

## Sustainability

# Corporate sustainability practices in accredited Brazilian hospitals: a degree-of-maturity assessment of the environmental dimension

*Práticas de sustentabilidade corporativa em hospitais brasileiros acreditados: verificação do grau de maturidade quanto à dimensão ambiental*

*Prácticas de sostenibilidad corporativa en hospitales brasileños acreditados: evaluación del nivel de madurez en la dimensión ambiental*

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### Abstract

The main objective of this paper is to assess the degree of maturity of Brazilian accredited hospitals in relation to sustainable practices, specifically the environmental dimension. Therefore, a questionnaire was constructed, shaped by the literature review and the evaluation method of the Corporate Sustainability Index of **BM and FBovespa** (n.d.). Furthermore, the relationship between three corporate sustainability tools (the certification of the International Organization for Standardization [ISO] 14001, published sustainability reports, and the existence of an area dedicated to corporate sustainability) and the maturity of hospitals in relation to sustainability practices were assessed. The results show that, of the 38 hospitals that participated in the survey (43% of subjects studied), 58% obtained a maturity rating of very high or high rating, according to the established criteria. In addition, some research variables showed statistically significant differences among the hospitals that have ISO 14001 certification, those that publish sustainability reports, and those that have an area dedicated to sustainability. Consequently, hospitals should take action to include much more sustainability actions in their strategies, such as how to establish a participatory dialog with stakeholders, in order to improve and raise the level of maturity of hospitals.

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**Keywords:** Sustainability; Environmental sustainability; Accredited hospitals; Maturity level

### Resumo

O principal objetivo deste artigo é verificar o grau de maturidade dos hospitais acreditados brasileiros em relação às práticas de sustentabilidade, mais especificamente na dimensão ambiental. Para isso, um questionário foi construído a partir da revisão de literatura e do método de avaliação do Índice de Sustentabilidade Empresarial da **BM&FBovespa** (n.d.). Além disso, verificou-se a relação entre três ferramentas de sustentabilidade corporativa (certificação *International Organization for Standardization* [ISO] 14001, a publicação de relatórios de sustentabilidade e a existência de uma área dedicada à sustentabilidade na empresa) e a maturidade dos hospitais em relação às práticas de sustentabilidade. Os resultados apontam que, dos trinta e oito hospitais que participaram da pesquisa (43% do universo investigado), 58% das instituições obtiveram classificação de maturidade muito alta ou alta de acordo com os critérios estabelecidos. Ademais, algumas variáveis investigadas apresentaram diferenças estatisticamente significativas entre os hospitais que possuem a certificação ISO 14001, que publicam

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relatórios de sustentabilidade e que possuem uma área dedicada à sustentabilidade. Assim, os hospitais devem adotar atitudes para inserir cada vez mais a sustentabilidade em suas estratégias, como estabelecer um diálogo participativo com os *stakeholders*, que poderão aprimorar e elevar o grau de maturidade das instituições hospitalares.

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*Palavras-chave:* Sustentabilidade; Sustentabilidade ambiental; Hospitais acreditados; Grau de maturidade

## Resumen

El principal objetivo en este artículo es verificar el nivel de madurez de los hospitales brasileños acreditados respecto a las prácticas sostenibles, específicamente en la dimensión ambiental. Para ello, un cuestionario fue construido a partir de la revisión de la bibliografía y del método de evaluación del Índice de Sustentabilidad Empresarial de BM&F Bovespa. Además, se investigó la relación entre tres herramientas de sostenibilidad corporativa (*International Organization for Standardization* [ISO] 14001, la publicación de informes de sostenibilidad y la existencia de un área dedicada a la sostenibilidad en la empresa) y la madurez de los hospitales con relación a las prácticas de sostenibilidad. Los resultados muestran que, de los treinta y ocho hospitales que participaron en la encuesta (43% del universo investigado), el 58% obtuvo calificación de madurez muy alta o alta, de acuerdo con los criterios establecidos. Asimismo, algunas variables investigadas presentaron diferencias estadísticamente significativas entre los hospitales que cuentan con la certificación ISO 14001, que publican informes de sostenibilidad y que poseen un área dedicada a la sostenibilidad. De esa manera, los hospitales deben adoptar acciones que incluyan cada vez más la sostenibilidad en sus estrategias, como, por ejemplo, establecer un diálogo participativo con los *stakeholders*, lo que mejorará y elevará el nivel de madurez de los hospitales.

