Measuring sustainability in practice: exploring the inclusion of sustainability into corporate performance systems in Brazilian case studies

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ABSTRACT

Given the challenge of measuring corporate sustainability in practice, the aim of the present exploratory research is to investigate the incorporation of sustainability in corporate performance measurement systems, towards sustainability performance measurement system (SPMS). More specifically, the research seeks to explore the factors that affect the interaction between sustainability indicators regarding their relative priority for decision making and to investigate how firms include sustainability indicators into their corporate performance measurement systems. To address these objectives, cross-sector case studies were conducted in five firms located in Brazil. Data were collected based on semi-structured interviews and triangulated with published reports and internal documents. The results show four performance measurement systems that encompass sustainability indicators: (a) periodic performance measurement system of a specific area/department; (b) individual performance assessment; (c) sustainability reporting; and (d) project assessment. The paper value lies in bringing a structured view of integrating sustainability in a corporate performance measurement system, based on empirical evidence. However, further research is still needed to develop a more integrative and dynamic SPMS encompassing both leading and lagging indicators to better understand the priorities, interactions and tradeoffs between sustainability indicators.

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1. Introduction

Given the limits of nature (Hardin, 1968; Holling, 1986; Meadows et al., 1972) and the obligation to consider the needs of society (not only those of shareholders) (Marcus et al., 2010), without compromising economic dimension (Elkington, 1997), organizations are driven towards developing a more sustainable way of managing business. Several approaches to corporate sustainability have emerged to help companies face this challenge (Schneider and Meins, 2012; Lee and Saen, 2012), particularly performance indices (Dow Jones Sustainability Index, 2008; Global Reporting Initiative — GRI, 2006) and international standards guidelines (Social Accountability — SA 8000; ISO 14000 and 26000). However, these approaches have been criticized as being merely recommendations (Lee and Saen, 2012), superficial rather than effective (Figge et al., 2002a, b).

Considering that corporate performance measurement systems (PMSs), indicators and bonuses may affect their actions and decision making (Hauser and Katz, 1998), any company aiming to be sustainable must develop a PMS that can incorporate sustainability performance measures, in a normatively desirable sustainable scenario (Vergragt and Quist, 2011), creating a series of aligned consequences. Such a system may be useful to provide information for decision makers, to promote organizational learning and to encourage stakeholder engagement (Veleva and Ellenbecker, 2001). However, there is a lack of integration between sustainability performance indicators and strategic performance measurement systems (Briassoulis, 2001, Schneider and Meins, 2012). This integration is critical to incorporate sustainability into business (Crittenden et al., 2011; Savitz and Weber, 2006), aligning environmental and social objectives with business strategies (Figge et al., 2002a, b, Searcy, 2012). A few strategic PMSs, such as sustainability balanced scorecards (BSCs), have been proposed

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(Epstein, 2008; Figge et al., 2002a, b), but the sustainability perspective is not widely used in BSCs (Tung et al., 2011).

In this context, the aim of the present exploratory research is to investigate the integration of sustainability into corporate performance measurement systems, towards a sustainability performance measurement system (SPMS). In this research the understanding of PMS is that it is not restricted to a list of indicators (Neely et al., 1995), but the interaction between them is also relevant for decision making in firms. Accordingly, the specific objectives of the present exploratory research are twofold. The first research objective is to empirically explore the factors that affect the tradeoffs between sustainability indicators, influencing priority between them, concerning economics, social and environment dimensions. The second research objective is to investigate how firms include sustainability indicators in their corporate performance measurement systems. The relevance of this objective is justified by the challenge to consider not only the economic indicators, but also to integrate environmental and social ones in the performance systems that are currently being used by firms.

With the research objectives in mind, cross-sector case studies were conducted at five firms operating in the areas of agribusiness, capital goods, engineering design, cosmetics, and chemical/petrochemical products. Data were collected based on semi-structured interviews with managers from the sustainability area and other areas relevant to each business, making a total of fifteen interviews. Based on a broad sense of sustainability, the present paper is not restricted to initiatives with environmental goals, also encompassing initiatives with social benefits. Moreover, since the research focuses on corporate performance measurement systems, the intention was to build a general picture of how the firms measure their TBL performance, in order to manage their business. Therefore, the paper is not focused on a specific product or on industrial operations, but on performance measurement for management decision making.

2. Literature review

2.1. Challenges of corporate sustainability

The triple bottom line concept (TBL) proposed by Elkington (1997) considers that a sustainable firm has to take into account the interrelationship between the three pillars (economic, environmental and social) in its decision making process. Underpinned by a comprehensive literature review, Bolis et al. (2014b) go beyond TBL and highlight the importance of an axiological perspective of sustainable development, translated into moral and ethical values that incorporate collective drivers (instead of solely individual interests) in decision making processes. Thus, sustainability should be disseminated in every business process throughout the organization. Several publications deal with the incorporation of sustainability in specific aspects of business, such as innovation (Morioka et al., 2006; Nidumolu et al., 2009), supply chain management (Rao and Holt, 2005; Vachon and Klassen, 2008), operations management (Angell and Klassen, 1999; Jiménez and Lorente, 2001; Kleindorfer et al., 2005), product development (Nielsen and Wenzel, 2002; Thierry et al., 1995), integrated management systems (Gonzalez-Benito and Gonzalez-Benito, 2005; Jorgensen, 2008), project management/ecodesign (Brones and Carvalho, 2014; Brones et al., 2014) and ergonomics (Bolis et al., 2014a). The integration and coordination of business processes aligned with sustainability is fundamental to achieve effective results and can be enabled by a solid strategy aligned with sustainability principles (Crittenden et al., 2011; Hubbard, 2009; Porter and Kramer, 2006) and an adequate sustainability performance measurement system (Azapagic, 2004; Figge and Hahn, 2004; Labuschagne et al., 2005;

Veleva and Ellenbecker, 2001). Thus, there is still challenge to corporate sustainability regarding the integration of sustainability into the business strategy (Gond et al., 2012).

