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Title: Environmental projects and Institutional Economics: Clean Development Mechanism, overview and performance

Summary

One of the most relevant agreements that tried to solve greenhouse gases (GHG) increase was the United Nations Framework Convention on Climate Change (UNFCCC), which took place in 1992. This meeting established countries debate regarding to act together to solve GHG problem.

Annual ones followed this first agreement, and Kyoto Protocol was created during the third one, in 1997, and it serves as basis for subsequent meetings until this days. This treaty determined targets for developed countries (called Annex I) in order to reduce greenhouse gas emissions. To facilitate the fulfillment of the reduction targets, Kyoto Protocol created three trade instruments called flexible mechanisms, and the mechanism that directly affects developing countries is Clean Development Mechanism (CDM) through which industrialized countries can get their reduction commitments by investing in projects that avoid GHG in developing countries. In other words, a developed country has two alternatives according to cost-benefit analysis: to invest in technology more efficient in terms of GHG emissions in their own country, or to use Kyoto flexible mechanisms.

Due to Kyoto Protocol complexity and importance, this article is developed in order to show CDM projects establishment and to analyze the Clean Development Mechanism performance in an Institutional Economics view. This research includes secondary and primary data survey related to CDM global projects to fulfill these purpose.

The global data survey is related to Clean Development Mechanism projects with Certified issued until March, 2009. The source includes official information from UNFCCC and UNEP Risoe Centre on Energy, Climate and Sustainable Development (GODOY, 2009; RISOE, 2009, online; UNFCCC, 2010, online). Global data analysis showed that most important countries in terms of number of projects are India, China, Brazil, but depending on the variable analyzed (for instance, emission reduction volume) this ranking could change. The most relevant sectors in emission reduction volume were HFCs, N2O,

but when analyzed number of projects, biomass is the most relevant, followed by hydroelectric and wind energy.

Other conclusion of this research refers to CDMs performance, called Reduction Success (RS) and is here defined as the measure that quantifies the percentage compliance of emission reductions compared with what was estimated by the proponent before the CDM has been approved. When considering CDM performance in term of number of projects, most CDMs did not fulfill total reduction estimation. However, in terms of emission reductions amount, most of the projects achieve more than 91% of RS. Most efficient sector around the world are HFC and N2O (in Brazil, N2O and fossil fuel), and least efficient sectors are solid waste and agriculture (in Brazil, agriculture and solid waste).

Besides CDM global data survey, interviews were conducted with Brazilian companies that had Certified Emission Reduction (carbon credit) issued by March 2009, and it is equal to 89 CDM projects. 86 CDM proponents were contacted, and 41 returned the survey (46%). The interviews were based on questions about the probably reasons that could affect RS and could be barriers to develop a CDM. Basically, CDM developers were questioned if they had problems related to: find CDM information; understand CDM process; negotiation; CDM organization relationships; CDM future; CDM rules; CDM fee payments; carbon credit trade. This research also concludes that transaction costs affect the success of CDM emission reductions, and the most relevant are *ex-ante* costs, mainly resulting from information problem gaps, measurement and monitoring problems.

Key-words: CDM, Clean Development Mechanism, Institutional Economics, institutions, New Institutional Economics, NEI, transaction cost, carbon credit, Kyoto Protocol, carbon market

Abstract

Due to Kyoto Protocol complexity and importance, this article was developed in order to show CDM projects establishment and to analyze the Clean Development Mechanism performance in an Institutional Economics view. This research includes secondary and primary data survey related to CDM projects to fulfill these purpose.

Global data analysis showed that the most important countries in terms of number of projects are India, China, Brazil, but depending on the variable analyzed (for instance, emission reduction volume) this ranking could change. The most relevant sectors in emission reduction volume were HFCs, N2O, but this would change when we analyze number of projects, where biomass would come first, followed by hydroelectric and wind energy.