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*Palabras clave:* Sostenibilidad; Sostenibilidad ambiental; Hospitales acreditados; Nivel de madurez

## Introduction

From the 1980s, concern about the scarcity of natural resources and their conservation for future generations meant that all sectors of the economy began to assume responsibility in the pursuit of sustainable development (Klabi & Aragão, 2010). One of the areas under discussion is health, more specifically, the hospital sector, whose operations have a major social and environmental impact, since they involve a huge amount of waste to be disposed of in landfills (Jarousse, 2012), as well as high consumption of materials and energy (Weisz, Haas, Pelikan, & Schmied, 2011).

A first step in the pursuit of sustainability in the sector is to assess the impact of its activities by building metrics: these are important not only to assess the current state of companies, but also to assist in setting future goals for reducing environmental harm caused by operations (Zucchi & Mwamakamba, 2011). Therefore, this study aims to assess the degree of maturity of Brazilian hospitals in relation to corporate sustainability actions, particularly in the environmental dimension.

To this end, a questionnaire was created, inspired by the literature review and the Índice de Sustentabilidade Empresarial (Corporate Sustainability Index/ISE), the Brazilian index that analyzes the performance of companies listed on BM&FBovespa according to aspects of corporate sustainability. Additionally, the degree of commitment to sustainable practices was also evaluated, using three parameters: (i) operational performance, evaluated based on ISO 14001 certification; (ii) the relationship with society and transparency, evaluated based on publication of a Sustainability Report; and (iii) management structure, evaluated based on the existence of a specific sustainability area.

The paper is organized as follows: first, a literature review is presented addressing the key concepts of corporate sustainability and its elements, such as corporate sustainability certifications, reports and indicators, etc. Environmental sustainability issues for hospitals are looked at in depth. The methodology, the research questions and the hypotheses are then described. A discussion of the results follows, with a rating of the hospitals according to the degree of maturity. Finally, the main conclusions of the research are presented.

## Review of the literature

### *Corporate sustainability and its tools*

Corporate sustainability concerns the way in which enterprises conduct business, including their production processes, stakeholder engagement, disclosure and public commitments (João, Serralvo, & Cardoso, 2011; Zylberstajn & Lins, 2010). Based on the balance between financial, environmental and social aspects (triple bottom line) in the management and evaluation of companies (Lemme, 2010), the concept of corporate sustainability should be aligned with the organization's strategy and objectives (Marrewijk, 2003). For this to occur, it is essential to use tools for monitoring, measurement, incentive, information and engagement in this area. Among the existing mechanisms, we will analyze those that according to the literature have the highest impact on the management of corporate sustainability: (i) ISO 14001 certification, (ii) publication of sustainability reports, and (iii) creation of a specific area in the company; in addition to sustainability indexes.

### ISO 14001 certification

In order to minimize the negative effects of their activities on the environment, companies seek to adapt their activities to modern environmental management standards, ISO 14001, in particular (Alexander et al., 2008; International Organization for Standardization [ISO] 2009; Jabbour, Teixeira, & Jabbour, 2013). ISO 14001 is a voluntary and certifiable standard aimed at the continuous improvement of environmental standards, through the establishment of management objectives and systems (Oliveira, 2008). In addition, it provides strategies and general guidelines for businesses' targeting of policies, plans, projects and environmental programs (Brouwer & Koppen, 2008; Korul, 2005; Oliveira, 2008).

To receive the certification seal, the company must identify environmental aspects; conduct environmental audits, and put procedures and plans in place in the event of an emergency environmental nature (Abreu, 2011). As a result of the right application of the standard, the company benefits from an optimal use of resources and consequently (i) reduction of waste or increased efficiency (Oliveira, 2008); (ii) increasing competitiveness based on measurement, innovation, and profits; and (iii) a more credible image vis-à-vis society (Korul, 2005; Petroni, 2000). Thus, the literature indicates that hospitals with ISO 14001 certification are more advanced in terms of sustainability practices than those without. This allows us to formulate the following null hypothesis:

**H01.** There is no statistically significant difference in terms of adopted sustainability practices among hospitals that do have ISO 14001 certification and those that do not.

### Sustainability report

The second tool used in the pursuit of corporate sustainability is the sustainability report, which aims to systematize and disseminate information – quantitative and qualitative – about the environmental performance of the company, fostering engagement and providing all stakeholders with transparency (Global Reporting Initiative [GRI], 2011; Oliveira, 2008). Among the main models of Sustainability Reports, the most used is the Global Reporting Initiative (GRI), a non-profit organization founded in 1997 that offers sustainability reporting guidance and metrics for the structuring of reports around the world, regardless of a business's size or sector.

Sustainability reports perform the fundamental role of reporting the activities carried out by institutions, systematically conveying transparency and communication with the different stakeholders (Oliveira, 2008; GRI, 2011). By doing so, such reporting can act in the evaluation of the company's performance and position on sustainable issues, denoting a possible influence of sustainable development in the company's strategy. Thus, the literature reviewed indicates that hospitals that publish sustainability reports are more advanced in terms of sustainability practices than those that do not. Thus, the following null hypothesis:

**H02.** There is no statistically significant difference in terms of adopted sustainability practices among hospitals that do publish a sustainability report and those that do not.

