. Purchase/Sale of Carbon credits).
4 Motivation in the firm.	Degree of motivation in the firm resulting both from the proactive side of the mobilization of employees and publication of their actions and the relative strength of the obstacles that stand in the way of the implementation of a climate strategy. Key Practices: Proactive. Mobilization (Direct participation of top management; Direct participation of employees; Employee autonomy for climate initiatives; Financial bonus linked to climate targets; Employee awareness program; Employee climate practice training program; Maximum areas involved in climate practice implementation; Areas leading the climate strategy

	implementation); Internal Publication of Climate strategy related issues (Internal CEO Communiqué; Internal reports; Intranet); Reactive. Mitigation of Obstacles to climate strategy implementation (Obstacles, e.g., Lack of Climate related skills/competencies; Lack of Financial Resources for climate initiatives; Lack of Information on climate risks related to firm's production processes/products; Middle management resistance).
5 External relations of the firm	Degree of influence of the firm and its ability to communicate with the public, governments and private business associations, in order to disclose its actions aimed at reducing emissions, as well as influence the formulation of carbon restricting legislation and regulations. Ability to obtain the support of other entities and the third sector by way of partnerships. Key Practices: Scope. Partnerships (with other firms, NGOs; government; professional associations; investors); Publication (External Reports on climate issues; Carbon Disclosure Project, External CEO Communiqué; Use of Media)

Table 1 – CSM Variables (Macedo-Soares, Fuchs & Russo, 2009; Fuchs, Macedo-Soares & Russo, 2009)

It is important to mention that several new pertinent studies were found during the bibliographical review update undertaken at the third stage, such as the climate related publications on the WRI website (WRI, 2009a, 2009b), contributions from Marcus & Fremeth (2009), Siegel (2009) and Reid & Toffel (2009) as well as the Stern Report (2008) which emphasizes the importance of developing countries' involvement in achieving global emission reductions. These were taken into account in the discussion of the results of the third stage.

3. Research Methods

Because the focus of this paper is on the last stage of the research where the content of the interviews is analyzed in the light of the results of the previous stage, it was deemed important to also briefly explain the methods adopted for the latter.

Regarding the literature reviews, we used the method recommended by Villas, Macedo-Soares & Russo (2008) that emphasizes the adoption of multiple criteria (rankings of journals based on impact factor as well as seminal works) for the literature selection process.

As to the development of the CSM, we used Hoffman's (2006) model as a starting point and added constructs and practices/drivers from the different studies reviewed.

Regarding the second stage devoted to the application of the CSM, two groups of firms were selected: 1) the 42 P&P manufacturers from BRACELPA (Brazilian Pulp-and-Paper Association) that accounted for 99% of Brazil's production of pulp and 80% of its paper; 2) the 24 AUT companies from ANFAVEA (National Automotive Vehicle Manufacturers Association) that corresponded to all the manufacturers of auto vehicles and automotive agricultural machines with industrial facilities in Brazil.

The climate strategy assessment was conducted by way of an on-line survey of perceptions of executives from the selected firms, using a structured (Likert 1 to 5 and multiple choice formats) questionnaire based on the key practices/drivers pertinent to CSM variables. The data captured by way of this questionnaire was treated statistically (SPSS, version 13.0). For Variables 1 and 3, the data collected was submitted solely to a descriptive statistical treatment, as the research did not attribute a value scale (of the Likert type) to their key practices. As for the data pertinent to Variables 2, 4 and 5, five hypotheses were statistically tested to establish comparisons with the benchmark practices/drivers (Student T-tests were performed separately for each sector to a significance level of 0.01) and between the sectors themselves [Kruskal-Wallis test, (Mcclave, Benson & Sincich, 2001)].

Since practically all firms in the two industries took part in the survey, it was possible to generalize its statistical results. This constituted the strength of the second stage. However, to understand better these results, a qualitative data collection method was considered more appropriate.

Thus, in the third stage, 60 minutes interviews were conducted with senior executives of 10 firms from each one of the groups focused on. Note that only firms that gave prior approval to be cited are explicitly named in this paper when presenting excerpts of interviews.

