Disclosing the Consumption of Natural Resources by the Companies through the Eco-efficiency Indicators

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ABSTRACT: This study aims to show, according to the accounting standards, what should or should not be recognized and/or disclosed as environmental liabilities. It also aims to verify through of a real case, the capacity of the Eco-efficiency Indicators of providing information that allow an evaluation of the companies' consumption of natural resources in their activities. The company under study was the Companhia Siderúrgica de Tubarão (CST) within the period from 1999 to 2003. The findings show that the traditional accounting model contemplates the recognition and demonstration of the possible environmental liabilities when companies exceed the legal limits of pollution, and/or when they assume constructive environmental liabilities. We still conclude that the Eco-efficiency Indicators proposed by the ISAR/UNCTAD would meet satisfy, at least partially, society's demands for information that allow an increased control over company's actions regarding the consumption of natural resources within legal and constructive limits. Finally, we emphasize the results are valid only for the searched company, the specific case analyzed.

Keywords: eco-efficiency indicators, natural resources, disclosure.

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1. INTRODUCTION

I In the last decades the depletion of the ozone layer, the global warming, the occurrence of acid rains, the pollution of rivers and seas, the depletion of tropical forests and other factors resulted in a series of efforts aiming to raise people's awareness about the relevance of measures taken to preserve earth's natural resources.

Currently, the need of an ethical and socially responsible attitude has become an axiom under the strict surveillance of not only national and international organizations but also the society as a whole. It can be understood that the focus on environmental protection is included in such attitude.

Several people are worried about corporate performance regarding to the search for profit by overusing endangered natural resources, which are extremely important for the survival of human beings in the long run.

In this context, accounting has been frequently mentioned to be able to highlight to the society the relationship between the companies' search for profit maximization and the environmental impact of such activity, by disclosing the existence or not of environmental liabilities in the financial statements. On the other hand, many authors point out the possible conflicts of interest and also legal restrictions that could prevent the managers of companies from not only recognizing these possible environmental liabilities but also putting them in evidence[1]. HOLTHAUSEN (1994, p211) highlights that from a financial accounting perspective, individuals interested in valuing organizations which are potentially subject to environmental costs must estimate the valuation implications of those environmental costs, and further must be able to estimate the extent to which the financial statements already incorporate accruals for those environmental liabilities.

In order to guide entities and ensure the correct assessment by the users of the accounting information regarding the consumption of natural resources and its environmental impacts two types of action are performed: regulation and supervision.

In terms of accounting standards, the subject is approached by organizations such as the International Accounting Standards Board (IASB), the Financial Accounting Standards Board (FASB), the Brazilian Independent Auditors Institute (IBRACON) among others, mainly in terms of recognition, measurement and disclosure of liabilities, provisions and contingencies. Supervision is performed by the government and non-governmental organizations through inspections and scheduled analysis of the company's activities.

In general, there is a different perception in what is an environmental liability according to accounting standards and what is the understanding of this issue by the society. Usually, there is a delicate association between the pollution generated by the company and the "necessary" existence of an environmental liability to be recognized and reported them. This thin line about understanding of what is an environmental liability and how this information could be used by the companies' external users relates to the motivation of the study developed in the last 20 years by the Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting (ISAR), of the United Nations Conference on Trade and Development (UNCTAD). The ISAR/UNCTAD efforts originated the elaboration and publication of the Eco-efficiency Indicators (UNCTAD/ISAR, 2004)

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[1] Regarding to disclosure of environmental liabilities, we suggest the reading of the following papers: BIACCONIERE & PATTEN (1994), BARTH & McNICHOLS (1994), DYE (1985), FREEDMAN & WASLEY (1990), INGRAM & FRAZIER (1980), LI, RICHARDSON & THORNTON (1997), VERRECCHIA (1990), WAGENHOFER (1990), WISEMAN (1982).

This study aims to contribute towards the subject in two ways: (1) an understanding on what, according to the accounting standards, should or should not be recognized and/or disclosed by the companies; and (2) an application of the Eco-efficiency Indicators to check their capacity of providing information that allow an evaluation of the companies' consumption of natural resources in their activities, what could be called a "moral debt" of the pollutant agents with the society.

In order to better show the benefits of the use and analysis of the Eco-efficiency Indicators, it was considered relevant the use of a real case. The company under study was the Companhia Siderúrgica de Tubarão – CST[2].

