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## Environmental sustainability in hotels, theoretical and methodological contribution

Sustentabilidade ambiental nos hotéis, contribuição teórica e metodológica

La sostenibilidad ambiental em hoteles, teórica y metodológica contribución

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**Abstract:** *The environmental sustainability is a multidisciplinary subject and its scope has attracted the attention of researchers from various fields of knowledge. In this perspective, the environmental management in the hotel industry stands out for two aspects: first, the economic importance of the hotels, a key element of the tourism sector, and second, the environmental impacts generated that need to be managed. Thus, it is important to examine how this subject has been addressed by the academia. In this sense, the objective of this research, exploratory and descriptive in nature, consists of mapping the theme of sustainability management in hotels, according to the delimitations set by researchers. To accomplish this purpose, we used the Knowledge Development Process - Constructivist (ProKnow-C). At the end of the survey, 13 articles were identified, published in international journals within the framework established by the researchers. The development of the Bibliographic Portfolio (BP) has taken into account some aspects: (i) relevance and adherence to the theme of the articles; (ii) proposals and results obtained in the research; (iii) theoretical and methodological contribution of the research published in the BP items. The results show that the topic is relevant and current, and that it lacks a structured process to evaluate the environmental management, in order to support management decisions.*

**Keywords:** *Environmental Sustainability. Hotels. Bibliographic study.*

**Resumo:** A sustentabilidade ambiental é um assunto multidisciplinar e sua abrangência tem chamado a atenção de pesquisadores de várias áreas do saber. Nesta perspectiva, destaca-se a gestão ambiental em empresas hoteleiras, por dois aspectos, primeiramente a importância econômica dos hotéis que constituem um elemento-chave do setor de turismo, e em segundo lugar, a atividade gera impactos ambientais que necessitam ser gerenciados. Dessa maneira, compreende-se que cabe investigar como o tema é tratado no meio acadêmico. Nesse sentido, o objetivo da presente pesquisa, de natureza exploratório-descritiva, consiste no mapeamento do tema gestão da sustentabilidade em hotéis, segundo as delimitações postas pelos pesquisadores. Para cumprir tal

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propósito, utilizou-se o processo *Knowledge Development Process – Constructivist (ProKnow-C)*. Ao final do levantamento, identificaram-se 13 artigos publicados em periódicos internacionais alinhados às delimitações postas pelos pesquisadores. Na montagem do Portfólio Bibliográfico (PB), evidenciaram-se: (i) aspectos de relevância e aderência dos artigos ao tema; (ii) propostas e resultados obtidos nas pesquisas; (iii) contribuição teórica e metodológica das pesquisas divulgadas nos artigos do PB. Os resultados revelam que o tema é relevante e atual, que carece de processo estruturado para avaliar a gestão ambiental afim de apoiar decisões gerenciais.

**Palavras-chave:** Sustentabilidade ambiental. Hotéis. Estudo bibliográfico.

**Resumén:** *La sostenibilidad del medio ambiente es un tema multidisciplinario y su alcance ha atraído la atención de los investigadores de diversos campos del saber. En esta perspectiva, no es la gestión ambiental en la industria hotelera, por dos aspectos, en primer lugar la importancia económica de los hoteles que son un elemento clave en el sector turístico, y en segundo lugar, la actividad genera impactos ambientales que deben ser gestionados. Por lo tanto, se entiende que se trata de investigar el tema se trata en el mundo académico. En este sentido, el objetivo de esta investigación, exploratorio y descriptivo en la naturaleza, consiste en mapear el tema de la gestión de la sostenibilidad en los hoteles, de acuerdo con las delimitaciones que plantean los investigadores. Para lograr este fin, hemos utilizado el proceso de conocimiento Proceso de Desarrollo - Constructivista (ProKnow-C). Al final del estudio, se identificaron 13 artículos publicados en revistas internacionales concuerdan con los límites colocados por los investigadores. Al instalar el bibliográfica de la cartera (PB) se pone de manifiesto a través de: (i) los aspectos de relevancia y la adhesión a la temática de los artículos; (ii) las propuestas y los resultados obtenidos en la investigación; (iii) la contribución teórica y metodológica de la investigación publicada en los artículos PB. Los resultados muestran que el tema es relevante y actual, que carece de proceso estructurado para evaluar la gestión ambiental con el fin de apoyar las decisiones de gestión.*

**Palabras clave:** Sostenibilidad del medio ambiente. Hoteles. Estudio bibliográfico.

## 1 INTRODUCTION

The hotel industry is important to the world economy as it contributes to economic and social development. However, to develop their activities, processes and services the hotels generate environmental impacts that may contribute to global warming and the depletion of natural resources.