The inclusion of internal and external stakeholders needs, constraints and influences leads to a link between corporate sustainability and stakeholder theory (Epstein and Widener, 2011; Hillman and Keim, 2001; Peloza and Shang, 2011). The main idea of this theory is to consider the effects of decisions on other stakeholders and the potential impact that other stakeholders have on the decision-maker (Freeman, 1984). Lee and Saen (2012) claims that this context can force companies to consider sustainability more seriously. In some situations, the firm is able to obtain a win–win relationship between sustainability pillars, also known as sweet spots (Savitz and Weber, 2007). Yet when this is not the case, organizations have to deal with tradeoffs, considering that resources are limited and priorities are to be defined. Tradeoffs can be seen as compromises made by managers, which cannot be eliminated (only overcome), depending on the resource and/or capability engagement (Silveira and Slack, 2001). Furthermore, the authors point out the aspect of sensitivity of tradeoffs, measuring the intensity with which one aspect impacts the other. When it comes to the sustainability objectives of firms, managers are confronted with several tradeoffs, since firms face the challenge of reconciling different (and usually conflicting) interests in business management (Azapagic and Perdan, 2000).

Several authors have investigated the cause-and-effect relationship between aspects related to sustainability, and their findings indicate that environmental and social performance are not necessarily associated with economic performance. On the one hand, Dowell et al. (2000) found evidence that American firms under more stringent environmental regulations have higher market values. Accordingly, Rao and Holt (2005) found that the green supply chain management can be related with competitiveness and economic performance. Empirical evidence of a positive correlation between the social and economic pillars of sustainability is also discussed in the literature (Callan and Thomas, 2009; Vitezić, 2011). In their statistical research, Lo and Sheu (2007) found empirical evidence that corporate sustainability (regarding TBL performance) can be associated with market value. At the same time, López et al. (2007) found evidence of the negative short-term impact of CSR on the performance of firms listed in the *Dow Jones Sustainability Index* (DJSI), compared to firms listed in the *Dow Jones Global Index* (DJGI). This demonstrates that the relationship between socio-environmental initiatives is not always associated with economic performance. Furthermore, investments in environmental and social initiatives cannot always be related to economic rewards. Intangible aspects such as customer satisfaction, employee engagement, corporate image and reduced risks are relevant for firms (Savitz and Weber, 2007), but are more difficult to quantify in terms of monetary value. The statistical analyses of the relationship between sustainability indicators tend to use control variables, which can influence these relationships. Some are pointed out as follows: firm's size (Callan and Thomas, 2009; Dowell et al., 2000; Lo and Sheu, 2007), leverage (Dowell et al., 2000; Lo and Sheu, 2007), profit and sales (Lo and Sheu, 2007), investment level (Callan and Thomas, 2009; Lo and Sheu, 2007), research and development investments (Callan and Thomas, 2009; Dowell et al., 2000), advertising intensity (Callan and Thomas, 2009; Dowell et al., 2000), and multinationality (Dowell et al., 2000).

2.2. Sustainability performance measurement systems

The literature on PMS has been intensively discussed since the 1990s (Neely, 2005). PMS can influence corporate results, since it directly impacts managers' actions and decisions (Hauser and Katz,

1998). PMS is more than a list of performance indicators, since it also requires an understanding of the cross-impacts between indicators themselves, as well as the consolidation of the infrastructure needed to acquire, collate, sort, analyze, interpret and disseminate data (Bititci et al., 2000; Neely, 1998). Indicators that are strictly financial do not suffice to evaluate a firm's performance and must be balanced (Kaplan and Norton, 1992), requiring a multidimensional framework that considers internal and external aspects (Azzone et al., 1991; Keegan et al., 1989), leading (determinant) and lagging (outcome) indicators (Fitzgerald et al., 1991) and stakeholders needs/contributions (Neely et al., 2001). Furthermore, PMS must be linked to corporate vision, strategy (Kaplan and Norton, 1992; Lynch and Cross, 1991; Neely et al., 2001), capabilities and business processes (Neely et al., 2001). Companies aiming to be sustainable must face the challenge of incorporating sustainability into their corporate PMS, i.e., face the challenge of design SPMS. SPMS can be defined as the "system of indicators that, in the short and in the long term, provides the corporation with information necessary to assist in the management, control, planning and performance of its economic, environmental and social activities" (Searcy, 2012, p. 240).

In this regard, the literature presents several frameworks for measuring sustainability in firms, which can be divided into three categories. The first category classifies sustainability indicators, encompassed by frameworks that generally focus on GRI indicators, which are based on the TBL pillars (such as Labuschagne et al., 2005; Schneider and Meins, 2012). Interesting contributions of these publications include the consideration of social initiatives in the institutional role of organizations (Labuschagne et al., 2005) and the challenge to develop sector-specific indicators, characterized by a modular approach of sustainability indicators (Azapagic and Perdan, 2000). Moreover, Schneider and Meins (2012) propose two dimensions: (i) current sustainability performance (present approach) and (ii) sustainability governance (future tendency).

The second category of frameworks suggests a sequential process for SPMS (Table 1). These frameworks underscore the importance of continuous improvement (Chen and Chiou, 2008; Chen et al., 2006), the need for coordination between initiatives (Balezentis and Balezentis, 2011), the possibility of using decision analysis (Erol et al., 2011), and the need to systematically involve stakeholders (Valdes-Vasquez and Klotz, 2013).