When considering CDM performance (Reduction Success – RS) in number of projects, most CDMs did not fulfill total reduction estimation. Reduction Success is here defined as the measure that quantifies the percentage compliance of emission reductions compared with what was estimated by the proponent before the CDM has been approved. However, in terms of emission reductions amount, most of the projects achieve more than 91% RS. The most efficient sectors in the world are HFC and N2O (in Brazil, N2O and fossil fuel), and the least efficient sectors are solid waste and agriculture (in Brazil, agriculture and solid waste).

Besides CDM global data survey, interviews were conducted with Brazilian companies that had Certified Emission Reduction (carbon credit) issued by March 2009, and it is equal to 89 CDM projects. 86 CDM proponents were contacted, and 41 returned the survey (46%). The interviews were based on questions about the probably reasons that could affect RS and could be barriers to develop a CDM. Basically, CDM developers were questioned if they had problems related to: find CDM information; understand CDM process; negotiation; CDM organization relationships; CDM future; CDM rules; CDM fee payments; carbon credit trade.

This research also concludes that transaction costs affect the success of CDM emission reductions, and the most relevant are ex-ante costs, mainly resulting from information problem gaps, measurement and monitoring problems.

Introduction

In last years, environmental subjects have been becoming more discussed and disseminated around the world. Due to research development, scientists classifie human activities as major global warming (GW) responsible, consequently, an important climate changes cause.

One of the most relevant agreement that tried to solve greenhouse gases (GHG) increase, was the United Nations Framework Convention on Climate Change (UNFCCC), which took place in 1992. This meeting established countries debate regarding to act together to solve GHG problem. Until this days, UNFCCC serves as framework for many ideas related to environmental issues.

This first agreement was followed by annual ones, and the Kyoto Protocol was created during the third, in 1997. The treaty determined targets for developed countries (called Annex I) in order to reduce greenhouse gas emissions, and it served as basis for subsequent meetings. As a result, carbon markets could emerge, being possible to develop emission reductions certificates trade.

To facilitate the fulfillment of the reduction targets, Kyoto Protocol created three trade instruments called flexible mechanisms, and the one that directly affects developing countries is Clean Development Mechanism (CDM) through which industrialized countries can invest in projects that avoid GHG in developing countries. Thus, developed countries can buy certified emission reductions from developing countries (UNFCCC, 1998). In other words, a developed country will have two alternatives for achieving the goals according to their cost-benefit analysis: investing in more efficient technology in terms of GHG emissions in their own country or use Kyoto flexible mechanisms.

Firstly, this article claims to show an overview of global CDM, analyzing the project performance (here defined as a comparative between CDM estimated emission reduction and reductions really obtained). Besides that, based on the New Institutional Economics, the focus of this research is also to identify transaction costs in Brazilian CDM (Clean Development Mechanism, a Kyoto Protocol instrument) projects and investigate if they can affect project efficiency. In order to fulfill these goals, this research includes secondary and primary data survey related to Brazilian CDM projects.

1- Clean Development Mechanism and carbon credit market

The Intergovernmental Panel on Climate Changes (IPCC) is a huge responsible in agregate many scientific estudies related to Climate Change. IPCC was established in 1988 by the United Nations Environment Program and the World Meteorological Organization. The first report released was published in 1990, the second in 1995, the other in 2001 and a fourth in 2007. The IPCC is composed by researchers from United Nations countries that examine critically the scientific and technical literature existing globally and publishes reports with all conclusions about the studies (IPCC, 2008, online).

Based on the first IPCC report, in 1990, the United Nation General Assembly established the Intergovernmental Negotiating Committee, responsible for drafting the United Nations Framework Convention on Climate Change - UNFCCC, signed in 1992, during Rio-92 meeting (UNFCCC, 2010). The 3rd conference was held in 1997 in Japan resulting in the Kyoto Protocol. In the last meeting which took place in 2010 there was much discussion about greenhouse gas emissions reduction goals for developing countries and about forest carbon credits, without, however, any final approval being reached and therefore no significant changes to the main Kyoto Protocol assumptions. Still today, the emission reductions current rules agreed by the signatory countries, still follow the main Kyoto guidelines.