2. THEORETICAL BASIS

Accounting consists of three fundamental pillars: recognition, measurement and disclosure of economic events regarding an entity. As a model, accounting incurs in limitations that are part of its characteristic of presenting the economic and financial situation of a company by using financial statements and its notes, in order to give support to its users' decisions and, in doing so, breaking information asymmetry.

As this study focuses on the relationship between the entities and the environment, it is necessary to discuss four sub-topics: (1) environmental liabilities; (2) pollution generated by the productive process and its relationship with the environmental liabilities; (3) the relationship between corporate performance (profitability increase) and environmental liabilities; and (4) the utility of eco-efficiency indicators to supply information demanded by the society.

2.1 Environmental Liabilities

The present discussion is based on some theoretical view of what accounting should be and also on the existing standards. Due to the recent convergence process of accounting standards in the world, the definitions in the IAS 37, published by the IASB[3], were adopted as the fundaments on which liabilities would be recognized by the companies.

HENDRIKSEN & VAN BREDA (2000, p. 671) define liabilities as "probable future sacrifices of the economical benefits resulting from present obligations". According to TEIXEIRA & NOSSA (2003, p. 4), environmental liabilities incorporate the commitment that results in the "probable consumption of future resources to face obligations from environmental issues."

Generally, three characteristics are required so that a liability be recognized: the company has a present obligation as a result of a past event; it is probable the outflow of resources to settle the obligation; and the amount to be paid can be estimated. According to the IAS 37 paragraph 14:

> A provision should be recognised when:
> (a) an enterprise has a present obligation (legal or constructive) as a result of a past event;

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[2] The CST is one of the biggest Steel Companies in Brazil. The present research presents the data regarding the use of water, main natural resource used in the steel making activity.

[5] In 2001 the former International Accounting Standards Committee (IASC) was reformulated and started to be called IASB. As a result, the International Accounting Standards (IAS) corresponds nowadays to the International Financial Reporting Standards (IFRS). Currently, more than 100 countries adopt them or suggest the application of international accounting standards issued by the IASB.

(b) it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation; and
(c) a reliable estimate can be made of the amount of the obligation.
If these conditions a re not met, no provision should be recognized.

Items (a) and (b) mentioned before are related to the recognition of an obligation with the understanding that it can only occur as a consequence of a past event even if it is probable that the entity incurs in future expenditures due to a legal or constructive aspect.

It should be understood as constructive aspects, the acts of the company in which it publicly and widely accepts a policy that generates expectations towards others regarding its responsibilities. This way, according to the IAS 37 paragraph 3:

The Standard defines a constructive obligation as the one which derives from acts of an entity, where:
(a) by a standard practice established in the past, published policies or a current announcement sufficiently specific the entity has declared to other parts that it shall accept certain responsibilities; and
(b) as a consequence, the entity has raised a valid expectation on the other parts that it shall fulfill such responsibilities.

If an economic event can be classified as a probable obligation, either legal or constructive, an environmental liability has been identified, complying with accounting first pillar, recognition. However, this liability has to attend to the measurement criterion.

Measurement results in attributing economic amounts to tangible and intangible items. MOCK & GROVE *apud* KAM (1990, p. 497), "emphasize that the objective of the measurement process is to provide reliable, relevant and economical information for decision making". As a consequence, an environmental liability can only be demonstrated in financial statements if there is a reasonable estimate of its value[4].

After the recognition and measurement, it is necessary to disclose the environmental liability in the financial statements and also in its notes clarifying the reasons of its nature and meeting the third pillar, the disclosure of information.

In case an event meets the recognition criterion of a liability, but whose measurement proves impossible, it will not be provisioned, but its disclosure on notes is required.

2.2 Pollution and Environmental Liabilities

It is assumed here that any company in operation, some time, will act as a pollutant agent. The matter is to analyze when the pollution generated by a company implies in recognizing a liability in its financial statements and, in this case, an environmental one.

In case the company has been operating within the limits established by the environmental legislation in force and with no constructive obligations assumed, the company would not have environmental liability to be reported in its financial statements, according to IAS 37. The fact that there is no environmental liability in the statements or in its notes implies that there is no environmental liability in the lights of accounting standard-setters.

On the other hand, if any liability was recognized in this case, the formation of a hidden reserve, prohibited by legislation in several countries for diminishing the profit for distribution, and that could come against the interest of minority shareholders.

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[4] According to IAS 37, the impossibility of making a reasonable estimate is considered rare.