### Specific area responsible for sustainability

Having teams in place that are responsible for establishing organizational goals, objectives and timelines (planning) and monitoring implementations, performance metrics and evaluations (supervision) are success factors in hospital environmental sustainability projects that propel the company toward the adoption of sustainable practices (Hamilton, 2008; Jarousse, 2012; Turpin & Lee, 2011). These teams (called green teams) are best staffed by individuals and departments from throughout the company, and, if possible, a hired manager, such as a Director of Sustainability, who would be tasked with (i) supervising the sustainable initiatives put in place by other managers throughout the organization; (ii) providing the company with technical expertise and overseeing the training and work of the sustainability teams; and (iii) fostering outreach with the surrounding community (Hamilton, 2008; Jarousse, 2012).

Thus, the following null hypothesis:

**H03.** There is no statistically significant difference in terms of the sustainability practices adopted, among hospitals that do have a specific area dedicated to sustainability and those that do not.

### Corporate Sustainability Indicators

The Corporate Sustainability Indicators are the numbers that are capable to reflect the dimensions quoted in the Triple Bottom Line (Siche, Agostinho, Ortega, & Romeiro, 2007): they allow managers to have an assessment of the environment and social systems, both in the macro and micro realms, with short- and long-term perspectives, thus helping them to determine what actions should or should not be taken in the pursuit of a sustainable society (Ness, Urbel-Piirsalu, Anderberg, & Olsson, 2007). Singh, Murty, Gupta, and Dikshit (2011) highlight the importance of sustainability indicators as powerful tools for the adoption of policies and communication since they can simplify complex information.

This paper focuses on the indicators known as *best in class*, *best of class*, and *qualitative screening*, which aims to list the best companies in each sector with respect to sustainability standards (Lemme, 2010). Examples of these indicators include the Dow Jones Sustainability Indexes (DJSI), a family of indexes established by the New York Stock Exchange in 1999, and the FTSE-4Good, a similar index of the London Stock Exchange launched in 2001. For emerging markets, notable examples include the JSE Responsible Investment index of the Johannesburg Stock Exchange, established in 2004, and the Índice de Sustentabilidade Empresarial (ISE) of Brazil's Sao Paulo Stock Exchange, launched in 2005 (Marcondes & Bacarji, 2010). A pioneering initiative in Latin America, the ISE aims to foster an investment scenario compatible with current society's needs of sustainable development, thereby highlighting the companies that align their strategic planning with social and environmental practices (Monzoni, 2010). For this reason, the ISE can be used as a benchmark for socially responsible investments in addition to serving as a stimulus to the institutions for ethical responsibility and the introduction of environmental, social and governance in decision making on investments (Pinto, 2010).

In this paper, the methodology for assessing the ISE was the basis for devising a maturity index of sustainability-accredited Brazilian hospitals, as it will be further detailed in the methodology section.

### *Corporate sustainability in the hospital healthcare industry*

Hospitals – institutions that play a central role in the health-care system – can minimize their negative side and forge gains in health itself by integrating social and environmental questions into the core business, i.e., health care and promotion of health (Weisz et al., 2011). Sustainable development for hospitals is linked to the optimization of the various quality criteria, not only in terms of the hospital's main activity, but also for its economic efficiency, and environmental (Jameton & McGuire, 2002) and social (Weisz et al., 2011) compatibility. It is important to emphasize that sustainability programs should reflect the unique needs and characteristics of each organization; this is because the implementation of this type of program in business requires, in addition to time, a significant cultural shift (Griffiths, 2006). Moreover, for hospitals, these programs end up permeating all aspects of the institution at all levels, both in terms of culture and education (Hamilton, 2008), including food service, materials management, and nursing staff (Jarousse, 2012).

A successful environmental sustainability program provides the company with several advantages. First, the organization enjoys increased performance in terms of efficiency and effectiveness (Donabedian, 1998, as cited in Manzo, Brito, & Corrêa, 2012, p. 389). These increases are accompanied by improved outcomes in terms of clinical results, the experience of staff and patients, system reliability and company's culture (Jarousse, 2012). The second advantage is the reduction of risk, given the regulatory oversight of energy consumption and waste disposal (Jarousse, 2012). The third benefit is in reduced costs: less consumption of resources and less generation of waste (Hamilton, 2008; Gillmeister, 2012; Jarousse, 2012). At last, there is an increase in society's positive perceptions, due to the conservation of scarce resources and promotion of the health of patients and staff (Grayson et al., 2011; Jarousse, 2012).

