

**THE ROLE OF INDUSTRY IN SUSTAINABLE DEVELOPMENT: SADIA
CASE STUDY IN THE CARBON MARKET**

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Summary

In the context of the Kyoto Protocol, which discusses policies and measures for the mitigation of climate change adverse effects, the aim of this study is a preliminary discussion of the insertion of Brazilian companies in carbon market trading through the analysis of Sadia case study. The study will focus on the 3S, Sustainable Hog Farming System by Sadia, analyzing if industries may contribute to the sustainability of the Brazilian matrix, through initiatives to reduce emissions of greenhouse gases (GHG). This analysis deals with the way the Sadia program has been developed, in the light of the Kyoto Protocol commitments and the climate change issue.

Key words: *Sustainability; Carbon Market; Sadia; Climate Change.*

1. Introduction

Greenhouse gases emissions are responsible for several adverse environmental effects, mainly related to climate change effects. One of the negative impacts concerns the high carbon dioxide (CO₂) concentration levels in the atmosphere, leading to a global temperature rise.

Through the analysis of a production process in the food industry, it has been determined that it is possible to convert an adverse effect, such as greenhouse gases emissions, into a positive effect for society. Despite its not annulling environmental damage, Sadia initiative – fostering the Sustainable Hog Farming System, thereby reducing greenhouse gases emissions – converts detrimental effects into a sustainable management opportunity.

Through the analysis of statistics related to the matter, the rising position of the Brazilian market in swine production can be easily seen. The sector has been growing around 4% a year. Santa Catarina, Paraná, and Rio Grande do Sul are the largest swine-producing states in the country. Currently, Brazil is responsible for 10% of world pork production and exports, with sales of over \$ 1 billion annually. Furthermore, the government points out at favorable market trends for the Brazilian pork producing sector and exports, with a projected annual production tax of 2,84% in the period of 2008/2009 to 2018-2019, being second only to chicken meat producing and exports (MAPA, 2012).

In light of favorable market trends for the Brazilian exports and the rising swine-producing industry, it is reasonable to analyze a study concerning a sustainability program, implemented by a private Brazilian enterprise, in the pig-farming chain.

Moreover, the debate over the carbon market presents itself as a fundamental issue in the world scene, due to the necessity of implementing policies and measures for the reduction of greenhouse gases emissions. Nowadays, climate change debate has been constant in the media, in research centers, in corporations, and among governments, as well as in organized society.

Since the signing of the Kyoto Protocol, mechanisms related to the mitigation of climate change have been pursued, among them the Clean Development Mechanism (CDM). Countries like Brazil have been gaining world expression, in terms of numbers of CDM

project activities, and contributing to sustainability solutions in the world scene. Brazilian CDM programs, such as the 3S by Sadia, have been gaining importance for their novel solutions in economic, social, and environmental enhancement.

Thus, the choice of a study researching the analysis of the role of industry in sustainable development – through the Sadia case study in the carbon market – is made, based on the debate over the possible benefits brought by private entities programs.

Also, the swine-producing industry is considered to be an activity of significant environmental impact by governmental agencies, being responsible for high pollution levels due to poor waste management practices. Most of the manure produced is disposed in groundwater, streams, and rivers without adequate treatment, leading to declining water quality and harmful gases emissions; in short, it harmfully impacts the environment.

Finally, the topic is important for its relevance on the Brazilian political agenda. Brazil has a voluntary reduction commitment, with a view to reducing its overall greenhouse gases emissions by 36,1% to 38,9% below 1990 levels, until 2020. Currently, it results in funds creation (i.e. the Amazon Fund, managed by the Brazilian Social and Economic Development Bank - BNDES) and financing lines which value and/or prioritize projects and activities having as their aim GHG emissions reduction (i.e. the ABC Program – the Low Carbon Cost Program financed by Banco do Brasil).

Hence, the study of such an initiative as the Sadia one is relevant, in the light of the united effort of the private sector and the government to accomplish the target commitments established by the Kyoto Protocol, preventing adverse effects to the environment. In this context, this study discusses the relation of the company with the sustainability issue.

2.1 Objectives

2.1.1 General Objective

The aim of this study is presenting and analyzing a program in compliance with the Clean Development Mechanism, implemented by a Brazilian private enterprise having as its target contributing to the greenhouse gases emission reduction. The aforementioned program is the 3S Program, Sustainable Hog Farming System.