The third category of frameworks focuses on cause and effect aspects for SPMS (Table 2). This literature discusses aspects that must be addressed to attain a given sustainability objective. Some of the literature is based on the framework proposed by the OECD (1993), which encompasses three type of indicators: pressure (how

society is modifying the environment), state (status of the natural environment, based on qualitative and quantitative criteria) and response (how society is responding to pressures and state).

Despite these efforts to propose frameworks, various gaps remain and companies still face the challenges of dealing with sustainability in business performance at a practical level. These frameworks still lack a comprehensive integration with strategic maps and value creation (Schneider and Meins, 2012). Although the frameworks for sustainability measurement involve a few strategic approaches, such as sustainability Balanced Scorecards (BSCs) (Epstein, 2008; Figge et al., 2002a, b), a recent survey revealed that the sustainability perspective is relatively little applied to BSCs (Tung et al., 2011). This seems to indicate that sustainability is still measured as a system separate from that of corporate PMS.

3. Research methods

Given the lack of research body on SPMS, there is need for exploratory research to develop new insights (Karwan and Markland, 2006). We propose an exploratory case-based research, which is indicated as a contribution to theory building (Eisenhardt, 1989) and the most suitable research method to our objectives. To investigate the objectives, we present five multisectoral case studies.

3.1. Sample characterization

Eisenhardt (1989) suggests that selection criteria for the case studies should be well defined, considering the intentional choice of the case to be analyzed. Accordingly, the cases were selected based on the following criteria: (a) strategic relevance of sustainability, proven by means of external documentation such as mission, values, and sustainability reports; (b) high relevance of the company's performance (excellence in terms of actual business); (c) the existence of a formal area of sustainability: and (d) the organizations must operate in different economic sectors, in order to shed light on which sustainability issues transcend the sectoral contexts of the business ecosystem and those that are specific to it, acting as a moderator variable of the study, and (e) access to certain internal documents and to internal stakeholders pertinent to the research objective.

Based on these criteria and Eisenhardt (1989) recommendation to use from four to ten cases, studies were conducted in five relevant companies located in Brazil, from different sectors. . A pilot case was developed aiming at improving the quality of the research instrument as suggested by the literature (Eisenhardt, 1989). This

Table 1
Frameworks that suggests a sequential process for sustainability indicators.

Dimensions	Characteristics	Literature
Cyclic sequence of activities related to the planning, implementation and control of actions, based on management by results and according to sustainability criteria	Applied to environmental issues	Chen et al. (2006); Chen and Chiou (2008)
Open method of coordination for implementation of the strategy of the European Union - selection of goals according to clusters of countries - mutual learning (transfer of best practices) - definition of structural indicators suitable for supporting sustainable development - use of benchmarking to distribute support effectively (especially financial)	Focus on coordination for sustainable development	Balezentis and Balezentis (2011)
Multi-criteria framework based on fuzzy entropy and fuzzy multi-attribute utility (FMAUT): - Construction as an indicator set with respect to sustainable supply chain - Collecting data - Using fuzzy entropy to determine the weights of indicators - Employing FMAUT to measure sustainable supply chain performance - Alert management system for indicator analysis	Applied to supplier selection	Erol et al. (2011)
- Approach (stakeholder engagement, project considerations) - Assessment (health impact assessment, social impact assessment) - Desired results (sustainable outcomes, follow-up plans)	Focus on social sustainability in construction projects	Valdes-Vasquez and Klotz (2013)

Table 2
Frameworks of cause and effect aspects for sustainability management.

Dimensions	Characteristics	Literature
PSR framework: Pressure, State and Response indicators	Used as basis by Lundberg et al. (2009) and Rudd (2004)	OECD (1993)
DPSIR framework: - Driver indicators - Pressure indicators - Impact indicators - State indicators - Response indicators	Based on the PSR framework	Smeets and Weterings (1999)
DSR-HNS framework: - **D**riving force indicators - **S**tate indicators (including **h**uman, **n**ature and electric energy **s**ystem) - **R**esponse indicators	Framework for Electric Energy Systems Based on the PSR framework	Meyar-Naimi and Vaez-Zadeh (2012)
Three alternatives for adaptation of the BSC: - Integration of environmental and social aspects to the four original perspectives - Introduction of a fifth perspective related to non-market aspects - Deduction of a derived environmental and social scorecard	Based on BSC	Figge et al. (2002a, b); Hubbard (2009) and Yongvanich and Guthrie (2006)
- Independent variable: firms DNA (ideology, capabilities, social engagement) - Dependent variable: performance management (social and financial performance) - Moderator variable: stakeholder involvement	Market-oriented	Crittenden et al. (2011)
- Characteristics (context, firm and supply chain) - Strategies (defensive and offensive) - Activities - Performance	Implementation of sustainability in supply networks from an innovation perspective	Van Bommel (2011)

pilot case was conducted at AGRO, the Brazilian subsidiary of an American multinational company operating in the agribusiness sector. This case was instrumental in bringing the language and perceptions of the literature to the reality of companies. This allowed for a better access to relevant information from the interviewees for the exploratory cases. For confidentiality purposes, the firm's real name has been disguised. Table 3 describes the main characteristics of the four exploratory case studies.