In case the company expects some sort of contingency linked to future events, it could retain earnings for this possible loss, aiming at the protection and maintenance of capital in the long run.

Many companies, however, recognize the existence of environmental liabilities, but consider that they could not be estimated on reasonable basis. In this case, there would be no provisioning of values, and the fact should be disclosed in the notes of financial statements.

A flowchart of decision that may summarize the ideas debated in this and in the previous sub-topic is presented next:
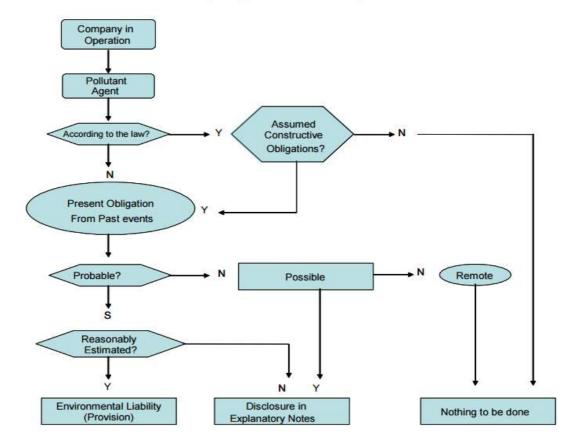

Figure 1: Decision Flowchart: Recognizing environmental liabilities. (Adapted from IAS 37).

2.3 Corporate Performance (profitability) and Environmental Liabilities

Except for cases of conflicts of agency, the target of the companies' managers is to maximize the return on investment (profit). On the other hand, the increase in profitability of a company can be interpreted, *lato sensu,* as the result of a higher consumption of natural resources, i.e. a higher level of pollution.

However, a better corporate performance (profit) is a result of an increase in the margin and/or turnover. The increase in the margin can be reached due to an increase in prices and/or reduction in costs. Turnover derives from the increase in the production volume and/or sales.

Through the prism of margin increase, the analysis of the variables involved leaves no doubt about the improbable increase in environmental liability.

As for the increase in turnover that is originated by an increase in production, the concern about whether it will generate an environmental liability applies. But the increase in production per se, will only imply an environmental liability if the company's consumption of natural resources surpasses the legal limits or when it has been assumed a public responsibility (constructive obligation). Therefore, and increase in production do not necessarily implies the recognition and disclosure of an environmental liability.

2.4 The utility of eco-efficiency indicators to supply information demanded by the society
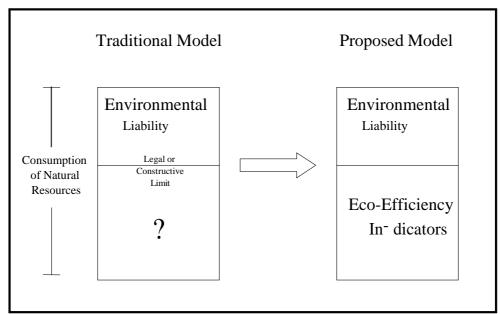
The discussion on the three previous sub-topics allows the construction the premise the traditional accounting model contemplates the recognition and demonstration of the possible environmental liabilities, when the companies exceed the legal limits of pollution, and/or when they form constructive environmental liabilities.

On the other hand, when there is no environmental liability to be recognized and/ or demonstrated in the light of accounting, one can notice a gap to be covered regarding the supply of information that allows society to better control the companies' actions regarding the consumption of natural resources.

Thus, emerges the hypothesis that the eco-efficiency indicators proposed by the ISAR/UNCTAD, at least partly, would be able to supply to the society's demand for information, enabling a better control over companies' actions regarding the consumption of natural resources.

Figure 2 summarizes the above ideas.

Figure 2: Eco-efficiency Indicators – Adding Informational Capability to the Traditional Accountant Model regarding the consumption of natural resources by the companies.

3. THE CASE OF THE COMPANHIA SIDERÚRGICA DE TUBARÃO - CST

In order to build the *Eco-efficiency Indicators* some information demanded and were not available in the traditional reports – economic-financial, social or environmental. Therefore, for its elaboration, it is necessary that the company disclose the additional information. The set of data gathered so far refers to water springs and water use, within the period from1999 to 2003.

The case CST will be analyzed here in three steps. In the first step the financial, environmental and social statements[5] disclosed by the company were compared with the theoretical basis described in items 2.1 and 2.2. In the second step the performance of the company and its probable contribution to the increase of pollution were compared with the theoretical basis in item 2.3. In the last step the indicators of environmental performance related to the usage and consumption of water between 1999 and 2003 were calculated and its information content was compared with the informational gap presented on item 2.4.