2.1.2 Specific Objectives

Identify and discuss the role of the industry in sustainability and present the Kyoto Protocol, as well as the Clean Development Mechanism, as options for reducing the adverse effects of climate change. Secondly, present a brief description of Sadia and an analysis of its program: 3S, Sustainable Hog Farming System. Finally, raise issues concerning the project developed by the enterprise.

2.2 Research Methodology

The present study was developed by means of bibliographical research, secondary sources analysis, and case study, being all these important and essential parts for the analysis of a project, developed and implemented in the light of the Clean Development Mechanism (CDM).

First of all, bibliographical research was done. The basic bibliography reading enabled the theoretical discussion of the subject of study; moreover, it helped defining and identifying the proposed issue. Furthermore, another research was conducted, based on secondary data, in great part available on the official company sites and on specialized sites, like governmental ones. Simultaneously, a case study was performed by means of the analysis of the program developed by Sadia, the 3S Program, to discuss the Clean Development Mechanism matter as well as the CDM program implemented by enterprises. The program discussion and analysis involved the investigation of the program background record, as careful and detailed description enables the

interpretation of cultural values and behaviors of certain categories, such as companies, engaged in the matter (GEERTZ, 1989).

3.The Role of Industry in Sustainability

Last century's transformations have not been the product exclusively of political changes. Also, they have been followed by changes in economic, social, and mainly environmental contexts. Among them, the climate change effects rise can be detached. Climate change can be defined by the transformations in the planet climate provoked by natural phenomena and human-induced activities. These alterations may result in global temperature rise, a phenomenon known as global warming, which has led to melting glaciers, sea ice, and ice sheets, and, consequently, to sea level rise. Furthermore, such changes can also be observed in desertification exacerbation, as a result of an unbalanced global climate system. The aforementioned consequences have been attributed to anthropogenic activities such as the cause of the increase of the greenhouse effect¹, thereby building up the carbon dioxide concentration levels in the atmosphere. The carbon dioxide build-up results from human-induced activities, "principally from the burning of fossil fuels, notably coal, petroleum by-products, and natural gas, which occurs on a worldwide basis due to domestic and commercial uses and in transportation, energy production, industry, and agriculture." (FRONDIZI, 2009)

The impact of environmental changes was already visible in the 1960's, when a series of environmental disasters came out in the open. Together with environmental imbalance, these disasters have become a source of concern to society, not only due to environmental questions, but also to its being a threat to the future of mankind.

In the last decades, environmental concern has risen in consequence of the brutal exploitation of natural resources. The current consumerism model has been the target of fierce criticism due to a new development model, determined by a novel life style based

¹ The greenhouse effect is a phenomenon produced by gases build-up in the atmosphere, such as carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, and perfluorocarbons, the last being residues of the production of industrialized goods. They form a layer which traps some of the infrared radiation that escapes from the earth, making the planet warmer than it would be otherwise.

on the American Way of Life. Reducing gaps, both technological and economic development contributed to the creation of a new society, a consumer-based society. Lower classes have experienced income rise, leading them to higher consuming levels. In this scenario, environmental issues have obtained more attention not only from scientists and scholars, but they have generated concern in organized society as well.

Formerly limited to scientists, the environmental issue has started to affect society, once there has been “an increase in human-induced pressures upon the environment and a direct interference on people’s quality of life (...).” (PORTILHO, 2004). Thus, the concept is that it is not enough to consume less – it is also fundamental to consumer better. This means consuming in a sustainable way, as “it must supply the needs of the present generations, without undermining the future generations, promoting social advancement and environmental improvement” (Brundtland Report, 1987).

Therefore, evolution in society’s perception change occurs when its behaviors start affecting its way of life. Thus, the concern around climate change, the greenhouse effect, and global warming has called increasing attention in society. Although it has not reached media attention until recently, the issue has risen in importance since the 1980’s, when deep concern with environmental changes in consequence of anthropogenic activities began.

According to the United Nations Climate Agency, greenhouse gases concentration levels hit record highs in 2010, displaying the highest level of carbon dioxide in the atmosphere since 1750, which traces back to the Industrial Revolution Age. Back then, there were neither carbon dioxide sequestration technologies, for these harmful effects mitigation, nor knowledge of the issue (O Globo, 2011).

In this light, governments, private enterprises, and non-governmental institutions have been in search of solutions and/or mitigation for the climate change matter. The First World Climate Conference, held in 1979, stands as the first event with relevance for the issue debate. Since then, several events related to the matter have been organized such as the United Nations Conference on Environment and Development (UNCED, 1992);

COP/MOP² (Conference of the Parties serving as the Meeting of Parties of the Protocol, 1995); etc.