Since the purpose of this stage was also to capture new insights from an international perspective, the criterion for firm selection in each group/industry was that in each one half would be composed either of foreign-owned firms and the other half of Brazilian firms.

A few central questions (see end of Part 4) guided the interviews that were recorded and analyzed qualitatively, using 'content analysis' methodology (Weber, 1990).

4. Summary of the Results of the Second Stage of the Research

Considering the focus of this article, it was not deemed necessary to present the statistical results of the second stage (for details on these results, see Macedo-Soares, Fuchs & Russo, 2009, and Fuchs, Macedo-Soares & Russo, 2009). We merely summarize those findings considered most relevant and that needed to be analyzed more profoundly.

The crucial finding of the second stage was that most firms in both industries investigated had not yet implemented what could be considered a climate strategy proper. The data collected from the on-line survey and the hypotheses tests strongly suggested that the overwhelming majority of these firms possessed very few of the key practices for implementing such a strategy effectively.

Approximately, one third of the firms did not even measure GHG emissions (Variable 1), and most of those who did only measured direct emissions, i.e. from sources owned/controlled by the firm (Scope 1, GHG Protocol Standards). The indicators most used were total emissions in tons of CO² and emissions per unit of production. Less than a third in the P&P industry and around one-tenth in the AUT industry measured indirect emissions, i.e. from the generation of electricity purchased by the firm from third parties (Scope 2), and even fewer firms, especially in the AUT industry, did so from sources that were not owned by the firm (Scope 3).

In addition, most firms (around 3/4 in the AUT industry, and over 2/3 in the P&P industry) did not have emissions reduction programs (Variable 3). In the small minority of firms that had such a program, the predominant GHG reduction practices consisted of environmental management, energy efficiency measures, replacement of fossil fuels, and the use of renewable energy and recycled material. In the P&P industry, almost half mentioned that they traded carbon credits in the scope of Clean Development Mechanisms – CDM projects, as opposed to the AUT industry where this practice was non-existent.

The fact that a significant proportion of the firms focused had not adopted key climate practices came as no surprise. It was in line with the findings of the investigations of Enkvist et al. (2008) and Enkvist & Vanthournout (2008) into climate practices of 2193 firms worldwide.

What was surprising was the similarity of results in both industries, for example for key climate strategy drivers (Variable 2), because this was contrary to other studies (e.g. Kolk & Pinkse, 2005). In both industries, firms mentioned the following key drivers in the same declining order of importance: 1) positive reputation of the firm and its brand; 2) increase in the firm's operational efficiency; 3) practice of social responsibility; 4) increase in competitiveness in relation to competitors; 5) coherence with the firm's culture and history; 6) improvement in risk management; 7) changes in attitudes of consumers and customers.

What was noteworthy, however, was that contrary to the literature (Hoffman, 2006; Esty & Winston, 2006) where 'pressure from NGOs' and 'occurrence of litigation' were highlighted as key climate strategy drivers, these were not cited as such by the firms of both industries investigated in Brazil.

With respect to motivating employees to take part in climate strategy efforts (Variable 4), the results at this stage revealed that most firms in both sectors did not possess many of the key practices needed to achieve this. Very few granted a financial bonus linked to the

attainment of climate targets and few firms empowered their employees to undertake climate related initiatives.

Another important finding of this second stage (also Variable 4) concerned the obstacles to successful climate strategy implementation. With small differences between industries, the lack of climate practice related competencies, of financial resources for climate strategy implementation and of information on climate risks of firm production processes/products were considered to be the most serious obstacles. Moreover, only a small minority of these firms had taken initiatives to mitigate these obstacles.

With regard to the lack of information obstacle, the research at this second stage strongly suggested that most firms lacked the key practices of disclosing and publicizing information on climate change-related activities, both within and outside the firm (Variables 4 and 5). Indeed, the results of the test (T-test) of the hypothesis pertinent to the latter made evident that in both sectors very few firms had adopted the key climate practice of publicizing their climate activities, whether in the media, in annual reports or by participating in the Carbon Disclosure Project. Similarly, the results revealed that very few of the firms had adopted the key practice of establishing partnerships for climate related initiatives.