3.1 Environmental Liability - CST

The financial statements and the environmental and social annual report disclosed by the company for the year 2003 were confronted with the IAS 37 definitions described in items 2.1 and summarized in the decision flowchart detailed in item 2.2.

Analyzing the 2003 annual report[6], section Society, page 41, the company assumes "… that CST does not have any legal pending matter in the environmental agencies according to the Certification of Negative Environmental Debts (CNDA no. 386/03) published in the end of 2003". Thus, according to its financial statements, the company does not have a present obligation related to legal demands.

In relation to the evaluation it the CST has assumed constructive obligations, it was not found in the reports analyzed any commitment taken by the company that could incur in this type of present obligation.

Following the proposed flowchart in Figure 1, it is reasonable to conclude that there is no need for recognizing an environmental liability in the balance sheet.

The company provides additional information to the topic on note 16 of its financial statements, where it states that

> The Company constitutes provisions for possible area recovery costs and penalties related, in case of probable and reasonably quantifiable losses. At this moment, it is not possible to estimate the total of possible recovery costs and penalties; notwithstanding the management of the Company considers that the costs and penalties not provisioned for should not significantly affect the financial position of the company.

3.2 Corporate Performance and Environmental Liabilities – CST

In this stage the search aimed at identifying the propelling factors of the Company's performance and their potential in increasing pollution, through the analysis of the financial statements disclosed by CST.

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[7] The financial statements of 2003 elaborated according to International Standards (IFRS) were analyzed.

[6] The CST financial statements were audited by PriceWatherhouseCoopers International Ltda.

First of all, a methodology was created so as to allow the breakdown of factors that explain the variation in net revenue. In the case of CST: (1) exchange rate variation; (2) price variation; (3) quantity variation. Items (1) and (2) affect the margin and item (3) the volume. Annual data was used to cover the period 1999 to 2003.

During the analyzed period, CST produced basically two products: steel slabs and hot rolled. The production of rolled only started in 2002.

In order to identify the different sources of revenue, the following equation was applied:

$$RL_{R\$t} = e_t RL_{U\$t} \qquad (1)$$

Where:

$RL_{R\$t}$ is net revenue in current Reais in the year t,

e_t is the average exchange rate in year t (price of a dollar in Real) and

$RL_{U\$t}$ is the net revenue in dollars in the year t

Since CST produces only two products $RL_{U\$t}$ can be replaced for

$$RL_{U\$t} = P_{pt}Q_{pt} + P_{bt}Q_{bt} \qquad (2)$$

Where:

P_{pt} and Q_{pt} are the prices and quantities of slabs sold in year t,

P_{bt} and Q_{bt} are the price and quantity of coils sold in year t.

Transforming the expression algebraically (1) one can obtain

$$\frac{\Delta RL_{R\$t}}{RL_{R\$t-1}} \cong \frac{\Delta e_t}{e_{t-1}}\gamma_t + \frac{\Delta RL_{U\$t}}{RL_{U\$t-1}}\lambda_t \qquad (3)$$

Where:

$\Delta RL_{R\$t} = RL_{R\$t} - RL_{R\$t-1}$ (the same interpretation applies for Δe_t e $\Delta RL_{U\$t}$),

$$\gamma_t = \frac{e_{t-1}RL_{U\$t}}{RL_{R\$t-1}} \text{ and } \lambda_t = \frac{e_t RL_{U\$t-1}}{RL_{R\$t-1}}.$$

Applying the same procedure in the expression (2) one can obtain

$$\frac{\Delta RL_{U\$t}}{RL_{U\$t-1}} \cong \frac{\Delta P_{pt}}{P_{pt-1}}\alpha_{pt}^{p} + \frac{\Delta Q_{pt}}{Q_{pt-1}}\alpha_{Qt}^{p} + \frac{\Delta P_{bt}}{P_{bt-1}}\beta_{pt}^{b} + \frac{\Delta Q_{bt}}{Q_{bt-1}}\beta_{pt}^{b} \qquad (4)$$

Where:

$$\alpha_{pt}^{p} = \frac{P_{pt-1}Q_{pt}}{RL_{U\$t-1}}, \quad \alpha_{qt}^{p} = \frac{P_{pt}Q_{pt-1}}{RL_{U\$t-1}}, \quad \beta_{pt}^{b} = \frac{P_{bt-1}Q_{bt}}{RL_{U\$t-1}} \quad \text{and} \quad \beta_{qt}^{b} = \frac{P_{bt}Q_{bt-1}}{RL_{U\$t-1}}.$$