1.1. Kyoto Protocol principles

The Kyoto treaty introduced economic tools in order to assist goals fulfillment and principles established by United Nations Framework Convention on Climate Change. The main conclusion established that developed countries and Economies in Transition (Annex I) should reduce reenhouse gases (GHGs) emissions by at least 5.2% between 2008 and 2012 when compared to 1990. To facilitate the reduction target fulfillment, the Kyoto Protocol created trade instruments called flexible mechanisms, by which an Annex I country may overcome emissions limit, if at the same time it provides an equivalent reduction in other country, ensuring there is no global net emissions increase (UNFCCC, 1998).

In other words an Annex I country will have two alternatives for achieve the goals, according to their cost-benefit analysis: invest in more efficient technology in terms of GHG emissions in their own country or to use Kyoto flexible mechanisms.

Flexible mechanisms establish specific rules and organizations, and they are: Joint Implementation (JI), Emissions Trading (ET) and the Clean Development Mechanism (CDM). The three instruments allow the carbon market creation and development.

Joint Implementation allows industrialized countries to offset their emissions by participating in projects and sinks in other Annex I countries.

The Emissions Trading allow developed countries to negotiate among themselves emission quotas agreed in Kyoto, whereby countries with emissions greater than their quotas can buy carbon credits to cover such excess (UNFCCC, 1998; PEREIRA, 2002; ROCHA, 2003).

Finally, the mechanism that directly affects developing countries, Clean Development Mechanism (CDM), through which industrialized countries can get their reduction commitments by investing in projects that avoid greenhouse gases emissions in developing countries.

CDM project implementation cycle

A proponent interested in an emissions reduction project in a developing country must go through a measurement and verification process with various institutions and organizations previously established.

CDM project cycle stages:

1 - A company should draw up a document with all project description, including its objectives, the implementation methodology, and project monitoring process, proving project relevance; besides that it has to provide environmental impacts analysis and calculations description with emissions reduction estimative. This document is called Project Design Document, PDD.

2 - The second step is validation. PDD must be reviewed by an auditing company, the Designated Operational Entities (DOE), resulting in the project validation. This organization is a national or international certification body accredited by CDM Executive Board.

3 - Once validated, in the next stage the document is forwarded to the Designated National Authority (DNA) for approval. DNA differs in each country, and should approve the eligible projects under the CDM principles. At this point, the project is opened to comments and suggestions from stakeholder, and only then it will be sent to the Committee to be approved. Within the stakeholder (any interest groups in society) are included NGOs (nongovernmental organizations) and the general population.

4 - The fourth step is the registration of the project, in which the DOE submits PDD to the Executive Committee for approval and registration.

5 - Once registered, the project has to be monitored. The DOE will verify if greenhouse gas emission reduction is occurring or not.

6 - The sixth stage is the certification, in which the DOE must report if project activity fulfills the emission reductions estimated initially. The certification ensures that GHG emission reductions were in fact additional, that means that would not occur in the absence of the CDM project.

7 - Finally, carbon credits are issued. The certification report shall include a request to the Executive Committee to issue a RCEs amount (Reduction Certificate Emission) corresponding to the total CDM project activity emissions reduced. So, a carbon market can arise (UNFCCC, 1998).

2. New Institutional Economics

First of all, institutional economics studies are not monolithic, but all approaches agree about considering institutions as a significant economic development factor. Institutional arrangements are very important in order to understand economic problems, due to that they can affect performance, efficiency, and resource allocation in the economy. Institutions are consequence of social and collective decision process and are endogenous to the system. (COASE, 1937; ZYLBERSZTAJN, 2002).

In an Institutional Economics point of view, market information is imperfect and asymmetric, and because of the uncertainties about the transactions it is possible to emerge conflicts among parties. So, institutions appear to bear markets in order to guide actors' action, helping human interaction (COASE, 1937).

Institutions are defined as rules, laws, and contracts. They work as market structure, and have to be internalized, absorbed by society in order to become routine, commitment, thereby making Citizen habits (COLEMAN, 1988).

Social changes related to environment depend on historical moment. During Industrial Revolution, for example, the majority society and governments concern was economic increase above any other interest. Countries' economies were increasing and many polluted factories and industries were been created. Environmental concerns as GHG emissions problems were not part of thoughts societies. Otherwise, nowadays are more feasible incorporate changes related to environment problems due to it is a historical moment with much more concern about climate change than in the time of Industrial Revolution (GODOY, 2010).