While these results were considered to be important for the industries' stakeholders, a closer look at them prompted several questions. The first question that arose regarded the similarity of results in both industries, for example, for key climate strategy drivers. Another question, related to the latter, concerned the fact that two significant key drivers – 'pressure from NGOs' and 'occurrence of litigation' were hardly cited by the firms.

The other questions concerned the finding that the overwhelming majority of firms in both industries were not adopting most of the key practices for successful climate strategy implementation, suggesting that they did not have a climate strategy proper. Although, as mentioned above, this was not surprising because it converged with other investigations

worldwide, many of the firms in the industries focused on in our research were subsidiaries or joint ventures of leading multinationals or global firms, and presumably had followed headquarters' guidelines. If, and to what extent, their practices in Brazil were similar to those of the company abroad and if not, why this was so, were identified as important issues from an international perspective.

Another question from this perspective was whether there were significant differences between foreign and local companies in Brazil where climate strategy implementation difficulties were concerned, and if so were there any deeper underlying factors that accounted for this.

In the next part of this article, we present the findings of the research's third and last stage that attempted to answer these questions.

5. Results of the Third Stage of the Research

5.1. Similarity of Results and Key Drivers

With respect to the first question regarding the similarity of results between industries, the interviews provided insights especially on key climate strategy drivers. While confirming the survey's results as to which key drivers were considered most important, the interviews revealed that, in keeping with the literature, there were some relevant differences between industries and firms.

In practically all the firms interviewed in the AUT industry, competition from Chinese rivals was perceived as being the main driver. It accounted for the fact that car manufacturers were requiring environmental standards certification (ISO 14000) of cars sold in Brazil so as to create a barrier to entry for Chinese firms who were achieving extremely low costs by ignoring environmental and basic quality of working life standards. As a senior manager at the subsidiary of the German multinational - Volkswagen (cars) in Brazil said:

“There is a threat of imports of Chinese cars that will cost US\$ 5000. We are concerned with this kind of competition... (We) will have to put pressure on the government to create new environmental regulations, with a view to creating a barrier to Chinese products”.

He emphasized the importance of the economic factor rather than any environmental sensitivity on the part of the Brazilian customer: *“The customer wants a nice looking car, with a good engine, that costs little. It is not part of the car buyer’s culture (in Brazil), to be concerned with gas emissions”.*

The observation of a senior executive from General Motors Brazil (part of GM, the global US AUT Company) was relevant in this respect:

“The consumer always looks for the best cost-benefit option for him... (and)...is willing to pay up to a certain point for ... a greener car. In the case of Brazil (however), the consumer does not have to worry ... about this because ethanol from sugar cane (for ethanol fuelled cars)...when one measures ... CO² emissions, represents a reduction of up to 80% in emissions throughout the (production) process”.

As to the P&P industry, the most important key internal drivers for implementing a climate strategy appeared to be sustainability and cost reduction by way of eco-efficiency. The key external ones in the case of firms that exported were changes in consumer attitudes and competitiveness.

As a senior manager from Stora-Enso Latin American, a leading global Nordic P&P firm put it:

“For us, climate change has this potential threat, (to) create disturbances to the raw material. From the sustainability viewpoint it is the existence proper of the firm (that is at stake) and it is, no doubt related to competitiveness”.

With respect to cost reduction (increased operational efficiency driver), the interview with a senior manager from Orsa Group, a Brazilian P&P firm that exports 90% of its production, suggested that it was linked to sustainability and, thus, contributed to competitiveness:

“I believe that what really motivates is ... cost reduction that has a very strong weight aligned with the question of sustainability and preservation of the environment. But all these factors also contribute to competitiveness, which in our case already is very strong”.

The manager interviewed at Fibria, a Brazilian firm that exports most of its pulp, observed that the point was to achieve cost reduction through eco-efficiency. He distinguished between this internal driver and external drivers, suggesting that changes in attitudes of foreign consumers together with pressures from international NGOs could be significant external drivers for implementing climate strategies in the case of firms that export.

“FIBRIA today exports 90% of its production and the big consumers are Europe and US where the consumer has a better understanding of environmental questions and where it is mainly the international NGOs that have exerted pressure on distribution chains. Even if today one notices in public opinion surveys that the consumer is not prepared to pay more for a sustainable product... most international supplier networks are realizing that this is becoming a prerequisite”.