3.2. Data collection and research instrument

The main data source instrument is a semi-structured questionnaire used to collect interviewees' perceptions. At least 3 interviews were conducted per case study, as recommended by Voss et al. (2002) in researches for which no person has the all the knowledge needed. Given their relevance to each case core business and to social and to environmental issues, the following areas were contacted throughout the case studies: Sustainability, HSE (Health, Safety and Environment), Management Systems, Social Responsibility, Project Management Office and Innovation (see Table 3). Each interview was recorded, transcribed and sent to the

interviewee for validation, whenever possible, as suggested by the literature (Voss et al., 2002), and the interviewee's responses were triangulated from the other actors.

The interviews are structured into three main stages. The first is the discussion on the concept of corporate sustainability, aligning the understanding of the term between the interviewee and the interviewer. The second stage is focused on the tradeoffs between sustainability indicators. Using cards containing the sustainability indicators, most commonly found in the most widely used models of each of the three pillars of sustainability within the normative and Brazilian context (GRI, ISO 14000, ISO 26000, OHSAS 18000, the Brazilian Ethos Institute, and Social Audit), the interviewees' task was to rank the indicators in terms of importance to their organization (not to their specific area). As for economic indicators, the most common ones were considered: net income, administrative expenses, and operating costs. Then, the next task consisted in assigning 170 points (in terms of importance) to the previously ranked 17 indicators, in order to obtain evidence about the relative importance (or distance) between the indicators. More relevant than the quantitative result itself, this stage is intended to serve as a basis to discuss the factors that influence the relative importance

Table 3
Companies and areas interviewed.

Company	Sector	Number of interviewees	Areas interviewed	B2B or B2C	Level of the GRI report (2012)
CAP	Capital goods	4	Sustainability HSE Quality Project Management Office	B2B	B
ENG	Engineering projects	3	Social Responsibility Management Systems HSE	B2B	A
CHEM	Chemical and petrochemical	4	Sustainability Social Responsibility Innovation Project Management Office HSE	B2C	A+
COSM	Cosmetics	3	Sustainability Management Systems Innovation (Ecodesign)	B2B	A+

between the pillars of sustainability. The third stage of the interview is composed of questions that were directed to the description of corporate performance measurement systems, including main indicators, roles/responsibilities involved in the performance measurement system processes of planning, implementation and use (Bourne et al., 2000). The interview led to what the firm is doing to incorporate the measurement of sustainability performance, including social and environmental indicators. Throughout the interview, challenges related to SPMS were also identified.

Seeking to preserve the rigor of the research, data should be collected from multiple sources, as suggested by the literature (Flynn et al., 1990; Voss et al., 2002). An extensive review of archival data was performed. The key documents analyzed were the following: published sustainability reports, internal documents with roles and responsibilities on sustainability, ISO14000 manual and related documents, OHSAS 18000 manual and related documents, company balanced scorecard or other performance measure system document, and company website. The document analysis was performed before interviews to facilitate the dialogue with interviewees, allowing identifying compatible language and jargon of the company, and particularly allowing the triangulation of interviewee's response from the document analysis.

3.3. Data analysis

The interviews were analyzed qualitatively through iterative coding into the major theme formalized by the research objectives. Similarly, the document analysis was performed. As part of our coding and analysis process, the authors traveled back and forth between analysis, collection and extant studies, hence facilitating theory building (Miles and Huberman, 1994). The rich datasets were summarized and written up as case reports in which the qualitative data were processed using descriptive statements to create a bridge from the qualitative evidence to theory, the main aspects of which were codified (Eisenhardt and Graebner, 2007; Miles and Huberman, 1994).

In multiple cases, the analysis should explore similarities and differences across cases towards theoretical generalizations. For Ketokivi and Choi (2014) the essence of case research is the duality of being *situationally grounded* and seeking *a sense of generality*. Thus, in this research the qualitative data analysis began with a within-case analysis, exploring the uniqueness of each case study the context, followed by a cross-case analysis (http://www.sciencedirect.com/science/article/pii/S027269631400062XMiles and Huberman, 1994).

The cross-case analysis was performed in three aspects aligned with research objectives as follows: sustainability performance measurement systems, moderating factors of the priorities of the indicators, and context of sustainability.

4. Results and discussion

This section presents and analyzes the main evidences collected in the case studies, discussing them based on the literature.

4.1. The context of the case studies

Three aspects of sustainability definition were identified in the case studies: long term survival, stakeholder management and alignment with business. Some statements to illustrate these aspects are shown in Table 4. The case studies show that the companies understand that sustainability has to do with surviving in the long term and, to achieve this, they must be able to conduct their business operations taking into account the needs and interests of various stakeholders (both internal and external). Although the companies operate in different sectors, they have a similar understanding about the concept of sustainability, one that is not restricted to the TBL concept (Elkington, 1997). While Table 4 brings illustrative statements that represent the aspects of the concept of sustainability for the case studies, Table 5 shows the deployment of identified aspects in each case study.

Evidence from the field showed that corporate sustainability means not only to survive in the long run, but also to consider the needs and interests of the various stakeholders. This is aligned with the connection pointed out by the literature between corporate sustainability and stakeholder theory (Epstein and Widener, 2011; Hillman and Keim, 2001; Peloza and Shang, 2011) and shows that firms have the explicit effort to incorporate internal and external stakeholders needs in their business. This was evident not only in the interviews, but also in the sustainability reports promoted by the case studied. The main stakeholders pointed out by the firms' disclosures are shown in Table 5 (second line). Another stakeholder that does not appear as an explicit stakeholder in the discussion of sustainability, but is fundamental to the business survival, is the stockholder/shareholder.

Moreover, empirical evidence also shows that firms have the same perception as the literature (Crittenden et al., 2011; Hubbard, 2009; Porter and Kramer, 2006), confirming the importance of incorporating sustainability into business (and vice versa). The idea is that sustainability initiatives make sense to the organization only if they are aligned with its operations and strategies. For example, the Social Responsibility interviewee that belongs to ENG pointed out that they decided to reduce their investment on ballet presentations in theatres and, instead, intensify their financial support

Table 4
Aspects of sustainability in the cases under study.