After a literature review, we list the factors considered decisive for the success of hospital environmental sustainability projects:

- Integration of sustainable development concepts in the company's strategy (Gillmeister, 2012; Jarousse, 2012);
- leadership as a differentiating factor in the successful implementation of sustainable initiatives (Gillmeister, 2012; Jarousse, 2012);
- measurement of risks and impacts of operations, which helps teams with constructing goals and metrics and monitoring and evaluation (Hamilton, 2008; Jarousse, 2012; Turpin & Lee, 2011).
- variable compensation linked to the achievement of sustainable goals (Hamilton, 2008; Jarousse, 2012).
- water management programs: a sustainable practice that seeks to optimize resources and reduce waste (Brega & Filho

Mancuso, 2003; Ilha, Nunes, & Salermo, 2006; Poland & Dooris, 2010).

- energy efficiency programs aimed at cutting costs and increasing profit.
- sustainable procurement, with materials harmful to the environment being replaced by those that are less aggressive (Hamilton, 2008; Lamming & Hampson, 1996);
- systematic communication of performance to stakeholders, thus bringing transparency to the actions taken and engagement of these parties (Hamilton, 2008).
- educational programs that influence stakeholders involved in the process (Gillmeister, 2012; Turpin & Lee, 2011).
- increased indexes of efficiency and effectiveness due to sustainability practices, thus providing increases in critical care to the sector, without impacting other areas (Jarousse, 2012; Oliveira, 2008).
- communication without the need to demand from stakeholders, which is important from the point of view of establishing relations between the parties (Oliveira, 2008) and (GRI, 2011).
- start of sustainable actions by the waste management program, which entails the institution cutting costs (Jarousse, 2012).
- Creation of teams responsible for setting goals and short and long term goals, timelines, supervision of implementations, measurement metrics, and evaluation of organizational performance, working closely with key leaders, in particular, the board of directors (Hamilton, 2008; Jarousse, 2012; Turpin & Lee, 2011).

Throughout the literature review, no papers were found that proposed evaluation metrics for sustainability actions by hospitals, or even undertaking a comparative assessment of engagement by hospitals or their degree of maturity in relation to sustainability practices. Although studies stress the need to evaluate organizational performance in relation to sustainability goals (Gillmeister, 2012; Jarousse, 2012; Zucchi & Mwamakamba, 2011) and to devise specific indexes for certain economic practices (Siche et al., 2007) such as hospital activities. Therefore, this study aims to contribute to a subject little explored in theory, seeking to evaluate the performance of the hospital sector in Brazil through metrics designed specifically for this type of economic activity.

### **Method**

This work is a quantitative, descriptive and exploratory field study, whose main purpose is to assess the degree of maturity of accredited Brazilian hospitals in relation to sustainable practices, specifically in the environmental dimension. The population consists of 88 institutions that in October 2012 had at least one of the following accreditations: Accreditation Canada International (ACI), Joint Commission International (JCI), and/or Organização Nacional de Acreditação (ONA) "Acreditado com Excelência" (Accredited with Excellence), according to the information posted on the sites of the respective accreditations, of hospital program types, with operations in Brazil. Of these,

75 agreed to participate in the survey; of these, only 38 actually completed the questionnaire.

The questionnaire was based on the literature review, the questionnaires used by the authors cited in the review itself, and questions adapted from Group E (covering the service sector, including medical and hospital services) of the ISE questionnaire of 2011. The questionnaire consists of three parts:

Part I – Demographic profile, for characterization of the respondent and the institution, based on 12 questions. Open-ended questions with a nominal, nonparametric scale.

Part II – Sustainability practices – overall dimension: issues related to the hospital's position as the leading practice in corporate sustainability. For all questions, the Likert scale of 5 points was adopted.

Part III – Sustainability practices – environmental dimension: questions regarding the profile of the institution with regard to the environmental sustainability actions taken by the hospital. For all questions, the 5-point Likert scale was adopted.

The questionnaire was submitted to a pretest with six health professionals in order to evaluate the clarity of the instrument and the correspondence of the business terms to medical terms and vice versa. To validate the proposed scale, Cronbach's alpha, or alpha coefficient, was used as a measure of internal consistency of the scale. The Alpha coefficient varies between 0 and 1, with a coefficient equal to or greater than 0.7 being considered satisfactory (Hair, Black, Babin, Anderson, & Tatham, 2009). The Cronbach's Alpha obtained in this study was 0.765, which shows the internal consistency of the adopted scale. Following is a descriptive and exploratory analysis of the data, not only to trace the demographic profile, but also to compute the degree

of maturity of the sample hospitals in terms of sustainability actions. Finally, the nonparametric Wilcoxon–Mann–Whitney test for comparison of independent samples was applied in order to test the hypotheses.