These global environment conventions have contributed to changes in the attitudes and actions of society, as well as in its interest and engagement in the sustainability matter. Such transformations have been accompanied by a change and an evolution of the environmental movement. The aforementioned movement dedicated itself to the preservation and conservation of the environment, until the 1950's (Alier, 2007). Since then, it has also questioned the effects connected to social and environmental matters resulting from anthropogenic actions.

In view of human-produced activities and their impact, mainly resulting from industrial processes, companies become co-responsible for the enhancement and maintenance of life quality in their areas of influence. After all, their activities impact on society not only positively, displaying negative aspects as well. Therefore, according to CHEIBUB and LOCKE (2002), in plenty of the current models of corporate social responsibility (CSR), “companies have moral responsibility towards society, which permits them to operate their business processes. Therefore, they must produce direct positive impact on varied societal sectors, through their business activities. They must assume a more active role in social problem solving, since they are agents holding abundant resources, which allows, and indeed morally obliges, them to take such roles.”

Therefore, the perception that economic, social, and environmental issues are also under the sphere of corporative responsibility - as corporations impact on society with their activities – has enabled corporative emergence in sustainable development. Within a new market logic, companies display corporative social responsibility, being technically qualified to make a contribution to the achievement of societal goals, disqualifying the former exclusive role of the State. Therefore, there is “a territory colonization of social policies from corporative perspectives” (Muller, 2006), whereby companies come into being qualified agents of social policies management, attributing a certain efficiency

² COP stands for Conference of the Parties. “It serves as the meeting of the Parties of the Protocol, striving to monitor the implementation of the Protocol, through periodic verifications, taking further action, if needed, for its effective implementation” (FRONDIZI, 2009).

and planning expertise to the detriment of governmental bureaucracy and inefficiency (Paoli, 2002).

Therefore, the decision of performing a careful analysis focusing on corporate actions and ideas is necessary, in order to verify the role such enterprises adopt in participating in and influencing on climate change issues. By carrying out an analysis of the role of industry in sustainability, the study discusses whether or not corporate contribution to sustainable development is feasible.

3.1 Sustainability Mechanisms

3.1.1. The Kyoto Protocol

In light of such debate, new proposals to establish greenhouse gases emission reductions have been planned and put into practice, such as the Kyoto Protocol. The Kyoto Protocol is a protocol to the United Nations Framework Convention on Climate Change, presented in the COP-3 in Japan in 1997. It establishes that the industrialized nations (the parties included in Annex 1) shall pursue greenhouse gases emission reduction commitments. It aims the accomplishment of these countries' commitments in an economically viable way, thereby not undermining their economies. In order to help these countries meet their targets of GHG emission limitations, they may compensate their deficits by purchasing GHG emission reduction credits from low-income developing countries (countries in the non- Annex I") by means of Clean Development Mechanism projects.

Once presented in 1997, the protocol was discussed in the COP 15 in 2009, where the document validity was confirmed until a new protocol be proposed for its replacement. It represents a concrete proposal for gases emission stabilization, which divided countries into two groups:

- Annex I – Industrialized countries (great emitters)
- Non-Annex 1 – Developing countries that, in order to meet their development targets, need to increase their energy matrix and their share of global emissions. Therefore, they have no emission reduction targets in this first phase.

The reduction commitments of the countries in Annex I are reducing overall GHG emissions by 5,2% below 1990 levels in the commitment period 2008 to 2012, defined as the first phase of implementation of the aforementioned protocol. So that these countries meet quantified emission limitations and reduction commitments in economically viable ways, flexibility mechanisms have been established, such as follows:

- Emissions Trading and Joint Implementation – trade of emissions among countries in Annex I, providing an opportunity for these Parties to trade among themselves portions of their assigned amounts;
- Clean Development Mechanisms (CDM): Parties in Annex I may achieve compliance with their quantified emissions limitation and reduction commitments by financing or purchasing emissions reduction projects from countries in the Non-Annex I. It is worth mentioning such a mechanism rose from a Brazilian proposal for a clean development fund creation in compliance with the **polluter pays principle**, also known as EPR (Extended Producer Responsibility).