The observation regarding the pressure of international NGOs was insightful because in our survey the pressure from NGOs in Brazil had hardly been cited as a key climate strategy driver. It became obvious that a distinction had to be made between firms in Brazil that operated locally, where the pressure from NGOs was evidently not effective, and those that exported and were affected by international NGO pressure on consumers and distributors abroad.

Similarly to Fibria, executives at Cenibra, a Brazilian firm controlled by several multinationals including a Japanese group, cited the external driver ‘change in attitudes of consumers’ as being the most important, followed by competitiveness in environmental practices:

“There is a commercial pressure (in the P&P industry) to offer green products, i.e. environmentally sustainable ones. The second most important driver is competitiveness between firms with respect to new approaches in terms of GHG. Firms with a ‘carbon footprint’ are at an advantage”.

5.2. Key Practices

With respect to the questions on the adoption of key climate practices, the interviews strongly suggested that here too there were significant differences not only between industries, but also between types of firm, in terms of whether they were foreign, or local exporting or non-exporting firms, as well as the countries they exported to.

With some exceptions, the extent of climate strategy implementation and level of practice sophistication were perceived to be much higher in the headquarters of the multinational or global firms (e.g. American, German and Nordic firms) than in their

operations in Brazil, at least according to the senior executives interviewed in the final stage of our research.

This was explicit in the interview with a senior manager from Volkswagen cars. Referring to ‘inventories of GHGs emissions’, he observed that:

“In Brazil, this is the case only at the main plant that is the largest in the whole of Latin America (He noted that VW has 3 other car factories in Brazil, one in Mexico and 2 in Argentina). In Germany, this is already being done, yes”.

Similarly at Volvo a senior manager made it clear that although this Swedish firm was a global one, there were different degrees of climate strategy implementation in each region:

“All over the world, in keeping with its global strategy, Volvo Holding’s goal is not zero emissions but Neutral CO². It is clear that this work... in each region, has different levels...in Europe we have a dealer in Italy that is already CO² neutral but this is not so in all regions in the world”.

He explained that although global goals were adopted worldwide, these were negotiated region by region and thus differed.

An interesting case among the firms in the AUT sector was GM Brazil. As a senior executive first observed: *“Because GM is effectively a global firm ...all processes are ... identical to those in the US, Europe or China, for example”*, and then added:

“Obviously, some programs started a long time go in the US and were extended afterwards to other units, but Brazil is a specific case: it is one of the oldest GM operations. ... thus, in Brazil, global energy efficiency programs were adopted and global measures ... GM Brazil Environmental Metrics have been used”.

Volvo is another global firm that, according to the senior manager interviewed, has had excellent results regarding energy use reduction “*sometimes up to 30%*” and recycling. The whole cycle is embraced “*to have a product with a 95% recyclability level*”.

Where recycling is concerned, a senior manager from Volkswagen (cars) drew attention to a taxation problem in Brazil: “*What makes things difficult in Brazil is government taxation. When one speaks of recycled material it would not be correct to tax it, because it has already been taxed*”.

In the case of recycling in the P&P industry, the interviews provided insights specific to this sector. As an executive at Cenibra observed:

“To produce pulp removes CO² from the atmosphere, because the planted areas are huge and the percentage of carbon removal from eucalyptus forests is very significant compared to the native forest. The production of recycled paper does not have this forest counterpart. If you look at GHG, producing pulp is much more interesting than recycling paper. Thus, one observes a contrary movement to what we had 5 years ago, which was a strong movement in terms of recycling paper”.

Similarly to GM in the AUT sector, Stora-Enso stood out as a benchmark company in the P&P industry in Brazil in terms of climate practices, including GHGs emissions measurements that follow global guidelines. As a Stora-Enso senior manager observed, “*We measure at a worldwide level*”. “*Measurement is done by product ton in production. This is the most used measure and the most appropriate*”. He thus confirmed the survey’s findings regarding the indicator most often used in the P&P industry.

Fibria, which exports 90% of its production, also stood out as an exception among Brazilian firms regarding the inventory of its emissions by an independent third party company. As a senior manager said, “*Fibria and a Norwegian firm, Sodra, are the only ones*

(in the P&P industry) *that have already had such a carbon inventory... performed by an independent firm (TUV in Germany)*".