Aspects	Description	Examples of statement
Temporal	Reconcile short versus long-term challenges to the company's survival	*"[Sustainability] is meeting the needs of all stakeholders today and in the future"* (Manager of Social Responsibility — ENG)
		"[Sustainability is acting] thus contributing to the company's survival and to a better world" (HSE Engineer — CAP)
Stakeholders	Understand and integrate the needs and interests of the various stakeholders (internal and external)	*"[Sustainability] is meeting the needs of all stakeholders today and in the future"* (Leader of the Area of Social Corporate Responsibility — CHEM)
		"Sustainability is about being responsible and playing collectively" (Engineer of the Directorate of Management Systems — ENG)
		"Dialogue with stakeholders to demonstrate the company's commitment, even if the actions have a medium to long-term result, is critical to the success of the process." (Sustainable Development Manager — CHEM)
Business	Potentiate the actions of sustainability with the company's business and vice versa	*"Sustainability should not be an afterthought, but should be incorporated into the company's business."* (Manager of Social Responsibility — ENG)
		"The goals [of sustainability] should be tied directly to the business in order to focus efforts." (Manager of the Emissions Area — Sustainability Directorate — COSM)

Table 5
Summary of the cases: context of sustainability.

Characteristic	CAP	ENG	COSM	CHEM
Temporal: Long-term survival	Support for the development of solutions to global megatrends	Strategic drivers include Social and environmental responsibility Awareness of the responsibility for the consequences of the implementation of their projects	Sustainability DNA since its foundation Use of Amazonian biodiversity Leadership in sustainability-related issues	20-20 vision of leadership in the sector. It consists of its strategic pillars and the goals for each pillar to be achieved until year 2020
Stakeholder: Consider the needs and interests of the various interested parties (internal and external)[1]	Employees Customers Suppliers and service providers Trade Unions and Class Associations Surrounding Community Society Academia NGOs	Employees Customers Suppliers and service providers Society NGOs	Employees Consultants Customers Suppliers Local institutions Representatives of the Amazonian community	Shareholders/Investors Customers Community Suppliers Employees Academia Mass media Government NGOs
Business: Potentiate the actions of sustainability with the company's business and vice versa	Focus on promoting and improving its environmental portfolio Internal eco-efficiency (operating with a lower environmental impact) Philosophy of zero accidents	Incorporation of innovations in the project to reduce social and environmental impacts during the construction and operation of the planned project	Use of the Amazonian biodiversity High capillarity made possible by the team of consultants to disseminate the culture of sustainability among customers and society	Focus on sustainable chemistry (products and processes), including renewable raw material and chemical safety

to initiatives directly related to education. He said that it is not that culture is not important, but more synergy and benefits are perceived from investing in enlightening the community about an important construction of theirs. Other examples from the case studies are the investment in technology and supplier development to produce products with higher energy efficiency (CAP) and the proximity to the academia for training skilled labour (CHEM). During the interviews, no clear distinction was identified between the terms sustainability and sustainable development.

4.2. Priority between sustainability indicators

In order to better understand the context of the case studies regarding sustainability issues, a brief dynamic related to the relative priority between sustainability indicators was conducted during the interviews. Fig. 1 summarizes the relative weights of the responses given by the other interviewees. It should be kept in mind that the interviewees considered all the sustainability aspects important and that these data were collected based on individual perceptions and do not necessarily represent a formal position of the organization. This step enables one to perceive the distance between the indicators in terms of their importance to the organization as a whole. Note that the ethics issue was considered separately, as the most important factor (see Fig. 1). This is followed by the relevance of net income, which is considered the minimum factor for the survival of the company operating ethically. The environmental issues were given an average or below average rating, with very similar values. It is also evident that the companies seek to distance themselves from specific political parties, but CHEM, in particular, understands its role in society influences public policies to ensure their greater strictness in preserving the environment and to favour society.

Given the limited number of interviewees, and although it is interesting, the main objective of this phase of the study was not to obtain the quantitative result of the ranking, but rather to engage in a discussion with the companies about the factors that interfere with this relative importance. Thus, the four moderating factors were identified, impacting the sensitivity of the tradeoffs (Silveira and Slack, 2001). Some statements to illustrate the above mentioned factors are presented in Table 6.

The first factor identified in the interviews that influences the sustainability tradeoffs is the precondition, representing that fundamental factors for operation are a priority in terms of the different goals towards corporate sustainability. One prerequisite for further operations of COSM is the increase of production in order to follow the firm's product demands. Hence, they have made efforts to build a new industrial field that is designed to promote industrial symbiosis. The literature (such as LO; SHEU, 2007) is aligned with the interviews (Fig. 1), pointing out that sales and profit are also requirements for business survival and, therefore, influences the relationship between sustainability indicators. Regarding the second factor identified in the case studies, it was verified that the past experience of the issue also influences sustainability tradeoffs, representing factors related to organizational culture and history. The better and more experienced the firm is in dealing with certain aspects, the more consolidated the subject is, resulting in more evidence of sustainability disclosure and management efforts. In the literature that discuss the relationship between sustainability indicators, no publications was found, indicating the presence of this factor.