New Institutional Economics (NIE) seeks to explain persistence of inefficient outcomes observed in economy, and concludes basically that these are the result of property rights bad definitions and the

existence of institutions faults, which do not induce the agents to move to efficient points. NIE main concerns are: property rights, externalities, transaction costs, institutions and organizations.

Drawing a parallel with carbon trade, market failure or success depends not only on the rules definitions, but also depends on region particularities in which an emission reduction project will be implemented. In other words, the culture, customs and local habits have direct influence in the way the rules will be absorbed by society. In relation to Clean Development Mechanism projects besides global rules, there are a huge amount of organizations and institutions (such as environmental law, auditing company, government ministries, NGOs) that are defined internally in each nation, considering their specific characteristics. So, CDM framework is composed by organizations and international standards, applied to all signatory countries, but also there are specific rules and organizations defined internally in each nation.

Some examples of general rules in the Kyoto Protocol are: the reduction targets; norms about flexible mechanisms; GHG that could be reduced and the kind of reduction projects that is eligible. And the specific rules: the way that each country will reduce emissions; how many projects inside and outside the country will be developed; it will have incentives for companies or not; the country will use or won't secondary market for carbon credits.

Another CDM local characteristic is the fact that a project is approved just after being verified by an auditing company (DOE), although it could be a multinational, it has to be located in a country where the CDM will be developed. Each country auditing has to analyze and consider region particularities, and then approve the project. Another point that considers each local characteristic is related to definition of sustainable development (SD). CDM can be implemented, and hence carbon credits can be issued, just if applicants ensure SD for host country of the project. The general definition of what Sustainable Development means is determined by general rules in the Kyoto Protocol, but it is up to each country to define, through their considerations and justifications about what comes to be that premise.

The geographical features of countries also determine their attitudes toward climate change. Countries most engaged in the GHG mitigation measures, such as England, Denmark and Japan are more likely to suffer the negative consequences of global warming, and, therefore, collaborate more actively in emissions reduction programs (IPCC, 2008).

Externalities

The first economics approach related to environmental problems was made by Alfred Marshall (1842-1924), pointing microeconomic aspects of environmental concerns. The author introduced the concept of "internal economies" resulting from the scale and production organization, and "external economies" (externalities) resulting from indirect production.

Externalities arise when the goods consumption or production generate adverse effects (negative externalities) or benefits (positive externality) to other consumers, and those are not reflected in prices, so it could emerge economy inefficiency.

Negative externalities arise when companies' activities can generate negative results to others. Externalities emerge as an imprecise definition of private property rights. Air pollution is a typical negative externality example, because it causes harm to others, even if they are not responsible for the damage. The carbon market with a clear definition of property rights seeks to internalize these externalities. The air is a public good, a common society property resource, and it is difficult to measure and trade it, thus the carbon market is an attempt to define the rights related to air pollution (MULLER, 2002; PINDYCK and RUBINFELD, 1999). Greenhouse gases are typical externality, and Kyoto Protocol by using their mechanisms, allow pricing emission reduction creating carbon market.

Property Rights

In NIE point of view property rights is defined as the set of laws that describes what people and companies can do with their properties, and arises in order to internalize externalities when internalization gains are greater than their costs (COASE, 1960; DEMSETZ, 1967).

If property rights are properly established and determined, they insure to owners, rights over their assets, thus they are allowed to replace and use them. However, in a market exchange, the friction caused by asymmetric information can avoid goods to be trade at zero cost, thus externalities could emerge so-called transaction costs, such as: drafting contracts, obtaining new information on the product and competitors, bargaining, conducting negotiations, and monitoring the process.