Most of the interviews suggested, moreover, that the most advanced firms in the P&P industry in terms of GHGs reduction measures had also adopted the sophisticated Kraft process. While explaining this process, a senior manager from Stora-Enso, highlighted differences between Europe and Brazil:

"Those (factories) that use the Kraft process in pulp plants are self-sufficient in energy. The pulp is extracted from lignina and the latter is used as fuel to generate energy. On the other hand, thermo-mechanical plants use both the pulp and lignina. Here (Brazil), energy has to be bought from third parties. In Brazil, because most energy is hydroelectric, there is no carbon problem, contrary to what happens in Europe, for example, where energy is often derived from coal. Moreover, in Brazil, Stora-Enso has eucalyptus plantations where carbon balance is achieved. 4 tons of CO² are sequestered for each ton of pulp produced".

It is important to recall here that the survey had revealed that a significant number (40%) of P&P industry firms had performed carbon credit transactions in the scope of Clean Development Projects (CDP). The executive interviewed at Cenibra explained why this was so:

"Carbon credits provide an opportunity to earn money... or finance projects that improve the firm's image. It can help us to be more efficient without investing our own funds and also obtain returns in the future."

Another important finding of the third stage concerned climate strategy implementation obstacles. While confirming the results of the previous stage on this point, the

interviews highlighted country differences and strongly suggested that the root-cause of many implementation difficulties was cultural and that the lack of effective environmental legislation should also be considered a critical obstacle.

In both sectors, the lack of financial resources, notably government financing for climate related programs was cited in the interviews as a significant obstacle. For example, at Volvo, a senior manager observed that *“the government could have specific credit lines”*. Similarly, a senior manager at Lwart Group, in the P&P industry, said: *“With respect to the economic question, I would say that there are no signs from the government that this is in fact important”*. *“We did not find specific financing for the climatic question”*. His observation suggested that the problem was that, in practice, the climate change issue was not yet considered to be a top priority by the Brazilian government.

In fact, in the P&P industry, the lack of financial resources together with the lack of competencies was cited by several firms as key problems. At Orsa Group, a senior executive explicitly said: *“There are no (financial) resources”*, and referred indirectly to the lack of climate practice related competencies when he observed that the company did not provide the necessary training in this field: *“It (climate change) is a relatively new subject, where nothing very specific exists. Engineering has to deal with issues for which there is no formal training”*.

Similarly, when a senior executive from Cenibra was asked to name the main obstacles he said: *“It is the lack of competencies. It is not easy to make these inventories”*... *“Thus we do not have tools to do this in a detailed way...(and) there are no people that know how to do it”*. His reply implicitly suggested that here too training was lacking to acquire the climate strategy competencies and necessary management tools.

A senior executive from Stora-Enso explicitly said that in Europe the situation was different:

“In Brazil, the economic reality is different from Europe’s. I believe that today it is mostly the demand for paper. But the financial issue is one aspect and the education of people with this capacity is another”.

It is highly significant that although practically all executives interviewed cited the key obstacles identified in the second stage of the research, several made it clear that the fundamental underlying problem was a cultural one. Even when the senior executive from Orsa Group commented on ‘lack of financial resources’, he observed that to get the necessary funds for climate practice investments, *“...you always have to link (the climate issue) with another aspect, such as operational efficiency, cost reduction”*. Implicitly, he revealed that the prevailing culture was an economic rather than an environmental one. Similarly, a senior manager from Volkswagen (cars) suggested that there was a lack of cultural sensitivity to environmental issues in the firm in Brazil and that the real motivation for environmental projects was an economic one: *“When you show the (cost) savings (of projects), then it is easy” ...“But the motivation is not the environment”*.

Other executives in both sectors explicitly cited the cultural factor as the underlying cause of the lack of practices to mitigate the obstacles identified in the firms in Brazil. At Volkswagen (Trucks) an executive manager said: *“The environmental question is a culture that does not exist (in the firm in Brazil)”*. With respect to effectively applying environmental/sustainability practices he observed that: *“... it is very difficult mainly in our country ... that is starting to develop” ...“(Brazil) is still a very price-oriented country”*. He highlighted the critical importance of the cultural factor for the success of such practices when he said: *“...every sustainability issue has to be rooted in each one (of the employees)”*.