#### *Weighting system based on the Índice de Sustentabilidade Empresarial (ISE) (Corporate Sustainability Index)*

In order to compute the degree of maturity of the hospitals surveyed in terms of sustainability actions and perform the non-parametric test, the weighting methodology applied by the ISE was adopted. The index has seven dimensions composed of criteria which have specific indicators based on which the questions are formulated. The criteria have different weights assigned according to their relevance to society, taking into account the context of business management (Critérios & Pesos ISE 2011/2012).

In this research, two dimensions were adapted from ISE: (i) general, applicable to all groups and sectors investigated by the index, pertaining to the commitment to sustainability and its development, through due concern for the future viability of the company; (ii) environmental (for service companies, such as health institutions), pertaining to policy, management, performance and legal compliance. The criteria, indicators and weights of each dimension are listed in Table 1.

The General dimension has four criteria: Commitment, Alignment, Transparency, and Combating Corruption. Because it was outside the scope of this work, "Fighting Corruption" was removed from the study and its points were redistributed among the other criteria, per Table 2. The questions in this section (1 to 4) were taken from the ISE index itself, thus maintaining the direct correlation between questions, criteria and indicators.

Table 1  
General and environmental ISE dimensions.

Dimension	Criterion	Indicator	Weight
General	Commitment	Basic commitment	15
		Voluntary commitments	
	Alignment	Consistency of commitments	25
		Policy of engagement with stakeholders	
	Transparency	Remuneration	40
		Reports	
Fighting corruption	Fighting corruption	20	
Environmental	Political	Commitment, scope and dissemination	5
		Environmental responsibility	
		Planning	
	Management	Management and monitoring	55
		Management systems	
		Communication with stakeholders	
		Global commitment: biodiversity	
	Performance	Consumption of environmental resources – inputs	25
		Emissions and waste	
		Critical emissions and waste	
Permanent preservation area			
Legal compliance	Legal reserve	15	
	Environmental liabilities		
	Administrative requirements		
	Administrative procedures		
		Judicial procedures	

Table 2  
Weighting and scoring system.

Dimension	Variable	Item weight	Dimension weight	Maximum score	Total score
General	1. Insertion in the strategy	14.28	100	71.4	500
	2. Measurement of risks and impacts	23.81		119.05	
	3. Variable remuneration	23.81		119.05	
	4. Impact monitoring	38.1		190.5	
	5. Systematic communication to stakeholders	15.79		78.95	
	6. Communication independent of demand	15.79		78.95	
	7. Educational programs	2.63		13.15	
	8. Efficiency and effectiveness	15.79		78.95	
	9. Independence from financial results	2.63		13.15	
Environmental	10. Beginning at waste management	7.895	100	39.475	500
	11. Security of executors	7.895		39.475	
	12. Reuse of hospital items	7.895		39.475	
	13. Energy efficiency programs	7.895		39.475	
	14. Water management programs	7.895		39.475	
	15. Sustainable procurement	7.895		39.475	

The environmental dimension has four criteria: Policy, Management, Performance and Legal Compliance. Because it was outside the scope of this work, “Legal Compliance” was removed from the study and its points were redistributed among the other criteria, per Table 2. The correlation of questions vis-à-vis criteria was established by adapting the content of the question to the definition of the criterion. Thus, the criterion Policy added questions 7 and 9 – dealing with the company’s commitment and strategy. The criterion Management encompassed questions 5 and 6 – which relate to the indicator communication with stakeholders – and 8 – which relates to operating efficiency and effectiveness. Questions 10 to 15 belong to the criterion Performance, which assesses the monitoring of consumption of resources. In order to facilitate the calculations, the values are redistributed to the sum of one hundred points between the eleven questions, i.e., new weights are generated by dividing the total value by the weight of each question, as expressed in Table 2.

As already pointed, the 5-point Likert scale was used, so the weights were multiplied by 5 in order to find the maximum possible scores, which represent the maximum degree of maturity in terms of sustainability actions (Table 2).

#### *Calculation of the degree of maturity of hospitals in terms of sustainability actions*

After performing the weightings, one can calculate the degree of maturity of the hospitals surveyed in terms of sustainable practices and classify them in quartiles, each interval containing 199 points. This number was obtained by adjusting the division of the total range of 799 points (i.e., the difference between 999 and 200, maximum and minimum, respectively - 1 point, equivalent to the benchmark, was removed) by 4, or 25% of the total range. Thus, below is the proposed rating system, indicating the different maturity levels of sustainable practices:

- Rating 4, or Very High (VH): the hospital has adequate management of sustainable practices. Between 800 and 999 points.