Two courses of action are considered eligible as greenhouse gases effect reduction:

- Enhancement of energy efficiency, development and use of new and renewable forms of energy, and innovative technologies and systems in transport and production;
- Carbon dioxide sequestration technologies through enhancement of sinks and reservoirs of greenhouse gases removed from the atmosphere, reforestation, and CO₂ injection in geological reservoirs (promoting sustainable forest and agricultural management practices). Reductions must be expressed in CO₂ assigned amounts.

To come into effect, the protocol must be ratified by at least 55 countries involved in the UNFCCC and also by countries representing at least 55% of the world's total carbon dioxide emissions for 1990.

3.1.2. Clean Development Mechanism

The Clean Development Mechanism (CDM) originated from a Brazilian proposal for a clean development fund creation, is to be formed by means of financial resources coming from developed countries not in compliance with their quantified greenhouse gases emission limitation and reduction commitments. Such a fund would be used to promote project activities in developing countries.

This notion has not been accepted by some developed countries, and the fund concept has been modified, turning into the Clean Development Mechanism. This mechanism consists in countries, which have emission reduction commitments, achieving compliance with their commitments under the Protocol, through certified emission reductions. These reductions, resulting from each project activity performed in developing countries, contribute to the achievement of sustainable development.

The concept consists of a project which, when implemented, generates environmental benefits (GHG emission reduction or carbon dioxide sequestration) in the form of transferrable financial assets, the Certified Emission Reductions (CERs). Such a project should result in more substantial emission reductions than any which would occur in the absence of a CDM project, ensuring real, measurable, and long-lasting benefits linked to the mitigation of climate change.

The objective of the CDM, as defined by the Article 12 of the Protocol, is to assist (i) developing countries (Parties not included in the Annex I) in contributing to the ultimate purpose of the Convention – i.e. achieving GHG concentration levels in the atmosphere which prevent harmful anthropogenic interference in the climate system – and in reaching sustainable development by means of implemented CDM project activities; and (ii) developed countries (Parties in the Annex I) in achieving compliance with their quantified emission limitation and reduction commitments.

Hence, the CDM is a significant voluntary contribution given by the Parties in the Non-Annex I to effectively change the global warm trend in accordance to the Convention, the Kyoto Protocol, and the principle of common but differentiated responsibilities.

The GHG emission reduction and/or carbon dioxide sequestration increase, resulting from CDM project activities, must be measurable in tons of equivalent carbon dioxide – tCO₂E. After proper verification, each CO₂E ton which is reduced or removed from the

atmosphere corresponds to one Certified Emission Reduction unit (CER), issued by the CDM Executive Board. The compliance or non-compliance of the countries in the Annex I with their commitments will be verified at the end of the first commitment period. They should also demonstrate that their emissions are equal or lower than a pre-determined limit, from 2008 to 2012.

3.2 Considerations on the role of industry in sustainability

The world is moving into a new direction, one in which sustainability is of ultimate importance. Nevertheless, this transition has been quicker and tougher than environmental global conventions could indicate. This transitional process will be concluded only when new balance between the environment and economy is reached.

The current crisis comprehension and the search for alternatives to face it are permeated by broader issues, such as the debate concerning the sustainable use of natural resources. Thus, differently from previous crises, not only the government through its public policies, but also non-governmental players, such as the community and the private sector, are involved in addressing this public issue. Therefore, for the advancement of the debate concerning sustainable development, the focus should be on the articulation among all players involved the issue, not on a determined stakeholder.

Thus, one of the purposes of this study is to present and analyze how this program is integrated with the sustainability issue.

3.2.1. Sadia and Sustainable Hog Farming System – 3S

Currently, Sadia is the largest food business in Latin America and one of the main export companies in the country, exporting over 1,000 products to more than 100 countries. Its portfolio displays more than 650 items, distributed across more than 300,000 retail stores.

The company is a market leader in the food industry, being elected the most valued brand in the food business in Brazil, four times in a row. Its importance also lies in its

socio-economic relevance, employing around 55,000 people. Moreover, it contracts and maintains cooperation with more than 10,000 family farms, breeding poultry and swine for Sadia, thereby contributing to the country's stability and development.

In 2009, the two largest corporations in the Brazilian food industry, Sadia and Perdigão, merged. Brasil Foods is a new global giant³, resulting from the merging.

The Sadia 3S Program, Sustainable Hog Farming System, can be mentioned, among its contributions to the environmental issue. It was created in 2005, by the Sadia Institute, a nonprofit institute that was in charge of managing the 3S Program. The program's objective is implementing sustainable development activities in the swine farming integrated system held by Sadia, developing CDM projects in compliance with the Kyoto Protocol. The project's purpose is the generation of CERs (Certified Emission Reductions), through the use of anaerobic digesters, or biogas systems, for waste disposal. The use of such digesters is implemented not only on the company's pig farms, but also on the contract family farms participating in the corporate swine production system.