At Lwart Group the importance of developing a new environmental culture was also explicit in the firm’s climate related initiatives. As observed by a senior manager of the firm

in Brazil with respect to the process of obtaining ISO14001 certification that took 2 years: “...we were not concerned with the certificate, in fact we wanted it to mirror the organization”. When asked if what they wanted was cultural change, he said: “Exactly. It takes more time. Today the employees know what the firm’s values are (including that of sustainability)”. He then described the mechanisms that were used to motivate people to change their behavior in accordance with the new climate strategy. As examples, he mentioned climate practice related training, suggestion programs, participation in profits and financial bonus linked to the attainment of climate practice goals. Interestingly, he also mentioned that they had adopted the well-know cultural change technique of forming groups to cascade the new principles and practices throughout the company so as to foster their buy-in at all levels. Each group would consist of a leader with a number of people reporting to him that would use his example to guide the process of applying the climate strategy’s new ways of doing things, on a day to day basis. These measures remind us of the techniques used by multinational firms, in the 1990s, to help implement TQM by fostering the deeper cultural change necessary to guarantee continuity of quality practices. At Xerox the kind of group referred to by the manager of the Lwart Group was called a ‘family group’ (Macedo-Soares & Chamone, 1994).

Although this manager said: “We believe that this has produced very interesting results”, he observed that “communication is never perfect”. It was obvious that, in spite of some commendable results, in terms of achieving the desired cultural change, a lot remained to be done at the company.

In connection with the latter, it is interesting to mention the case of Volvo Brazil where a senior manager had said that corporate socio-environmental responsibility was a strong climate strategy driver, because of the culture of the country, Sweden, where its headquarters were located:

“This comes from the Swedish people, because the headquarters are in Sweden. Swedes are naturally concerned with the environment and Volvo has absorbed this cultural heritage”.

One could infer from this observation that an environmental culture was quite developed at Volvo Brazil. However, this same executive drew attention to the fact that climate practice implementation in its firm in Brazil was not considered to be up to European standards. For example, he said that in Brazil the firm only publicized some of its environmental activities and did not publish an annual report with environmental indicators, nor did it participate in the CDP. He added that: *“abroad (Europe), we have a socio-environmental report that is issued every year and is available on the Internet”.*

With respect to the finding that what prevailed in the firms, where climate practices were concerned, was an economic rather than an environmental culture, it is noteworthy that as contributors to the AOM’s Annual Meeting 2009, “Green Management Matters”, made evident, there is an on-going debate in the world as to whether firm environmental practices should and can be adopted regardless of economic considerations (Marcus & Fremeth, 2009; Siegel, 2009).

As to the question regarding ‘obstacles’, a significant observation came from a manager at Fibria who explicitly observed that in Brazil the lack of adequate environmental legislation was also a key obstacle to effective climate strategy implementation: (In Brazil) *“we are lagging behind in terms of federal (environmental) legislation”.*

It is relevant here that, by and large, the interviews confirmed the result of the survey with respect to the fact that very few firms divulged their climate practices. An executive manager from Volkswagen (cars) said: *“Our communication process is deficient (in terms of environmental practices)”.*

However, what was most insightful, in terms of country differences and regarding, both, the question of divulging climate practices and environmental legislation deficiency in Brazil, was the reply of this executive when asked if the company had an annual report that included environmental indicators. He said: “*Yes, but only at headquarters (in Germany)... Brazil does not make a report*”, and explained: “*there (in Germany) they are obliged to make such a report and to publicize it because it is the law*”. In other words, he explicitly highlighted the importance of the threat of effective legislation to oblige firms to adopt key climate practices, such as disclosure of relevant climate strategy information. This converges with Reid & Toffel’s (2009) empirically tested arguments regarding the likelihood that regulatory threats increase a firm’s propensity to engage in practices consistent with the objectives of a social movement, notably, climate change practices which include corporate disclosure of climate change strategies.