- Rating 3 or High (H): the hospital applies most of the concepts of sustainable practices researched in its management; however, this application is not comprehensive. Between 600 and 799 points.
- Rating 2, or Low (L): indicates that the institution applies only some of the sustainable concepts and in an inconsistent way. Between 400 and 599 points.
- Rating 1 or Very Low (VL): indicates that the institution is unaware of or does not apply sustainable practices. Between 200 and 399 points.

The degree of maturity of the hospital is defined by the sum of the result of multiplication of the variables in each weighted dimension by the respondent’s agreement with the statements (on a scale of 1 to 5). To characterize the management of the institution as a benchmark in terms of sustainability practices, the maximum score is required on all the characteristics, i.e., a score of 1000 points.

## **Results**

The respondents represented 43% of the previously defined population. The vast majority are private (92%) and located in the Southeast region (76%). With regard to sustainability management tools, 11% of hospitals have ISO 14001 certification, 18% publish sustainability reports, and 45% have a specific area to address sustainability issues.

#### *Degree of maturity of sustainable practices in hospitals*

Among the 38 hospitals in the sample, 7 (18%) were rated as 4, i.e., Very High (VH); 15 (39%) were rated as 3, i.e., High (H); and 15 (39%) were rated as 2, i.e., Low (L). Only one hospital (4%) was rated as 1, i.e., Very Low, (VL). No hospital was considered a benchmark. The hospital with the best performance scored 885 points and the hospital with lowest performance scored 350 points, i.e., a range of 535 points.

All ISO 14001 certified hospitals (4 in total) obtained a rating of high or very high: Two hospitals obtained a rating of 3 and

other two obtained a rating of 4. This concentration of hospitals certified at the highest levels of maturity supports the view that the ISO 14001 is associated with minimizing the negative effects of business activities on the environment, indicating a high degree of maturity in terms of the sustainable practices of those institutions (Petroni, 2000; Brouwer & Koppen, 2008; ISO, 2009; Korul, 2005; Oliveira & Serra, 2010; Oliveira, 2008).

All five institutions (13%) having a specific area dedicated to the planning and supervision of sustainable actions activities also achieved the best results: Two achieved a rating of 3 (H) and three obtained a rating of 4 (VH). This result indicates that hospitals with an area dedicated to sustainability are more developed – or even mature – in terms of sustainability actions, an observation that goes along with the literature reviewed (Hamilton, 2008; Jarousse, 2012; Turpin & Lee, 2011).

Regarding social reports, no relationship was found between their publication and a greater degree of maturity in terms of sustainability practices. Of the seven hospitals that publish reports of this type (18%), only one was rated as 4 (VH); three were rated as 3 (H); the remaining three were rated as 2 (L). A likely reason for these divergent ratings is the lack of standardization among publications: different commitments vis-à-vis release of actions and relationships with stakeholders. For this reason, organizations, such as GRI, seek to standardize metrics for structuring reports, thereby by making them comparable.

#### Mann–Whitney test

##### Test of hypothesis 1: ISO 14001

**Ho1.** There is no statistically significant difference in terms of adopted sustainability practices among hospitals that do have ISO 14001 certification and those that do not.

As can be seen in Table 3, significant differences were observed for seven of the variables under study; that is, the null hypothesis was rejected for seven of the 15 variables investigated. The surveyed hospitals that have ISO 14001 certification obtained higher scores for the items “inclusion in the company’s strategy,” “measurement of risks and impacts,” “variable remuneration” and “water management” ( $p < 0.05$ ), and for the items “systematic communication with stakeholders,” “educational programs” and “efficiency and effectiveness” ( $p < 0.10$ ). In summary, the hospitals that have ISO 14001 certification showed significant differences in terms of the adopted sustainability practices, but only for seven of the fifteen variables investigated in this study. Thus, hypothesis H01 was partially hypothesis rejected.

##### Test of hypothesis 2: reports publication

**Ho2.** There is no statistically significant difference in terms of adopted sustainability practices among hospitals that do publish a sustainability report and those that do not.

As can be seen in Table 4, when performing the test to check if there were significant differences in terms of sustainability practices by hospitals that do publish sustainability reports, compared to those that do not, significant differences were observed

Table 3  
Hypothesis 1 Mann–Whitney test.

