

Measurement of Results from Investments in Clean Development mechanisms and Carbon Credit Generation

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This paper demonstrates the financial results generated by investments in clean development mechanisms (CDM) and in carbon credit generation (CCG) projects. The research was carried out in a big Brazilian company in the pulp industry, which has policies that are established and implemented in the area of sustainability and that between the years of 2006 and 2012, made significant investments in this area, especially in the creation of a co-generation plant for burning of biomass and the consequent generation of carbon credits, and the implementation of sewage treatment plant that enabled the use of sludge as a fertilizer, a fact that reduced the emission of gases. The investments and the results of the actions directed to CDM and CCG were identified through interviews with managers, monitoring of internal processes and analysis of sustainability and financial reports, the data also allowed the measurement of financial results for the period. The main conclusions were that the company's participation in sustainability projects added value to financial results of the company in the period studied, especially in profitability ratios, asset profitability and return on equity that had their percentages elevated due to revenues obtained from the sale of CO₂ credits.

1. Introduction

In the last decades the concern about environmental issues has been causing public and private entities to adopt strategic actions turned to the implementation and maintenance of clean development mechanisms (CDM) (Castro and Michaelowa, 2010). These projects, however, have high costs, mainly because of bureaucratic factors and of the fees charged to make carbon credit transactions (Moura Filho and Michels, 2013). In this sense, private companies increasingly started to develop sustainable projects, due to the fact that these companies generally seek to optimize results at the lowest cost possible, however, although they have assumed an important role in this context, it was observed that their efforts have managed to reduce cost, but the effectiveness decreased (Lund, 2013). It is also possible to observe that the sustainability aspects constantly increase its distribution and coverage, because its compliance has also been stimulated by the increase of the legal rigor, since the countries started to implement laws that force and punish those who do not develop actions in this area. On the other hand, public pressure also forced organizations to adhere to these practices, in particular those of industrial activity (Sellitto et al., 2011). In many countries CO₂ emissions have been growing significantly in recent years, despite the limits imposed by the Kyoto Protocol (Aichele and Felbermayr, 2013), in contrast, environmental awareness along with development has caused many companies to start investing in sustainability by participating in CDM projects based on the Kyoto protocol, which brought the opportunity to generate and sell carbon credits from investments in technological innovations for companies to reduce the emission of greenhouse gases in their production processes

(Parnphumeesup and Kerr, 2011). In this sense, the adoption of CDM by private companies generates expenses, costs and revenues. These variables may affect the economic and financial situation of these companies. Therefore, the performance measurement of these practices on a daily basis can demonstrate that in addition to meeting legal and social obligations, CDM and CCG can also increase financial results (Pérez-Fortes et al., 2014). Thus, organizations that adopt these projects can make use of performance measurement systems, which are an integral part of organizational management in order to determine and disseminate knowledge through the identification, measurement and integration of the necessary and satisfactory aspects to measure and manage the performance of the strategic objectives of an organization (Nudurupati et al., 2011). Considering this context, the objective of this study is to demonstrate the financial results generated by investments in clean development mechanism (CDM) and carbon credit generation projects (CCG), given that these practices require significant investments, but, on the other hand they provide alternative sources of revenue that can result in economic benefits that are detected through financial indicators of profitability. The development of the study is divided into five parts. Besides the introduction, there is also presentation of the theoretical framework on the subject, followed by the methodological procedures. Next, the research presents the study results and conclusions. At the end the study describes the references used for research on the topic.