The observation of the Volkswagen manager is all the more relevant given that in the survey and in the interviews the ‘occurrence of litigation’ had not been cited as a significant climate strategy driver.

In this connection, note that several articles appeared in Brazilian newspapers arguing that environmental legislation in Brazil was not strict enough or sufficiently effective (e.g. O Globo, 2009; Observatório da Imprensa, 2009). This would explain why the firms did not perceive the infringement of legislation to be a key driving factor.

As to partnerships, the interviews confirmed the results of the survey regarding the lack of genuine climate related partnerships in the majority of the firms investigated. They revealed that often what were called partnerships were in fact merely contracts or projects, and, with few exceptions, even in the foreign firms, most were one-off initiatives. In sum, the interviews suggested that establishing partnerships was not viewed as a critical climate

practice, contrary to what was emphasized in the literature and the attitude of US firms, in general, (Kolk & Pinkse, 2007).

6. Final Considerations

It is important to recall here that the objective of the final stage of the research was both to achieve a better understanding of the results of the previous stage and to capture new insights from an international perspective with a view to providing lessons that could also benefit firms abroad interested in doing business in Brazil, as investors or partners, and concerned with climate strategy issues.

As we saw, our research strongly suggested that even in the global and multinational firms in the automotive and pulp-and-paper industries in Brazil, the level of application of climate strategies and practices was, with few exceptions, well below that of their headquarters abroad. It also provided indications that, on the whole, the level at global and multinational firms in Brazil was higher than that of local firms, although in the case of the latter, there apparently were differences between those that exported a significant percentage of their product and those that did not.

Obviously, we could not generalize the results of the last stage. Nevertheless, the interviews achieved their objective of deepening the understanding of the previous stage's statistical results, notably with respect to the causes of key practice deficiencies.

No doubt, the most significant finding of the last stage came from comments explicitly suggesting that the root-cause for climate practice deficiencies in most cases was a cultural one, precisely, the lack of a true environmental culture, even in the foreign firms in Brazil. Indeed, the interviews provided eloquent testimony that the culture that prevailed was an economic one with cost reduction concerns. At the same time, some gave concrete

examples of the sort of mechanisms that were being used in a few exceptional cases, in an attempt to bring about the desired change towards an environmental culture.

The other significant insight came from observations regarding how urgent it was for Brazil to adopt a more forceful carbon restricting legislation.

The good news is that, as the interviews illustrated, precisely in the industries focused on, firms were benefitting from various aspects of Brazil's privileged energy model. As an executive at GM Brazil observed, "*Ethanol is a concrete alternative fuel for 2009, because it is available, accessible*". In the automotive industry, the production of flex fuel vehicles that can also run on ethanol and the use of biomass from sugar cane in the cogeneration of energy are all cases in point. Likewise, in the P&P industry, because the raw material - planted eucalyptus forests - is produced using sequestered CO² — firms in Brazil have an environmental competitive advantage.

Thus, it is believed that with the advent of a more comprehensive carbon restricting legislation and especially the threat of its effective enforcement that would help drive the adoption by firms of climate strategies and contribute to leveraging the mechanisms for carrying out the necessary cultural change, Brazil could be in a privileged position on the global scene.

With respect to making the desired legislation a reality, one of the lessons of the research for firms is the urgent need to realize the role they can play in this endeavor by establishing the right partnerships and by providing greater climate risk information transparency. Climate-related partnerships with other firms in the same sector could step up their bargaining power in legislation formulation discussions. Partnerships with government and NGOs would help increase their influence in such discussions as well as their credibility, in part, because they imply more transparency.

As we saw, the lack of information transparency was a critical problem in the firms investigated in Brazil that could jeopardize their efforts to obtain the necessary credentials to participate in governmental carbon restriction policy formulation programs. .

In view of the international context in which companies in Brazil increasingly operate, we recommend further research on the role that foreign actors can also play in contributing to the successful implementation of firms' climate strategies and the development of more effective environmental legislation in this country.

We suggest, moreover, that firms, in other sectors, and in the other BRICs should also be investigated, from an international perspective, with a view to drawing new lessons for firms in leading emerging countries in their role as key players in the environmentally sensitive global scenario (Stern, 2008).

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