Coase suggests what is known as 'Coase Theorem', that says that in the absence of transaction costs, the initial distribution or property rights allocation among the parties occur naturally in the trade negotiation. So, free market regulates economy, once transaction costs are low enough and property rights are well defined and tradable. In this case, it is not necessary that Governments define property rights, due to the result could be worse than those voluntarily achieved by economic agents. But, if there

are transaction costs, resources will be misallocated, and it will be necessary alternative ways of institutions and organizations in order to solve this problem. Still to Coase, the best agreement is one that minimizes the social loss and the transaction costs (COASE, 1960, NORTH, 1990; WILLIAMSON, 1985; ZYLBERSZTAJN, 2002).

Williamson (1993, 1985) divide transaction cost into: *ex-ante,* the cost necessary to find information; to prepare and draft contracts; to negotiate and safeguarding an agreement; and the *ex-post* costs, those costs arising from adjustments, if it is necessary, to the terms originally proposed in an agreement.

Other authors who study the influence of transaction costs in the markets show some different definitions. As Kenneth Arrow, who considers "the costs necessary to put the economic system in operation" Yoram Barzel states that are "the costs associated with the transfer, capture and rights protection" (apud CONEJERO, 2006). Despite the various explanations, all authors have in common the fact that considers institutions importance in reducing the costs that could arise.

International agreements that seek GHG emission reductions as Kyoto Protocol, through its rules and definitions, define property rights by determining emissions reduction level, and by defining which countries should fulfill targets. The emission rights is translated in carbon credits, which primarily belongs to the company that reduce its emissions. And who will buy this certificate, who will be the new property right owner can be determined *ex-ante* or *ex-post* reductions verification, depending on the free negotiation between interested parties. In other words, this means that carbon credits can be sold even before they are issued, anticipating resources sales, or only sell them when the emission reduction is really verified. And those buyers usually are: Governments interested in reducing greenhouse gas emissions; private companies; intermediaries such as banks, and consulting companies. Thus, through carbon market, agents trade rights previously determined, supported by an institutional and organizational apparatus created to provide transactions ground.

Institutions and organizations

Douglas North (1990) defines institutions as 'rules of the game' and organizations as 'players'. Institutions determine the way of leaving, the set of opportunities, the organizations that will be created and how they will be connected. They create incentives and constraints for transactions happen and cover political, economic and social relationship.

Organizations are defined as the number of people with a common interest that give structure in order to coordinate individual action. They are governed by an institutional established apparatus, and are necessary when individual actions are disorganized, less efficient or more costly, and a great problem is define which organization minimizes the agreement costs. Not forgetting, conflict interests can arise in the same organization and arrangement, but these structures can be changed in order to adapt to the reality (NORTH, 1990).

The institutions and organizations provide, therefore, the markets mainframe, which is where transactions will take place. The way the relationships between the rules and organization occur determines the structure of economic relations. The success or failure depends on the used technology, the activities nature, the kind of actors involved, and how they are established.

Different global arrangements established to seek GHG emission reduction have different organizations and standards that serve as the basis for fulfill the goals, and often, it's required a large number of arrangements to guarantee that. Carbon markets is a result of an original apparatus filled with well-established rules and organizations, in order to ensure the proper transactions trade.

Debates, complex ideas and interests are vital to the development of any market, such as carbon trade. The emergence of new solutions and arrangements requires new procedures, followed by new forms of institutions and organizations. In light of these, Kyoto Protocol promotes annual and quarterly meetings, allowing stakeholders participation in order to help to find new solutions. This is an example that the principle of learning by doing is an improvement tool. This is not a success guarantee, and nor that never will have failure and opportunism, or problems such as excessive bureaucracy, but the fact is that such agreement assumes that adaptation and researches all the time are necessary to achieve best results.

3. Global CDM data survey

The global data survey includes Clean Development Mechanism projects with Emission Reduction Certified issued until March, 2009. The source includes official information from UNFCCC and UNEP Risoe Centre on Energy, Climate and Sustainable Development (GODOY, 2009; RISOE, 2009, online; UNFCCC, 2010, online). Global data analysis showed that there are 33 countries with CDM projects, and 472 projects around the world.