2. Theoretical Framework

Social responsibility and culture of practicing sustainable actions can guide the management context of a company since they performed in a structured manner and appropriately communicated internally and externally, because these actions are aimed at fulfilling the social and legal role of business companies (Moreira Pinto and Gaya, 2010). Sustainable processes provide organizations improvement of activities in these areas and insertion of innovative policies in their business that enable rethinking of environmental business models and development of new technologies and products, providing a consequent reduction of costs and increase of revenues (Nidumolu et al., 2009). CDM projects aim to assist countries to achieve sustainable development and achieve their emissions targets cost effectively. Those that adopt the Kyoto Protocol qualify for obtaining credits arising from greenhouse gas emission reduction, which are called certified emission reductions. These credits can be used for companies to meet their reduction targets or even for them to sell these rights in the trading market (Parnphumeesup and Kerr, 2011). The Kyoto Protocol has forced companies to reduce the emission of pollutants from their production processes, however, as many fail to achieve the reduction targets under the Protocol, they need to resort to the purchase of carbon credits generated by companies located in developing countries which implemented CDM projects in order to reduce and eliminate greenhouse gases (GHGs) (Moura Filho and Michels, 2013). In this sense, the Kyoto Protocol established three flexible mechanisms to ensure the reduction of greenhouse gas emissions anywhere in the world. One of them is CDM, which aims to help countries meet their emission reduction targets at the lowest cost. In this context, the adoption of sustainable processes, such as the development and implementation of CDM, makes organizations demand high investments. On the other hand, it allows the sale of carbon credits, a fact that provides alternative sources of revenue, because good environmental performance is a determining factor for valuation of a company in the market, as well as poor performance can lead to the inability to meet the requirements and even determine the failure of a company (Hackl and Harvey, 2014).

2.1 Performance Measurement of CDM and CCG projects

The results of the participation of a company in CDM and CCG projects can be measured from a financial point of view through the use of indicators that show the effects of these actions. The set of indicators combines the performance measurement systems, which are part of the organizational management, considering that they determine and disseminate knowledge through the identification, measurement and integration of the necessary and satisfactory aspects to measure and manage the performance of the strategic objectives of an organization (Nudurupati et al., 2011). The performance measurement is also performed in order to manage and evaluate processes, translating strategic objectives into a set of indicators (Franceschini et al., 2012). In this way, it is closely linked to organizational strategy, given that the metrics used in the measurement should reflect the essence of the organization and demonstrate a balance between financial and non-financial measures (Gunasekaran et al., 2001). The definition of performance indicators that support the measurement process must carefully observe the strategic plans of the organization, otherwise, the process of measurement may be biased because, according to Neely et al. (1995) the measurement metrics are not simple formulas, but rather a set of variables that will make a complete measurement process. The definition of financial indicators should include the analysis of the financial position, using indexes such as participation of third party capital, debt composition, immobilization of equity, immobilization of non-current resources, general, immediate, current and drought liquidity, and the economic situation through asset turn

indicators, net margin or profitability, asset profitability and return on equity. The main source of information on financial indicators of the activities of a business are the financial statements, because even if they do not evaluate all business activities, its financial information plays a significant role in management decisions and define the potential risks and benefits of performance planning (Kotane and Kuzmina-Merlino, 2012).

3. Methodology

To conduct the research the chosen strategy was to divide it into four main steps shown in Figure 1, which were: The first step was the implementation of a focus group. The second deals with the presentational monitoring of internal processes linked to sustainable company policies. Third step consisted on the examination of the 2006 to 2012 sustainability reports and finally, in the fourth stage the accounting and financial information were analyzed.