Substituting the expression (4) in (3) we obtain

$$\frac{\Delta RL_{R\$t}}{RL_{R\$t-1}} \cong \frac{\Delta e_{t}}{e_{t-1}}\gamma_{t} + \left(\frac{\Delta P_{pt}}{P_{pt-1}}\alpha_{pt}^{p} + \frac{\Delta Q_{pt}}{Q_{pt-1}}\alpha_{Qt}^{p} + \frac{\Delta P_{bt}}{P_{bt-1}}\beta_{pt}^{b} + \frac{\Delta Q_{bt}}{Q_{bt-1}}\beta_{pt}^{b}\right)\lambda_{t} \qquad (5)$$

The expression (5) supplies the breakdown of the growth of the revenue in its various components: exchange rate variation, price variation and/or quantity of slabs and price variation and/or quantity of coils.

Using CST's data for the period 1999-2003 one can obtain the breakdown shown in Table 1.

Table 1: Accounting for the Growth Rate of Revenue (in R$)

	2000	2001	2002	2003
% Revenue	41,46	-2,76	33,93	42,15
% Dolar	-2,38	31,88	27,70	1,93
% Price of Slab	39,65	-25,85	4,46	23,95
% Quantity of Slab	7,24	-0,31	-1,57	-26,58
% Price of Coil	0,00	0,00	0,00	12,43
% Quantity of Coil	0,00	0,00	0,00	34,95

Observing Table 1, one can see that the main source of revenue variation is the change in two prices: exchange rate and slab price. The volume has little fluctuation. In fact, the only year the quantities change, 2003, one can observe a change in the production mix. The increase in the volume of coils production almost balances the fall in the slabs production.

To emphasize this last point, that is, that the variation of price is the main source of revenue variation (and not the variation in quantity), the steps   given to obtain the expression (5) were performed again. But now the quantity in tons is included. Formally:

$$RL_{R\$t} = e_{t} \cdot P_{t} \cdot Q_{t} \qquad (6)$$

Where:

P_{t} is the average price per ton of steel sold in the year t and

Q_t is the quantity of tons sold in the year t

Remaking the previous steps one obtains:

$$\frac{\Delta RL_{R\$t}}{RL_{R\$t-1}} \cong \frac{\Delta e_t}{e_{t-1}}\phi_t \ + \frac{\Delta P_t}{P_{t-1}}\mu_t \ + \frac{\Delta Q_t}{Q_{t-1}}\varphi_t \qquad (7)$$

Where:

$$\phi_t = \frac{e_{t-1}P_tQ_t}{RL_{R\$t-1}}, \quad \mu_t = \frac{e_tP_{t-1}Q_t}{RL_{R\$t-1}} \ \text{e} \ \varphi_t = \frac{e_tP_tQ_{t-1}}{RL_{R\$t-1}} \ .$$

Similar to expression (5), the expression (7) breaks down the source of variation of the current revenue (measured in Reais) in three factors: exchange rate variation, price of the ton of steel and the number of tons.

Using CST's data one can obtain, from equation (7), the following results shown in Table 2.

Table 2: Income (in R$) and Quantity in Tons

	2000	2001	2002	2003
% Revenue	41,46	-2,76	33,93	42,15
% Dolar	-3,45	23,51	29,05	2,69
% Price	38,70	-34,09	5,93	38,37
% Quantity	7,07	-0,41	0,31	2,55

Table 2 clearly shows that the almost all the amount of revenue increase in R$ is explained by the exchange rate and price variation, with a slight increase in the quantity produced.

Under such conditions it is easy to see that, with no increase in production, the company has had an increase in profits due to price increase. Moreover, in the years considered, if this increase generated an increase in profitability (as it was the case for CST), there if no indication of increase in the use of natural resources.

3.3 Environmental Performance Indicator in relation to the use of water - CST

The methodology used for the classification of the sources, uses, discharge and consumption of water by CST was the one proposed by the UNCTAD/ISAR (2004). For the calculation of the efficiency indicator for the use of water it was necessary to calculate the amount of water effectively consumed by the company, i.e. from the total available how much was consumed and what was the Net Added Value (NAV) generated by the Company.