Most important countries in terms of number of projects are India, China, Brazil, but analysing emission reduction volume this ranking change. **78%** of the CDM global market share belongs to these

three countries: India, 37%; China, 22%; Brazil, 19%. Analyzing CERs volume, there is a change in this rank, mainly because of high volume of some South Korea projects (China - 43%; India - 23%; South Korea - 14%; Brazil - 11%).

Most relevant sectors in emission reduction volume were HFCs, N2O, but when analyzed number of projects biomass come first, followed by hydroelectric and wind energy.

Analyzing CDM performance, Reduction Success is here diefined as the measure that quantifies the percentage compliance of emission reductions compared with what was estimated by the proponent before the CDM has been approved. In number of projects, most CDMs did not fulfill total reduction estimation. Only **26%** of CDM projects have RS between 91% and 110%, and most projects **(57%)** fulfill less than 90% of emission reduction estimated. However, in terms of emission reductions volume, this distribution changes, most of the projects achieving more than 91% RS: there are **47%** of projects between 91% and 110% RS and only **16%** of total less than 90%.

Finally, in terms of sector, the most efficient sectors in the world are HFC and N2O (in Brazil, N2O and fossil fuel), and the least efficient sectors are solid waste and agriculture (in Brazil, agriculture and solid waste).

4. Brazilian CDM data survey

This topic is developed to show the reasons that could affect Reduction Success (RS) from CDM projects in Brazil, indentifying if transaction costs could influence these differences; and if transaction costs could be barriers to develop a CDM project. As described on the topic 1 in this article, first of all, a CDM proponent has to estimate the emission reduction that it plans to decrease. After a project has been developed it is necessary to verify and to monitor the emission reductions that really were reduced.

The Reduction Success quantifies the share of effective emission reductions compared to emission reductions estimated. 52% of Brazilian CDM project fulfill by 90% of what they estimated that a CDM project would reduce (other countries have similar percentage, 55% of the projects fullfill by 90% SR) (RISOE, 2009, *online*; UNFCCC, 2010, *online*). So, it is possible to indentify which transaction costs are more relevant to influence these differences.

In order to achieve this purpose, interviews were conducted with Brazilian companies that had Certified Emission Reduction (carbon credit) (the interwei model is in Annex 1) issued by March 2009, and it is equal to 89 CDM projects. 86 CDM proponents were contacted, and 41 returned the survey (46%). The interviews were based on questions about the probably reasons that could affect SR and

could be barriers to develop a CDM. Basically, CDM developers were questioned if they had problems related to: find CDM information; understand CDM process; negociation; CDM organization relationships; CDM future; CDM rules; CDM fee payments; carbon credit trade.

CDM Transaction cost analyses

Williamson (1993, 1985) defines transaction cost as: *ex-ante*, and *ex-post*, as explain in topic 2 in this article. A CDM project implementation could be considered as this view, such as:

- E*x-ante* costs

Information costs, those resulted from information searched by CDM proponent in order to understand how to develop a project. In this case, for instance, if there is lack of information, wrong choices of a particular CDM methodology or project technology can occur.

Intermediaries costs, those related to intermediary organizations that mediate the CDM process (for instance, fees that have to be payed with consulting and auditing companies).[1]

Other costs, such as those resulted from period between PDD (inicial document) preparation and the project implementation.

Trading costs or **contracts preparation,** are those resulted from document arrangement before project implementation, and could be costs caused by carbon credit trade, for instance, resulted for buyer and seller negociation.

- *Ex-post* costs

Those costs caused after the CDM project implementation, such as costs related to project monitoring. Other example are costs that can emerge from changes that may occur after 2012, and hence would require amendments to adapt contracts and possible changes in the CDM project itself.

Based on this classification, CDM analyses could be made in order to identify which of these costs have more significant influence as barriers to project implementation, and as determinants of the CDM efficiency (Reduction Success).

According with the interviewed opinions, the excessive bureaucracy, a transaction cost problem, resulted from several steps that a CDM proponent must follow is the biggest problem as impediment to develop a CDM project. Another reason that appears with a high amount of answers result from the uncertainty about what will happen to the future of the CDM, and the changes that could be necessary to

[1] More details related to CDM cycle, organization and rules see topic 1 from this article.

make in the CDM contracts, in the projects and in carbon trade. This kind of cost could be considered as *ex-post* transaction costs.

