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The use of environmental performance indicators and size effect: A study of industrial companies

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ABSTRACT

Measuring environmental performance effectively has been a challenge for organizations. One crucial aspect for accomplish this task is the proper definition and use of environmental performance indicators (EPIs). The aim of this paper is to analyze the use of EPIs by industrial companies and to find out differences in the use of these indicators according to their characteristics and also to the size of the respondent companies. The study has as its basis the EPIs proposed by GRI (Global Reporting Initiative) Guidelines and was conducted through a survey. The sample reached 149 companies in industrial sector in Sao Paulo State, Brazil. The main results suggest different uses for EPIs, with an emphasis on those more directly linked to the productive direct costs and also have shown differences in their use between smaller and larger companies.

1. Introduction

In the last few years, sustainability[1] issues have been on the center of an extensive debate, drawing attention of both academia, which has been involved in a significant number of researches, and also organizations, which have largely been engaged in the discussions on the best practices for their businesses (Kolk and Mauser, 2002). Nevertheless, it has not been an easy task to define neither what sustainability or really is (Lélé, 1991), nor what is – or should be – a firm's position toward it (Aragón-Correa, 1998; Hart, 1997; Hunt and Auster, 1990).

In this fashion, companies have been turned into key elements in fostering sustainability since they are players with great economic, social and political power, and therefore have a large influence on the context in which they act (Hart, 2007). And then, another issue arises, that is how to effectively deal with measuring company's sustainable performance (Atkinson et al., 1997; Neely et al., 2002; Epstein, 2008).

Once it has become clear that the lack of measurement of sustainable performance could turn into an obstacle to the firm's management itself, new ways to see organizational performance have arisen, such as the Triple Bottom Line approach (Elkington, 2001; Harris et al., 2001; Pava, 2007). Since then several studies have dealt with one of these three dimensions, the environmental one (e.g. Tyteca, 1999; Perotto et al., 2008; Herva et al., 2011), particularly if we take into account that, due to its nature, environmental impacts turn into critical issues for industrial companies, the object of this study.

Furthermore, size is one variable that has been recurrently associated to environmental-related studies. Size effect has been extensively investigated by several authors (e.g. Chen and Hambrick, 1995; Pugh et al., 1968) and its relationship with environmental performance has also been emphasized by many studies (Aragón-Correa et al., 2008; Darnall et al., 2010; Russo and Fouts, 1997). We should expect that larger companies, with more resources at hand have a higher degree of use of environmental performance indicators (EPIs) than the smaller companies, mainly in the industrial sector that requires more entry barriers and high costs associated to the production processes.

Thus, the purpose of this study is twofold: (i) to find out differences in the use of EPIs by Brazilian industrial companies according to their characteristics; and (ii) to find out differences in the use of these indicators according to the size of the respondent companies. The surveyed sample summed up 149 companies associated of the Center of the Industries of the State of Sao Paulo (CIESP), Brazil. The set of environmental indicators used in this research

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[1] According to the definition from Brundtland Commission, sustainable development is the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). To the purposes of this study sustainable development and sustainability will be considered as synonymous.

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was based on the list proposed by the guidelines of Global Reporting Initiative (GRI), which is considered an important international reference when it comes to sustainability reports.

The paper is structured in six sections. The next one covers the concepts and relevant works on the research theme. In Section 3 we describe the methodological aspects for conducting the research. In the following section we present the research hypotheses. In Section 5 we present the main results and analyses made and we finally wrap up with the conclusions and recommendations that arise from the overall study.

2. Theoretical framework

2.1. Definitions for environmental performance indicators

Performance measurement is a theme present in different areas and sciences and has a rich diversity in methods, measurement units and other elements (Neely, 2007). Performance can be directly the organization's objectives according to Neely et al. (2002, p. xii): "Organizations achieve their defined objectives – that is they perform – by satisfying their stakeholders' and their own wants and needs with greater efficiency and effectiveness than their competitors". Therefore, performance should be properly defined, measured and managed in order to lead the organization to improve its position toward their stakeholders (Atkinson et al., 1997; Neely et al., 2002).

Measuring performance in the pursuit for sustainability has been an important issue for companies. In many cases, regarding sustainability, they have been using minimum standards just as a license to operate: in fact, companies should go beyond compliance and create independent performance control mechanisms in order to foster sustainability effectively (Hart and Milstein, 2003). Besides that, performance mechanisms should encompass numerous perspectives and needs of different stakeholders (Atkinson et al., 1997) in order to obtain a clear understanding of how sustainability has been taken into account – in the perspective of this work through environmental performance measurement-, what enfolds a challenge faced by organizations ever since (Bennett and James, 1998; Melnyk et al., 2003; Perotto et al., 2008; Tyteca, 1999).