The expressions (8) and (9) were used to calculate the water consumption.

$$AD = AC + AL1 \qquad (8)$$

Where:

AD = water available for the company
AC = water consumed by the company
AL1 = cooling water released to a significant water body

$$AC = AI + AE + AS + AL2 \qquad\qquad (9)$$

Where:
AC = water consumed by the company
AI = water incorporated to the product
AE = water naturally lost (evaporation, infiltration, etc.)
AS = dirty water discharged in the surface water, ground water or soil
AL2 = cooling water released to a small water body

Applying the equation (9), the consumption of water was calculated as presented in Table 3 in m^3, for the period 1999 to 2003.

Table 3: Consumption of Water – in m^3

	1999	2000	2001	2002	2003
Water consumed – AC – m^3	17,896,329	19,316,364	19,272,882	19,687,112	19,262,890

The Net Added Value (NAV) was calculated in Reais, according to the model suggested by IBRACON (BR GAAP) for the period 1999 to 2003 and is part of Table 4.

Table 4: Net Added Values (NAV) – in Reais

	1999	2000	2001	2002	2003
Net Added Value -R$	370,615,000	645,384,000	389,610,000	1,004,338,000	1,385,844,000

The eco-efficiency indicator for water was calculated based on the expression (10)

$$Ie = \frac{NAV}{AC} \qquad\qquad (10)$$

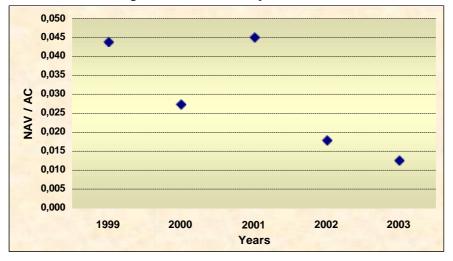Where:
Ie = eco-efficiency indicator
NAV = net added value
AC = consumed water

Applying the equation (10) the eco-efficiency indicators were calculated for the period 1999 to 2003 and the results are presented in Table 5 and Graph 1.

Table 5: Eco-efficiency Indicator – Water

	1999	2000	2001	2002	2003
Eco-efficiency Indicator	0.0439	0.0273	0.0451	0.0179	0.0126

Graph 1: Eco-efficiency Indicator - Water

The consumption of water in m^3 per unit of Net Added Value presents an improvement in efficiency in almost all the periods analyzed except for 2001. The consumption of water that was 0.0439m^3 per unit of Net Added Value in 1999 drops to 0.0126 m^3 per unit of Net Added Value in 2003. This performance reinforces the environmental report of the Company, that "CST improved the indexes of eco-efficiency with emphasis to the growth in the water recirculation index,…" (Environmental Report, 2003)

4. CONCLUSION

Based on the theoretical discussions raised on this paper, one can build the premise that the traditional accounting model contemplates the recognition and demonstration of the possible environmental liabilities when companies exceed the legal limits of pollution, and/or when they assume constructive environmental liabilities. Also, it enabled the identification of propelling factors in the improvement of the company's performance, segregating them according to the capacity each one has of fomenting or not the increase of environmental liabilities.

On the other hand when there is no environmental liability to be recognized and/or demonstrated in the light of accounting, an informational gap was noticed. Thus, an effort was made to evaluate if the *Eco-efficiency Indicators* proposed by the ISAR/UNCTAD would meet, at least partially, society's demands for information that allow an increased control over company's actions regarding the consumption of natural resources within legal and constructive limits.

The analysis showed that the fact that CST is producing does not necessarily generate an environmental liability. Furthermore, the increase in profitability does not imply an increase in pollution. In this case, the profitability increase since 2001 has been reached with a practically steady production. The improvement in economic performance is due to a positive price variation – steel or exchange rate. Therefore, the traditional financial indicator would be ineffective to demonstrate the company's efficiency in terms of natural resources' consumption.

Finally, efficient companies on cost of production and profitability not necessarily are more efficient regarding the consumption of natural resources. For those operating within the limits allowed, the eco-efficiency indicators consist in signers of the efforts of those ones concerned with the environment protection and preservation. This conclusion is partial, since

that only the consumption for water was analyzed. The others eco-efficiency indicators proposed by ISAR/UNCTAD are being performed.

Other limitation of this study is derived with its methodology. The results are valid only for the Companhia Siderúrgica de Tubarão-CST, the specific case analyzed. Other studies are necessary in order to expand and better understand the utility of the eco-efficiency indicators.

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