Interviewed also widely reported that they are concern about problems related to the complexity, lack of clarity and constant modification of existing methodologies in a CDM project. Besides that, there are methodologies that are updated constantly, difficulting the project implementation. Other important interviewed complain was about the huge CDM expenses related to payments that a project owner has to do as: auditing company payment; register payment; aproving CDM, and other mandatory expenses. So, *ex-ante* costs, more specifcly, information and intermediaries costs.

Some interviewed also reported that in some cases the time to audit and validate the projects is too long, and can delay the process causing more transaction costs and uncertainty for CDM proponents.
Regarding the differences between CDM estimated emission reduction and reductions indeed (Reduction Success) according to most interviewed the transaction costs play an important role in attempting to explain the RS discrepancies. The more relevant transaction costs are those related to information costs and costs of measuring and monitoring the CDM projects. Related to CDM information, most interviewed aggree about the fact that CDM rules should be more objective and simple. Interviewed point that the CDM disclousure should be more disseminated in order to increase the knowledge in people interested in emission reduction projects. Still related to lack of information, most interviewed found difficulties in understanding the process of the CDM. In fact, it is a complex process with many stages, organizations, international legal documents, and often it is necessary to have private consulting companies in order to support CDM proponent.

Although transaction costs are really present in CDM project implementation, UNFCCC is awere about that. One example is that CDM Executive Board established the programmatic CDM, an alternative through which several CDM proponents with specific project characteristics could make only one contract to request, not being necessary different process for each CDM interested. This is a great tool, although it is incipient this subject has been debated widely. Besides that, it is important to enphasize the frequent meetings in order to find better solutions to CDM improvement.

Conclusion

Kyoto Protocol emergence as an attempt to minimize excessive gases emission. An institutional apparatus with complex rules and organizations are demanded to support a global agreement between

parties with different situations. Rules, norms, regulations, contracts are necessary to support carbon market, and they set out the rights and obligations at an international level. New Institutional Economics offer useful explanations, in order to understand CDM projects establishment.

The understanding of Protocol and other agreement that follow it, is very complex, once they are documents that use technical language based on international law. There are so many rules, and nto always clear and direct,resulting in debates that have been occurring since the first meeting. This is reflected in CDM developers opinion, related to problems in obtaining information about the project development.

While it is necessary an institutional apparatus in order to avoid opportunism transaction costs could emerge in CDM project cycle affecting CDM efficiency. Transaction costs analyzed, both *ex-ante* and *ex-post* (Williamson, 1983; Williamson, 1995) can affect the Brazilians CDM Reduction Success. This research concludes that transaction costs could affect the success of CDM GHG reductions, and the most relevant are *ex-ante* costs, resulting from information problem gaps, measurement and monitoring problems (as CDM methodologies).

Transaction costs also can be considered as barriers to implement a CDM project. Besides costs related to mandatories fees (registration fees, auditing payment), other transaction costs also influence the decision to implement a CDM. They are mainly costs resulted from burocracy, information problems and uncertainties about the future of the CDM.

This survey also conclude that most important countries in terms of number of projects are India, China, Brazil, but depending on the variable analyzed, for instance, emission reduction volume, this ranking could change. The most relevant sectors in emission reduction volume were HFCs, N2O, but when analyzed number of projects biomass is the first, followed by hydroelectric and wind energy.

When considering CDM performance (Reduction Success – RS) in number of projects, most CDMs did not fulfill total reduction estimation. However, in terms of emission reductions amount, most of the projects achieve more than 91% RS. The most efficient sectors in the world are HFC and N2O (in Brazil, N2O and fossil fuel), and the least efficient sectors are solid waste and agriculture (in Brazil, agriculture and solid waste).