By means of bio-digestion, the program produces clean and renewable energy and nutrient rich fertilizer. The conversion of organic wastes occurs in an anaerobic bio-digester, free from atmospheric air. This anaerobic process generates biogas, a gas mix where methane can be found. The methane produced can be used for energy generation (in generators) or heating (in boilers and gas heaters).

Another product generated by the process is bio-fertilizer, a by-product of anaerobic digestion. An average of eighty percent to ninety percent of organic wastes is converted into biogas, a renewable source of energy. The effluent that remains after biogas production is a high quality organic fertilizer, rich in nutrients like nitrogen, phosphorus, and potassium. This waste-management solution system traps methane and converts it into carbon dioxide through a biodegradable break down process, reducing greenhouse gases emissions at 21 times the rate it would otherwise.

³ The merger between Sadia and Perdigão resulting in the creation of Brasil Foods (BRF) was announced in 2009, but only approved by Brazil's antitrust regulator (CADE) in 2011.

The participation of swine producers in the program is voluntary. Members of Sadia technical team present the program to swine farmers, who decide whether or not to join the program. A checklist is filled out and an adhesion contract is then signed. The emission reduction to be obtained with the use of the anaerobic bio-digester is calculated by analyzing the information on the checklist. The number of carbon credits each farmer will get is estimated (potential emission reduction). The program has been implemented in 1,000 contract farms, where methane emission reduction is obtained through the use of anaerobic bio-digesters for waste disposal management.

Upon contract adhesion, the Sadia Institute obtains financial resources on the market. With such resources, anaerobic bio-digesters are installed on the farms for waste disposal management. The farmers operate these bio-digesters in commodate, a gratuitous loan. The Institute then trades these carbon credits on the carbon trading market. The amount obtained is then shared with farmers, according to each potential emission reduction, after deduction of the investment made in the anaerobic bio-digesters and in the program implementation and operation costs.

Along the program implementation, auditing and verification of the program is expected. Such auditing is to be performed every semester by a Designated Operational Entity (DOE), an independent auditor accredited by the CDM Executive Board (CDM EB), as determined by the UNFCCC (United Nations Framework Convention on Climate Change).

As preliminary results of the program indicate, each unit represents a reduction of 389 tons of carbon dioxide equivalent (CO₂), calculated in accordance with the Global Warming Potential. It will represent a total amount of 3,894 carbon credits to be paid to farmers as supplementary revenue per year of the program implementation. In economic aspects, Sadia has been able to generate income through the sale of 290,000 tons of carbon credits from December 31, 2006 on, to the ECF (European Carbon Fund). However, as informed by the company, so far no assets have been received by the Institute as a result of the greenhouse gases emission reductions.

From an environmental point of view, a series of environmental benefits are expected, such as the conservation of riparian forest buffers, water course preservation, reforestation, and methane gas conversion into other energy sources. The supplementary

income obtained with the carbon credit sale is to be invested in environmental enhancement of the farms, as determined in the contracts.

4. Final considerations

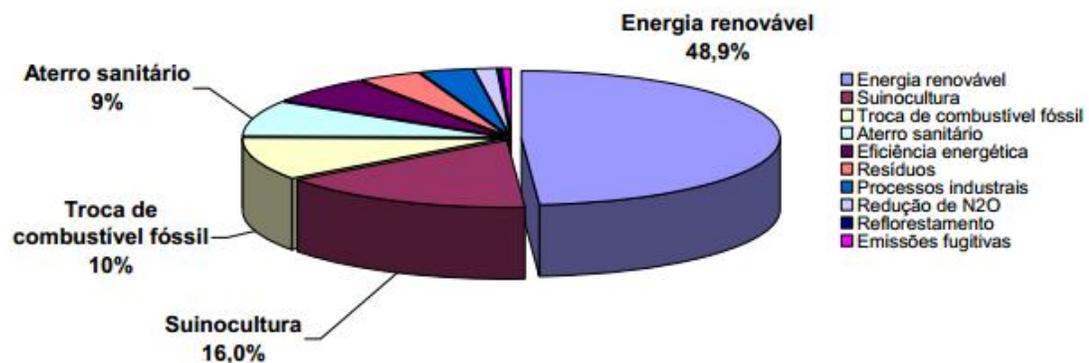
Despite the fact the 3S Program has been implemented for six years, there is still insufficient data available for the general public, both in terms of presenting the program and displaying its operation results. As informed by Sadia, so far the Sadia Institute has not received any amount for the greenhouse gases emission reductions, when consulted about current carbon dioxide emissions, carbon dioxide emission reductions, and carbon credit trading. It is also important to know what proportion these carbon credits represent in the corporate swine production carbon footprint. Since the project has been registered recently, it is still in the accreditation stage. During this phase, monitoring of emissions occurs, followed by the first project monitoring verification and the demand for CERs emissions for sale on the carbon credit trading market.