Corporate strategy and individual bonuses can also influence the priorities between sustainability issues. The strategic concern for sustainability issues is also present in the sustainability reports, corporate websites and other published documents of each case study. The strategic importance can be associated with advertising investments intensity, which was verified to influence the relationship between sustainability indicators by the literature (Callan and Thomas, 2009; Dowell et al., 2000). For example, in ENG, eco-efficiency and technological solutions for society in their construction projects have been present since the foundation of the firm, since this guideline was declared in the foundation letter of the firm, making evident the strategic character of sustainable innovation. Moreover, the explicit strategy of CHEM of being the leader in the sustainable chemical industry also makes the solutions for sustainable chemistry fundamental priority for this firm. Lastly, urgency was also identified as a factor for sustainability tradeoffs, highlighting that internal or external temporal pressure can also modify the priorities for sustainability concerns. It is worth noting that multinationality (Dowell et al., 2000) and industrial sector (Callan and Thomas, 2009; Lo and Sheu, 2007) were also

*Note: This data was collected based on individual perceptions and do not necessarily represent a formal position of the organization.
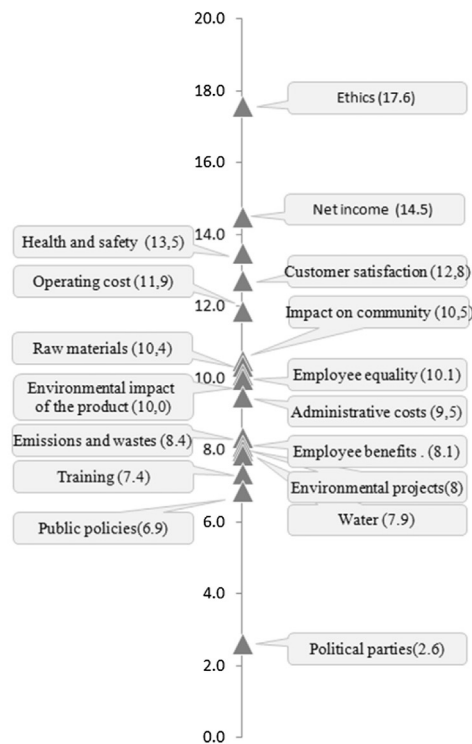

Fig. 1. Mean relative weight of sustainability indicators.
*Note: This data was collected based on individual perceptions and do not necessarily represent a formal position of the organization.

pointed out by the literature, but were not specifically found in the case studies.

Regarding this part of the research protocol, two interviewees (one from the Management Systems area in ENG and the other from the sustainability area are in CHEM) chose not to participate in the dynamic proposed by the interview to rank sustainability indicators according to priority. Both of them argued that the proposal of the research protocol made no sense, since all the indicators are important to the company and are related differently (not in order of relevance), for example, in terms of cause and consequence, such as the classification of leading and lagging indicators (Kaplan and Norton, 1992) or in terms of aggregation (strategic) and breakdown (operational). It is interesting to note that the two interviewees mentioned were in a position of supporting their respective firms in the promotion of corporate initiatives aligned with sustainability, based on a broad view of the firm and of sustainable development. Both cases were isolated within their respective organizations. The other interviewees of each case study showed no additional problem for conducting this part of the interview, as compared with the other case studies.

Table 6
Moderating factors of the priorities of the indicators.

Moderating factors	Description	Examples of statements
Precondition	Fundamental factors for operation	"Ethics is fundamental, nothing works without ethics." (PMO manager − CAP) "We are concerned mainly about our employees, since the processes depend on them." (Leader of the Quality Area − CAP) "Health and safety are non-negotiable." (PMO manager − CAP) "Here one does not question whether it is a legal requirement or involves a risk to the employee, even if it ends up increasing the cost." (HSE Manager − ENG)
Past experience	Factors related to organizational culture and history	"The environmental issue ranks higher, simply because it came before in [ENG], it is more entrenched." (HSE Manager − ENG)
Corporate strategy and individual bonuses	Connection with strategy and bonuses	"The first set of indicators corresponds to the indicators included in the bonus" (Manager Area of Emissions − Office of Sustainability − COSM) "We created the form [selection of innovation projects] according to what [CHEM] understands as sustainability," i.e., acting on the three strategic fronts listed in the sustainability report of CHEM. (Innovation PMO Specialist − CHEM)
Urgency	Factors that require more effort on the part of the organization and that vary over time	"Well resolved matters do not need indicators." (Engineer of the Board of Management Systems − ENG) "Emissions and water consumption are not such a priority because they are matters already well dealt with at CHEM, [...] but they are vital for the company to evolve in other fields. If they reach a critical level, they may end up being as important as cost and income." (Leader of the Area of Corporate Social Responsibility − CHEM) "Employee equality is a topic that is not under critical discussion at this time. But one cannot set goals and we do not have stakeholders concerned with this issue." (Social Responsibility Manager − ENG)

Interestingly, the interviewees who participated in this dynamic demonstrated difficulty in ranking the indicators, such that, in some cases, in the step of assigning relative weights, they ended up by modifying the ranking. This evidences that even the same person may not necessarily give only one answer and that it depends on the context. This result also reinforces the difficulty in understanding corporate sustainability in practice, including the difficulty in prioritizing and managing sustainability goals (such as Epstein and Widener, 2011; Glavič and Lukman, 2007) and context dependent (such as Lozano, 2012; Searcy, 2012).

4.3. Sustainability performance measurement systems

Based on the empirical evidence, we can see that there are efforts to measure sustainability performance systematically, but they are still incipient and have strong potential for further developments. Four performance measurement systems with sustainability traces were pointed out by the interviewees: PMS for a specific organizational area/department, employees' individual PMS (used as basis for periodic bonus), system of sustainability indicators for external communication (sustainability reports), and an initial project assessment system (applied early in the project life cycle). Table 7 describes the characteristics of the systems for each case. The four SPMS identified in the case studies that try to incorporate sustainability performance tend to be closer to the first category of frameworks pointed out in Section 2.2 (Sustainability performance measurement systems). This category does not emphase the cause and effect relationship between the indicator or is focused on sequential processes for managing sustainability indicators. Instead, this category highlights the classification of sustainability indicators, based on the TBL/GRI pillars (such as in Azapagic, 2004; Labuschagne et al., 2005; Schneider and Meins, 2012).