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Annex 1 - Model of the questionnaire issued to Brazilian companies interview:

A-Nos quadros abaixo, marcar um (X) o grau de contribuição mais adequado:

1- Classificar os motivos que influenciaram a decisão de sua empresa implantar um MDL:

		GRAU DE CONTRIBUIÇÃO				
		muito	não muito	pouco	muito pouco	nada
0.1.	Venda dos CERs (Certificados de Emissão Reduzidas)					
0.2.	*Marketing*/visibilidade da empresa					
0.3.	MDL abre oportunidades para outros tipos de empréstimos					
0.4.	O MDL traz melhorias tecnológicas p/ produção além do benefício ambiental					
0.5.	Interesse da Matriz estrangeira (caso haja)					
0.6.	Benefícios socias (ex.criação de empregos)					
0.7.	Pressão dos acionistas					
0.8.	Movimento social/mídia					
0.9.	Influência/incentivo do Governo					
1.0.	A empresa que sempre teve interesses de melhorias ambientais					
1.1.	Acompanhar o movimento de empresas do mesmo setor					
1.2.	Informações em relação ao MDL eram mais claras que os outros programas de redução de emissões					

2- Em geral, os projetos de MDL brasileiros e nos outros países apresentam diferenças entre as reduções de emissões propostas nos DCP's e as observadas depois do monitoramento/certificação. Na sua opinião, qual a contribuição das variáveis abaixo para a explicação das diferenças no seu projeto, caso ocorram? (informações disponíveis nos relatórios de certificação e nos DCPs que constam no site: www.UNFCCC.int).

		GRAU DE CONTRIBUIÇÃO				
		muito	**não muito**	**pouco**	**muito pouco**	**nada**
1.3.	**Tecnologia aplicada no projeto**					
1.4.	**Tecnologia de medição das reduções de emissões**					
1.5.	**Eficiência da empresa de engenharia que implantou o projeto**					
1.6.	**Eficiência da consultoria contratada**					
1.7.	**Eficiência da Entidade Operacional Designada**					
1.8.	**Tipo/setor do projeto**					
1.9.	**Escala do projeto**					
2.0.	**Prazo entre entrega do DCP e monitoramento**					
2.1.	**Metodologia de linha de base utilizada**					
2.2.	**O valor apresentado no DCP foi superestimado para trabalhar com margem de segurança**					
2.3.	**Falta de *know-how* inicial**					

Outros_____
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3- Em todo processo de implantação do MDL, sua empresa encontrou barreiras e/ou dificuldades em relação à:

	CLASSIFICAÇÃO				
	muito	**não muito**	**pouco**	**muito pouco**	**nada**
2.4. Elaboração do DCP de maneira geral					
2.5. Comprovação da adicionalidade do projeto					
2.6. Preenchimento do Teste de adicionalidade					
2.7. Validação do DCP de maneira geral					
2.8. Validação do DCP por problemas com a Entidade Operacional Designada (EOD)					
2.9. Aprovação do DCP de maneira geral					
3.0. Aprovação do DCP por problemas com a Autoridade Nacional Designada (AND)					
3.1. Registro do projeto de maneira geral					
3.2. Registro do projeto por problemas de entendimento com o Comitê Executivo do MDL					
3.3. Monitoramento do projeto					
3.4. Certificação do projeto					
3.5. Emissão dos certificados					
3.6. Venda dos certificados					
3.7. Consultorias contratadas					
3.8. Legislação Ambiental					
3.9. Obtenção de informações sobre MDL					

4- Na sua opinião, em que grau (de 0 à 5) as variáveis abaixo contribuiriam para impedir que sua empresa implantasse um novo projeto de MDL:

a. ( ) Excesso de burocracia
b. ( ) Alto custo de implantação
c. ( ) Alto custo decorrente do ciclo do MDL (aprovação, certificação, registro, etc)
d. ( ) Baixo ganho com as vendas dos CER's
e. ( ) Dificuldade de importação de tecnologia e *know-how* dos países desenvolvidos
f. ( ) Dificuldade em vender os CER's
g. ( ) Falta de financiamento
h. ( ) Interesse em outras alternativas mais lucrativas de reduções de emissões
i. ( ) Incerteza sobre validade dos CER's pós 2012

Outros_____

5- O que poderia ser modificado para melhorar o processo de MDL, ou para que mais empresas façam projetos de MDL no Brasil?

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