ISO 14001 certification	U	Z	p-value
1. Insertion in strategy	16	−2.601	0.009**
2. Measurement of risks and impacts	22.5	−2.224	0.026**
3. Variable remuneration	22.5	−2.31	0.021**
4. Impact monitoring	37	−1.543	0.123
5. Systematic communication to stakeholders	34.5	−1.652	0.099*
6. Communication independent of demand	56	−0.586	0.558
7. Educational programs	34	−1.688	0.091*
8. Efficiency and effectiveness	35	−1.651	0.099*
9. Independence from financial results	64.5	−0.18	0.857
10. Beginning waste management	45.5	−1.178	0.239
11. Security of executors	54	−0.686	0.493
12. Reuse of hospital items	59.5	−0.418	0.676
13. Energy efficiency programs	50	−0.933	0.351
14. Water management programs	19	−2.43	0.015**
15. Sustainable procurement	50	−0.886	0.376

\* Differences statistically significant at 10%.

\*\* Differences statistically significant at 5%.

Table 4  
Hypothesis 2 Mann–Whitney test.

Publication of reports	U	Z	p-value
1. Insertion in strategy	84	−0.97	0.332
2. Measurement of risks and impacts	100	−0.329	0.742
3. Variable remuneration	93	−0.623	0.533
4. Impact monitoring	98.5	−0.394	0.694
5. Systematic communication to stakeholders	92.5	−0.625	0.532
6. Communication independent of demand	42.5	−2.55	0.011**
7. Educational programs	55	−2.103	0.035**
8. Efficiency and effectiveness	100	−0.337	0.736
9. Independence from financial results	73	−1.448	0.148
10. Beginning waste management	55.5	−2.197	0.028**
11. Security of executors	94	−0.562	0.574
12. Reuse of hospital items	85.5	−0.896	0.37
13. Energy efficiency programs	87.5	−0.862	0.389
14. Water management programs	56.5	−2.042	0.041**
15. Sustainable procurement	107	−0.058	0.953

\*\* Differences statistically significant at 5%.

( $p < 0.05$ ) for four variables investigated in this study: communication independent of the need of demand from stakeholders; educational programs; beginning of sustainable practices for waste management, and water management programs. In summary, the hospitals that publish sustainability reports showed significant differences in terms of the sustainability practices adopted in four of the fifteen investigated items. Thus, hypothesis H02 was partially hypothesis rejected.

##### Test of hypothesis 3: specific area responsible for planning and oversight of sustainability issues

**Ho3.** There is no statistically significant difference in terms of the sustainability practices adopted, among hospitals that do have a specific area dedicated to sustainability and those that do not.

As shown in Table 5, when performing the test to see if there were significant differences in terms of sustainability practices adopted by hospitals that have a specific area responsible for

Table 5  
Hypothesis 3 Mann–Whitney test.

Sustainability area	<i>U</i>	<i>Z</i>	<i>p</i> -value
1. Insertion in strategy	31	−2.339	0.019**
2. Measurement of risks and impacts	33.5	−1.174	0.03**
3. Variable remuneration	41.5	−1.89	0.059*
4. Impact monitoring	46.5	−1.627	0.104
5. Systematic communication to stakeholders	32.5	−2.238	0.025**
6. Communication independent of demand	60.5	−0.975	0.33
7. Educational programs	34	−2.186	0.029**
8. Efficiency and effectiveness	47.5	−1.59	0.112
9. Independence from financial results	82	−0.023	0.981
10. Beginning waste management	53	−1.402	0.161
11. Security of executors	69.5	−0.578	0.563
12. Reuse of hospital items	75	−0.335	0.738
13. Energy efficiency programs	63.5	−0.894	0.371
14. Water management programs	41	−1.869	0.062*
15. Sustainable procurement	64	−0.827	0.408

\* Differences statistically significant at 10%.

\*\* Differences statistically significant at 5%.

planning and oversight of sustainability issues, compared to those without such an area, a significant difference was observed in six variables: insertion in the strategy; measurement of risks and impacts; systematic communication to stakeholders; educational programs; variable remuneration; and water management programs. In short, the hospitals that have a specific area responsible for the planning and supervision of sustainability actions showed significant differences in terms of the sustainability practices adopted in six of the fifteen items investigated. Thus, hypothesis H03 was partially hypothesis rejected.

## Conclusion

The results of this study point to a high level of adoption of the initiatives described in the literature, where seven hospitals (18%) had a rating of 4 (VH), and 15 hospitals (39%) had a rating of 3 (H); hence, 58% of hospitals were rated in the upper quartiles. On the other hand, 15 hospitals (39%) had a rating of 2 (L); and one hospital (3%) had a rating of 1 (VL). The hospitals that have ISO 14001 certification and a specific area for the planning and supervision of sustainable activities rank at the top, with ratings levels of 4 and 3. These characteristics are direct indications of a structured concern on the part of these institutions with regard to the impact of their activities on the environment. Their ranking at these higher levels also demonstrates a formal treatment on the part of the administration; indeed, they made investments in an environmental certification seal and in an organizational hierarchy, through a sustainability area.