The system of performance assessment indicators for areas varies not only from one company to the other, but also from one area to another in the same company. This is because the way in which managers evaluate critical points in the progress of their areas' activities depends on the nature of their operations, since PMS depends directly on the business process (Neely et al., 2001). The literature also points out the importance of linking PMS and business strategy (Kaplan and Norton, 1992; Lynch and Cross, 1991; Neely et al., 2001). Accordingly, in the case studies, performance assessment of the areas is directly linked to strategic planning, including top-down deployed targets, which are complemented by goals specific to the nature of the area activity. For instance, the HSE area of the CAP case is more mature in terms of the culture of monitoring indicators and defining action plans. This is because its activities are tied directly to management and certification systems, which require the systematically monitoring critical matters at various manufacturing locations. Therefore, this area is qualified to assess its performance using a well structured tool (the BSC), holding regular meetings to address critical issues, including the company's indicators of health, safety and environment. In this case, the operation area itself is directly connected to the external environmental and social pillar of sustainability. On the other hand, in the case of the monthly performance assessments of an operations area of the COSM company, such as that of a particular product group, the area of sustainability also participates, stimulating integrated discussions among the areas. In this case, the result of productivity (which assesses the percentage of money to be sent to the consultant) is also discussed from the standpoint of the carbon emission target and freight cost.

The employees' individual performance system can also be considered fairly aligned with sustainability guidelines, incorporating indicators pertaining not only to the economic pillar, but also to the environmental pillar and the internal and external social

Table 7
Summary of the cases: sustainability performance measurement systems.

System	CAP	ENG	COSM	CHEM
PMS for a specific organizational area	Deployment of corporate goals (*top down*) complemented with indicators specific to the area's activities Monthly follow-up meetings	Deployment of strategic drivers Strategic projects (multidisciplinary) for the promotion of discussions on sustainability in the company Upcoming challenges: proactive indicators (demonstrate the added value of innovative solutions that contribute to sustainability)	Corporative BSC including sustainability indicators Monthly follow-up meetings attended by the area of sustainability (encourage integrated and multidisciplinary discussions)	Periodic monitoring of the operation with the participation of the area of HSE and e de Sustainable Development Challenge: Develop social indicators that are reliable, measurable and possible to operationalize, translating the social impacts of the company
Employee's individual PMS	Criteria agreed upon between the leader and the led, based on the area's goals and the individual's specific activities	Criteria: customer satisfaction, safety, environment, climate research, financial results, sales, behavioral results (360 degree assessment) and specific performance of the area	Criteria inspired on indicators of the GRI report, on the strategic objectives of the BSC and on the specific evaluation system of the areas. Includes income, profits, reduction of the environmental impact of the product, customer satisfaction, climate research and health & safety	Depends on the actions and responsibilities of each individual Challenge: promote the dissemination of sustainability in all the positions of the company by means of specific indicators for the activities
System of sustainability indicators for external communication (sustainability reports)	Annual internal eco-efficiency report GRI report	GRI report: Challenge in classifying and organizing the indicators pertaining to more than one topic in the report	GRI report: Challenge in intercorrelating sustainability indicators to justify the company's performance	Constantly improved GRI report monitoring the growth in sustainability maturity Monthly internal reports sent to executives, summarizing the performance of production units and the status of improvement actions
Initial project assessment system	Promotion of projects that contribute to the company's environmental product portfolio	Business opportunity assessment tool based on the TBL	Development of processes to systematize the search for technologies that potentiate contributions to the environment and the community	A tool under development for new product designs A consolidated tool for assessing new ventures

pillar. This logic is aligned with the rationale pointed out by the literature (Hauser and Katz, 1998) that indicates that PMS can influence corporate results, due to its direct impact on managers' actions and decisions. For instance, the COSM system considers for employees' health and safety targets, customer satisfaction, organizational climate survey, and other goals. In other words, the employees are stimulated to seek not only financial goals, but also other goals related to the social and environmental sustainability pillars. A local community impact indicator is also being considered for certain job positions that deal with this issue at the CHEM company. The challenge, however, is to identify a suitable indicator to reflect this impact, and the company eventually only makes indirect assessments in terms of the efforts invested in this issue.

For external and internal communication, the companies in this study prepare annual reports based on GRI guidelines. These disclosures are aligned with the first category of SPMS (such as in Azapagic, 2004; Labuschagne et al., 2005; Schneider and Meins, 2012). That is because, as pointed out in the interviews of the case studies, the sustainability reports are still incipient and do not provide an integrated view of the firm in terms of sustainability. Different TBL indicators are complied in the report, separated in chapters according to a specific theme, but it is hard to understand the cause-and-effect relationship between the indicators. Some of the indicators included in the report are already monitored regularly by the organization, but they may be added or calculated in different ways. Ideally, internal and external indicators should show the highest possible synergy, reducing rework and ensuring information consistency. However, this is not always possible or appropriate. Data collection is decentralized, highlighting the multidisciplinary challenge of issues concerning to sustainability. The interviewees also pointed out the complexity of the report, since a given indicator may be associated with more than one topic of the report. To exemplify, discussions about the environmental product portfolio are linked both to environmental impact reduction and to increases in company earnings.