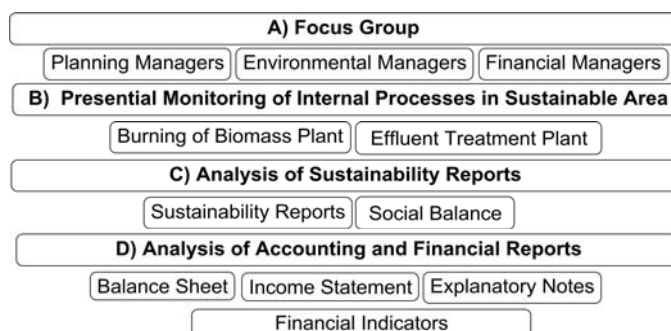


Figure 1: Research Structure

To conduct the focus group eight departmental managers were gathered, four related to the environmental department, two from the planning area, and two from the financial area, aiming to detect which environmental policies the company adopts, as well as to see which projects are implemented or will be implemented in the future, and also to diagnose the company's investment in projects developed and how the results are measured. Then were monitored internal processes and actions that the company adopts towards sustainability practices through the visit to two CDM and CCG projects that the company has which are burning of biomass plant and the effluent treatment plant. In the sequence the sustainability reports were analyzed in detail to identify sustainable investments and actions taken by the company in the period examined. Finally, the income statements were tested in order to make sure of revenue obtained from the sale of carbon credits in the periods of 2006 to 2012, the balance sheet and the explanatory notes in order to identify the impact of investments in sustainability projects, as well as to check the form and used resources.

4. Study Results

The study was conducted in a Brazilian company classified as large according to BNDES 2012 criteria, which operates in the pulp and paper production and that has defined and implemented policies in the area of sustainability. Based on the conducted research strategy it was identified that since 2005 the company started to invest in the development of clean technologies to capture greenhouse gases and to generate carbon credits, starting from the implementation of projects that include sustainable development. The actions developed by the company demanded considerable investments in the years 2006-2012, however, these practices enabled the company to obtain revenue from the sale of carbon credits, Table 1.

Table 1: Investments and revenue from CDM projects

Year	CDM Investment (US\$)	Carbon Credit Revenue (US\$)
2006	3,944,954	1,402,294
2007	1,948,718	948,718
2008	1,803,279	2,786,885
2009	800,000	2,157,000
2010	1,250,000	609,302
2011	958,084	628,743
2012	994,765	553,208
TOTAL	11,699,800	9,086,150

It is observed in the results presented that investments in CDM provided the accumulation of carbon credit, which were sold and generated revenues. In this context, the main projects developed by the company are highlighted, which were the implementation of a cogeneration plant that began in 2006, generating carbon credits through the burning of biomass, and also clean energy, reducing the environmental impact that would be caused by the decomposition of biomass in the environment, since it would generate greenhouse gases. Also, the ashes of the manufacturing process are used as fertilizer in the fields of afforestation. Between 2006 and 2012, certified emission reductions achieved with this project totaled 1,062,208 t of CO₂, which enabled a financial return of \$ 5.4 million from the sale of carbon credits. In addition, it was developed the CDM project of effluent treatment plant that began in 2008, which performs the treatment of waste water used in the production of pulp and paper as it passes through an aerobic process, preventing the sludge to be deposited in the bottom of lakes and generate methane gas. The benefit of this process was that the treated effluent can be directed to a river without damaging organic material and after wastewater treatment, the activated sludge can be used as fertilizer, or deposited in incinerated landfills. Between 2008 and 2012, certified emission reductions obtained with this project totaled 213 607 t of CO₂. The financial return made possible was \$ 3.1 million, coming from the sale of carbon credits. Table 2 presents a comparison between the value of investments in sustainability, the quantity (t) of certified reductions achieved with CDM projects and the value obtained from the sale of carbon credits.

Table 2: Certified Reduction of CO₂ Emissions

Period	CDM Investments (US\$)	Reduction CO ₂ "T" Emission	CO ₂ Sales Revenue(US\$)
2006 a 2012	11,699,800	1,275,815	9,086,150

It is observed that the company invested in large CDM projects, which demanded financial resources every year and also provided revenue in the same period, besides promoting a large reduction in CO₂ emissions. Based on the survey data, the concept of Parnphumeesup and Kerr (2011), which states that the values of traded credits have different values on the market, is also confirmed. Table 3 shows the difference the value of credits of each project.