As for the publication of reports, this parameter was perceived at levels 4, 3 and 2, which thus did not allow further conclusions to be made in that regard. In practice, a certain difference among the reports consulted had already been perceived: only the institutions that externally published such documents were considered. Thus, it can be concluded that the publication of reports, without any specific standardization, was not able to contribute directly to a higher ranking of degree of maturity in terms of sustainable practices.

Table 6  
Summary of observations – hypothesis testing.

Variable	ISO 14001	Report	Sustainability area
1. Insertion in strategy	**		**
2. Measurement of risks and impacts	**		**
3. Variable remuneration	**		*
4. Impact monitoring			
5. Systematic communication to stakeholders	*		**
6. Communication independent of demand		**	
7. Educational programs	*	**	**
8. Efficiency and effectiveness	*		
9. Independence from financial results			
10. Beginning waste management		**	
11. Security of executors			
12. Reuse of hospital items			
13. Energy efficiency programs			
14. Water management programs	**	**	*
15. Sustainable procurement			

\* Differences statistically significant at 10%.

\*\* Differences statistically significant at 5%.

Another objective of this research was to investigate the relationship between the ISO 14001, the publication of reports, the presence of a specific area dedicated to sustainability, and the adopted sustainability practices. The three null hypotheses were partially rejected. This information was grouped in Table 6.

For ISO 14001 certification, the null hypothesis H01 was partially rejected. Since, for seven variables a significant difference between hospitals that have and those that do not have this certification was observed. Thus, it can be concluded that these aspects deserve the attention of hospital managers who seek to enhance their practices of sustainability initiatives, in particular at the environmental dimension. Regarding the publication of reports, because for four variables there was a significant difference between hospitals that do publish a sustainability report and those that do not, null hypothesis H02 was partially rejected. Regarding the existence of a specific area responsible for planning and supervision of sustainability practices, null hypothesis H03 was partially rejected, since for six variables there was a significant difference between hospitals that do have such an area and those that do not. Therefore, it can be concluded that these are aspects that deserve the attention of hospital managers, who must create this specific area with due care to the content of such remit. Moreover, in observing Table 4, it appears that the educational programs and water management variables showed statistically significant differences in the three cases studied. In addition, the ISO 14001 certification showed a greater number of variables with significant differences, showing supremacy over the other factors in the sample studied.

It is concluded, then, that the accredited hospitals operating in Brazil, despite having a high level of adoption of practices in terms of sustainability, they still have a way to go in order to improve their degree of sustainable maturity. It is important to emphasize the variables that were able to differentiate hospitals with statistical significance. It is believed, so, that such hospitals



can obtain higher ratings and will ultimately have greater commitment if they adopt a new behavior as part of their routine. It is possible that the institutions with lower maturity levels (ratings 1 and 2), based on the longer trajectory to be traveled, have greater difficulties with regard to raising awareness and also to change the attitude of collaborators. It is therefore necessary not only to regular educational programs that are carried out as well as garnering the support of the leaders. Other factors to be considered and adopted are the identification of drivers and ongoing auditing.

### Research contributions

This study brings together academic and managerial contributions to the knowledge of sustainability in the hospital sector. For academic purpose, the paper presents the proposition of a weighted rating scale for assessing the degree of maturity of sustainable practices in hospitals. Regarding the business community, the research can help managers to construct models of sustainable management in hospitals: the study identified the relationship between specific factors and the most statistically significant variables for the degree of maturity of sustainability practices.

### Suggestions for future research

Seeking to broaden the understanding of sustainability practices in the health sector, the choice of a more specific universe is suggested. For example, only hospitals in the state of São Paulo or Rio de Janeiro – and not necessarily accredited ones, since some hospitals can be unaccredited yet have good sustainable practices. Further comparative studies between regions, locations, and audiences could also be made. Additionally, it would be interesting to conduct a survey aimed at understanding how the factors studied – ISO 14001 certification – publication of reports – specific area for sustainability – explain, through the 15 sustainable actions surveyed, the degree of maturity of accredited hospitals in Brazil.

Because this work addressed a single aspect of sustainability, i.e., the environmental dimension, further research on the social and financial dimensions of the triple bottom line is suggested. It would also be interesting to see, using a qualitative study, whether consumers of hospital services are influenced by sustainable factors when choosing a point of care.

Finally, because the focus of this study was the hospital sector, it would be appropriate to extend the study of sustainability practices to other players in the health system (e.g., analysis/diagnosis laboratories, the pharmaceutical industry, equipment suppliers), thereby affording an understanding of the industry as a whole and enabling the formulation of general and comprehensive metrics from the legislative and government action point of view.

### Conflict of interest

The authors declare no conflicts of interest.

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