Finally, initial project assessment measurement systems considering sustainability criteria were also identified in the field study. Given the strategic relevance of project portfolio (Cooper et al., 1999), firms that seek to incorporate sustainability in their strategy need to be concerned with the projects they choose to invest in. Each case of this study has its own way of dealing with this issue. CAP focuses on the choice of projects that foster its green portfolio. ENG, on the other hand, has a tool based on the TBL logic, which has been undergoing improvements in recent years, to evaluate customer proposals and to contribute to commercial negotiations. COSM has an area that focuses on the development of technologies even before they become products, based on the logic of eco-design. Lastly, CHEM has an area of corporate innovation that is under approval to deploy a form in addition to that of business and technical information, comprising indicators aimed at its long-term vision as a leader in sustainable chemistry. Thus, companies assess their efforts, seeking to evaluate not only their financial return but also the environmental and social impacts of their activities.

5. Conclusions and limitations

By investigating the incorporation of sustainability into corporate performance measurement systems, towards a sustainability performance measurement system (SPMS), the research provides several contributions to both theory and practice. One of the research contributions is related to the delimitation of the concept of sustainability. Although a number of publications present interesting debates on the concept (such as Bolis et al., 2014; Hopwood et al., 2005; Lozano, 2008), its definition is still not

completely clear (Glavič and Lukman, 2007; Lindsey, 2011) and the understanding of different authors can even be ambiguous (Glavič and Lukman, 2007). Addressing this issue, the research found evidence of alignment between the literature and a practical approach to sustainability. The case studies pointed out three main aspects related to the concept. The first is the issue of time frame, dealing with short-term vs. long-term challenges towards the company survival. This temporal aspect is also explicitly discussed by the literature such as in the World Commission on Environment and Development (1987) and Lozano (2008). The second aspect of sustainability identified in the case studies is the relevance of managing relationships with stakeholders, understanding and integrating the stakeholders' needs and values (also discussed for example in Perrini and Tencati, 2006; Sprengel and Busch, 2011). The third aspect reinforces the integration of sustainability into the firm's core business (Bocken et al., 2014; Boons and Lüdeke-Freund, 2013). The alignment of understanding between academics and practitioners is an interesting evidence, reinforcing the validity of the academic view of sustainability and confirming a broader view of practitioners that sustainability is more than philanthropic initiatives.

Another important contribution for both scholars and practitioners is the discussion on how sustainability can be inserted into corporate measurement systems. There have been some discussions on incorporating sustainability into the firm's balanced scorecard (Figge et al., 2002a, 2002b; Hahn and Wagner, 2001). The present research provides an alternative and more incremental recommendation for firms towards SPMS by incorporating sustainability indicators in their current PMS. The case studies conducted show four possibilities to do so: PMS for a specific organizational area/department, employee's individual PMS (used as basis for annual bonus), system of sustainability indicators for external communication (sustainability reports), and initial project assessment system. The cases indicated that each of these systems incorporated environmental and social indicators to their original financial driven performance criteria. The evidences collected show specific indicators such as water consumption, carbon emission, employee satisfaction and impact on the local community inserted in the above mentioned systems. However, this attempt is still incipient, since social and environmental indicators are being monitored, but the interactions (synergies or tradeoffs) between indicators are not explicit or assessed.

This interaction between indicators was also explored by the present paper, providing further understanding of the relative importance degree between sustainability indicators. The research shows evidence of factors that influence the priority amongst sustainability indicators. The cases show that the perception of the relative importance involves not only the business strategy (a factor that, to a certain extent, is controllable by companies), but also the requirements to enable firm's operation (such as revenue), the organization's maturity (history) in dealing with a given subject, and the urgency and pressure to solve specific problems. The relevance of academic research and formal official statement of firms regarding priorities between sustainability indicators and the firms understanding of the concept is that it can avoid misunderstanding between employees of the same company and promote synergies, since sustainability drivers for decision making are the same throughout the firm.

The main research indicates the need and the relevance for future researches focusing on the development of an integrative and dynamic SPMS encompassing more active (leading) indicators, i.e., that represent proactive efforts to boost profitability, reduce environmental impacts, and augment social benefits, to be added to the reactive (lagging) indicators. The dynamic and integrative aspect of PMS has been discussed by the corporate performance

literature (Bititci et al., 2000; Neely et al., 2000) and also by the sustainability performance literature (Figge et al., 2002a; Hubbard, 2009; Meyar-Naimi and Vaez-Zadeh, 2012). The present research complements this literature by evidencing the incorporation of sustainability indicators into the four performance systems already present in firms. It can thus serve as a first step to develop a more comprehensive SPMS in practice. In this sense, further studies are invited to address this challenge to enable the incorporation of sustainability into firms' core businesses.

One limitation of this study stems from the challenge of structuring the literature on sustainability performance, which is still relatively immature and dispersed. The research is also limited by the number of companies studied. Moreover, despite the triangulation of data collected in the field, the interviewee's perception influences the outcome of the study. This fact deserves special attention because the sustainability theme is still undergoing a structuring process (in both theory and practice), generating greater dependence on a more personal value judgment in the responses of the interviewees, and on the image the company wishes to project to the general public. With the exception of indicators published in the sustainability report, another limitation of this study was the access to sustainability indicators of the internal systems restricted by the companies. Another limitation concerns to the methodological approach of the case study. This approach may limit the generalization of the findings, considering the Brazilian scenario and the specific organizational context. Despite the research limitations, its contribution to both theory and practice are relevant, as previously discussed in the section. Research in the area of corporate sustainability is important to prevent sustainability from becoming a "mass grave, where everything fits in", as pointed out by one of the interviewees of the case study.

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