Table 3: Investments and Revenue of CDM projects

CDM Project	Credits Generated "T"	CO ₂ Sales Revenue (US\$)	Unitary Credit (US\$)
Cogeneration Plant	1,062,208	5,412,844	0.0900
Effluent Treatment	213,607	3,114,754	0.0375

Revenue obtained from the sale of carbon credits positively affected the financial results of the company studied as it is identified in the financial statements of the reported period. Therefore, the following financial indicators were calculated: net margin or profitability, which aims to check how much the company achieved of net profit for each US\$ 1.00 sold, that is, what the profit margin of the company is in terms of its billing. Asset profitability, this indicator shows the potential for generating profits for the company, that is, the net profit obtained for each US\$ 1.00 of total investments. Return on equity, through this indicator it is possible to check how much profit the company achieved for each US\$ 1.00 of equity invested.

Table 4: Financial Measurement Indicators of CDM Projects

Year	Profitability %			Asset Profitability %			Return on equity %		
	C	S	V	C	S	V	C	S	V
2006	0.32	-0.69	1.01	0.29	-0.63	0.92	0.2	-1.98	2.90
2007	4.17	3.64	0.53	3.04	2.66	0.38	13.33	11.64	1.69
2008	-13.96	-15.27	1.31	-9.62	-10.53	0.91	-71.88	-78.64	6.76
2009	11.57	10.44	1.13	8.47	7.64	0.83	62.93	56.77	6.16
2010	7.76	7.52	0.24	3.00	2.91	0.09	12.33	11.95	0.38
2011	1.94	1.73	0.21	0.79	0.70	0.09	2.01	1.78	0.23
2012	5.56	5.24	0.32	2,18	2.10	0.08	5.73	5.52	0.21

For comparison purposes measurement was performed (Table 4) considering the carbon credit revenue (C) and then the measurement without the revenue (S), thus it was possible to identify (V variations) that the sale of credits provided in the financial indicators of the company studied. As for the profitability it was observed that in all the years analyzed revenues from selling CO₂ credits improved the margin of final profit, and, for comparison purposes it was decided to demonstrate even negative results, that is, even in the year of 2008,

when the company reported a loss, the sale of CO₂ reduced that deficit. As for profitability of the asset, it was found that this indicator had its percentage enhanced by obtaining revenues from the sale of CO₂ credits, that is, the resources that the company invested in assets had higher profitability. The return on equity, which determines how much Investments of shareholders yielded, also showed that every year this percentage was leveraged by obtaining revenues from the sale of CO₂. It is also identified with the analysis that in 2008 the company presented a negative change in all financial indicators analyzed, a fact explained by the investment and disbursement performed in this period as a result of CDM projects.

5. Conclusions

The adoption of sustainability programs typically requires high capital investments and high costs, which requires companies to immobilize resources weakening its liquidity and generating new expenses that reduce the financial results. In this sense, this study identified that participation in CDM and CCG projects, in addition to meeting the legal and social obligations, provides the creation of alternative sources of revenue in addition to those arising from the main activity, that is, research shows (Table 1) that investments in sustainable projects generated revenues from the sale of CO₂ credits, which had a positive impact on the financial results of the company studied. It was also noticed that in periods when it was necessary the outlay for implementation of projects, the company was negative in its profitability indicators, however, over the years the investments began to generate revenue, demonstrating the trend that the values obtained with CO₂ commercialization remunerate the investments over time. Finally, the study showed that the company achieved financial gain throughout the study period (2006-2012), as reflects the measurement of financial performance which indicated an increase in the percentage of profitability, caused by the proceeds from the sale of CO₂ credits. Measuring also pointed to a rise in asset profitability, showing that the investments were paid annually, and it still noticed that the profitability of equity investors and partners also increased on account of obtaining this type of alternative revenue. It was also observed that investments in CDM projects were undertaken based on sustainable planning and policy of the organization, which met the legal requirements, but mainly the social issues. In addition, it enabled the company to find a source of revenue coming from actions that are not object of the main business.

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