From the understanding of what environmental performance really is it is necessary to define which indicators would represent it. And literature is extensive on this matter. Definitions come from both environmental agencies such as the European Green Table 1993 (Johnston and Smith, 2001, p. 2); ISO 14031 (1999/2004); European Environmental Agency (EEA, 1999); OECD (2003); DEFRA – UK (2006); and also from scholars like Tyteca (1999); Perotto et al. (2008) and Herva et al. (2011). However, the extensive number of existent methodologies of assessment (Singh et al., 2012) can lead to an arbitrary or subjective choose of the environmental indicators (Niemeijer and de Groot, 2008).

In the next section, we analyze what the EPIs are used for.

2.2. Functions of environmental performance indicators

According to what they are intended to, EPIs may have several functions or features. Since managers regularly require specific information to enable proper decision-making, performance environmental indicators often play an important role and provide meaning to the measurement of interactions between business and the environment (Bennett and James, 1998).

As per Metcalf (1996) EPIs, as a point of reference, allows: (i) to monitor progress in a specific environmental area in the company, (ii) to identify weaknesses in environmental management systems, (iii) to distribute resources more efficiently, (iv) to report the results of environmental actions, (v) and to create a mechanism of accountability for environmental outcomes. Due to their synthetic nature (Jasch, 2000), EPIs can help to reduce the vast amount of environmental data from a firm in a comprehensive and concise manner, making it possible for decision makers and other stakeholders to evaluate a firm's environmental performance (Young and Welford, 1998).

Besides that, a good framework to develop indicators to be used in an environmental assessment is important for companies to evaluate their products, services, and activities toward sustainability (Fiksel et al., 1999).

But it is also essential that EPIs should be relevant, simple and easy to understand, judicious and based on theoretical grounds, measurable and comparable (Johnston and Smith, 2001). That is why it is crucial to identify and understand the meaning and the usefulness for each indicator, as we discuss next.

2.3. Types and characteristics of environmental performance indicators

Once the number of possible EPIs is quite extensive, there have been several attempts to classify or categorize them. In one of the first studies related to this theme, James (1994) proposed six distinct categories in which environmental performance indicators could fit: production, auditing, ecological, accounting, economic and quality.

Some works have followed this course. For instance, Herva et al. (2011) suggest that are four types of EPIs: (i) Indicators of Energy and Material Flows; (ii) Indicators with a Territorial Dimension; (iii) Indicators of Life-Cycle Assessment; and (iv) Indicators of Environmental Risk Assessment. Another example refers to "EBEB (2001) – Environmental Barometer European Business 2001″ questionnaire, that uses seven different indicators concepts or categories: Procurement, EnviroManagement (EM) actions, EM and product/market, EM integration, EM and Export, Internal Obstacles, External Obstacles and EM Effects in the company (EBEB, 2001).

Fiksel et al. (1999, p. 8), based on the environmental aspects and the TBL dimensions – economic, environmental and societal – suggest, among the environmental indicators, categories such as material consumption, energy consumption, local impacts, regional impacts and global impacts.

Despite the existence of many ways to define and classify the EPIs, there has been also some controversy on the effectiveness of their use. It is crucial to combine the simplicity required for effectiveness and the scientific perspective necessary to the reliability of the processes (Herva et al., 2011).

Other issue is related to the context that the indicators are used in. A trend to standardize them can lead to misinterpretations (Herva et al., 2011; Young and Rikhardsson, 1996). Some authors also claim that this subject should be treated on a contingency basis, with patterns of indicators for each industry (Dewulf and Van Langenhove, 2005; MEPI, 2001) due to important differences among industries (Comoglio and Botta, 2012; Etzion, 2007; Goldstein et al., 2011). James (1994) also argued that other aspects, both external such as environmental issues and local context, and internal, like organizational characteristics and corporate strategies should lead performance measurement activities to be different for diverse countries, industries and companies.

For the purposes of this study, we have applied the Global Reporting Initiative (GRI)[2] guidelines as a proxy for the EPIs. GRI is a network present in over 40 countries, with the participation of experts and representatives from business, non-governmental organizations, experts, government agencies, among others, and it

[2] Global Reporting Initiative: https://www.globalreporting.org/Pages/default.aspx.