Therefore, for the effective evaluation of results, a future further analysis is recommended. Another point of consideration is the effect of the merging Sadia-Perdigão on the program. When consulted, the company claimed the issue would be addressed and evaluated by the company corporative board, upon the approval of the merge by the CADE, the Brazilian Antitrust Committee. However, it also claimed the program permitted the incorporation of new facilities by any of the companies. The merge was approved last year.

The company website informs Sadia is responsible for the emission of 17,8 KG of CO₂ / ton. Considering the 3S Program represents 389,000 tons of carbon dioxide emission reduction, the program implementation may contribute to the mitigation of the effects brought by the CO₂ emissions produced by the company activities. Furthermore, the program is associated to the market strategies followed by Sadia: it accomplishes a moral role, facing the environmental impact produced by the company. Also, a green corporate image brings benefits to the company, through its values of sustainability, corporate social responsibility, and consequently, higher market competitive advantage.

Thereby, the Brazilian performance may represent a possible role of environmental power for the country. Besides, in the carbon credit trading project category, the swine production sector represents the second in number of projects, having 16% of the implemented projects (see Figure 2), and the fourth in carbon dioxide emission reductions (see Figure 3).

Figure 2. Distribution of CDM Project Activities by Sector



Source: Science and Technology Ministry, “Current Status of Activities in Clean Development Mechanism Projects (CDM) in Brazil and in the World” Report (2009).

Figure 3. Distribution of Project Activities by Project Category in Brazil

Projetos em Validação/Aprovação	Número de projetos	Redução anual de emissão	Redução de emissão no 1º período de obtenção de crédito	Número de projetos	Redução anual de emissão	Redução de emissão no 1º período de obtenção de crédito
Energia renovável	205	17.785.417	130.444.819	49%	38%	35%
Suinocultura	67	3.913.156	36.348.405	16%	8%	10%
Troca de combustível fóssil	43	3.246.186	27.129.190	10%	7%	7%
Aterro Sanitário	36	11.327.606	84.210.095	9%	24%	23%
Eficiência Energética	28	2.027.173	19.853.258	7%	4%	5%
Resíduos	17	646.833	5.002.110	4%	1%	1%
Processos industriais	14	1.002.940	7.449.083	3%	2%	2%
Redução de N2O	5	6.373.896	44.617.272	1%	14%	12%
Reflorestamento	2	434.438	13.033.140	0,5%	1%	4%
Emissões fugitivas	2	42.336	296.352	0,5%	0,1%	0,1%

Source: Science and Technology Ministry, “Current Status of Activities in Clean Development Mechanism Projects (CDM) in Brazil and in the World” Report (2009).

Another relevant point for this project analysis is its being mentioned in the UNDP Report (2008) *Creating Value for All: Strategies for Doing Business with the Poor*. In the report, the 3S Program is described as a growing inclusive market business model since it “transformed the lives of its small swine suppliers by monetizing carbon emissions from swine” (page 16). In addition, it is a CDM project, mechanism resulting from a Brazilian initiative for greenhouse gases emission reduction.

Considering the fact the 3S Program by Sadia is in compliance with sustainable development principles and that it invests in bio-fertilizer production by means of bio-digestion systems, it is integrated with corporate sustainability matters. It also acts in cooperation with the Brazilian economic interests, when it refers to reaching greenhouses gases emission reduction targets.

Consequently, this study has the purpose of presenting a preliminary view of a CDM project case study, more specifically in the swine production sector, apart from the corporate reasons for such a choice: “(...) economic interests, altruism, political activism, idealism, religious values, citizenship, environmental concern, violence issues” (MULLER, 2006). The subject choice lies in the program relevance for the Brazilian sustainability matrix and in its contribution to reducing greenhouse gases emissions into the atmosphere.

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