The awareness and social pressure led the hotels to start managing the environmental impacts of their activities and to become accountable to society for this management. In this sense Oliveira et al. (2016) warn that the interest of society in sustainability becomes a decisive factor for selecting a given tourism enterprise, representing also a guarantee of comfort and hospitality.

According to Buosi et al. (2014) the re-

lational view of sustainable development of the place and the perceived image by tourists brings an interesting perspective to the strategic planning of marketing actions aiming at the success of the tourism destination, enabling the performance improvement of the enterprises.

The importance of the subject and its multidisciplinary scope prompted the motivation of the authors of this study to broaden their understanding of the topic, making the following research question: "How to conduct a mapping of Sustainability Environmental Management in Hotels, within the framework defined by the researchers?"

Thus, it was established as a general objective of this work to conduct a mapping on the topic Sustainability Management in Hotels, according to the framework set forth

by the researchers.

To achieve the above-mentioned objective, we adopted the Knowledge Development Process – Constructivist (ProKnow-C) proposed by Ensslin et al. (2010) as an instrument of intervention.

In addition to this introduction, this paper features four more sections. In section two, we present a review of literature on environmental sustainability in hotels. Section three, in addition to the methodological framework, presents the assumptions of the research, as well as the instrument of intervention. Section four presents the results of the survey, and, finally, in section five we present the conclusions of the work.

## 2 THEORETICAL FRAMEWORK

This section presents some issues related to the theme in order to a better understanding of it and to search the international theoretical framework.

The theme of environmental sustainability management in hotels has been developing aiming to contribute to the debate on the environmental problems of the global ecosystem experienced over the last few decades.

Within the hotel industry, according to Erdogan and Baris (2007) the hotels are a key element of the organized chain of activity in the hospitality industry, and are central to the concerns on the environmental protection related to travel and tourism.

Lunkes and Rosa's (2012) study points out that for hotel companies to promote sustainable development, it is necessary to have structures to meet the demands of the guests (facilities and services quality), efficient eco-

economic performance (environmental revenues, cost savings), and at the same time develop responsible environmental practices (measures to increase the energy efficiency of facilities, reduce water consumption, reduce greenhouse gas emissions, wastewater and residues, i.e., to develop actions to solve or minimize environmental problems).

In this context, the environmental management of the hotel is composed of a set of policies, programs, and management and operational practices that will entail the understanding of factors, such as: (i) the environment is an exhaustible resource; (ii) the managers have professional responsibilities; (iii) the hotels need to respond to social demands; (iv) the existence of international standards; (v) the need to be in legal compliance; among others.

According to Erdogan and Baris (2017) in the hotel industry worldwide the key forces are: Government regulations, consumer demands, professional ethics, and the initiatives of professional associations, international organizations, and non-governmental organizations.

Besides this, Chan and Hawkins (2010) indicate that the motivation of employees also contributes to the implementation of an environmental management system, emphasizing the importance of employees for the efficiency of environmental sustainability in hotels.

Therefore, in accordance to Lunkes and Rosa (2012) the main purpose of environmental planning and control is to provide normal hotel operations. As a reflex of the a priori control, the hotel can meet the demands, respond to legal requirements and achi-

even its strategic objectives.

The authors Lunkes and Rosa (2012) complement this discussion showing that the stakeholders' interests can be different and

sometimes conflicting, the management systems must be planned from these diversities, as presented in Table 1.

**Table 1** - Stakeholders' interest on the environmental information provided by hotels

Stakeholders	Interests in the environmental information
Suppliers and Customers	Environmental efficiency of the services provided (use of water and energy, wastewater, emissions and waste management, existence of material recycling programs, among others), Furthermore the hotel should note that customers and suppliers have other objectives that may be greater than the concerns with the environment, such as: price, quality and functionality of the services.
Employees and Unions	Environmental policies; on-job qualification and environmental training.
Funders and Investors	Economic and financial results obtained with an increase in environmental efficiency (such as: new revenues, cost reduction, reduction of liabilities from fines and penalties); monitoring and environmental responsibilities management; enhancement of the image of the hotel, correlation between financial and environmental performances.
Civil society	Environmental aspects and impacts; social interferences; sustainable development.
Government	Legal compliance of environmental responsibility; taxes; incentives.
Top Management	Strategic objectives; influence of environmental performance on economic and financial performances; legal requirements; legitimacy.

Source: Lunkes and Rosa (2012, p. 233 )

In addition to meeting stakeholders' demands, the hotel should follow the environmental standards, and meet their strategic objectives. Therefore, in this research the management of environmental sustainability is considered a complex activity that requires planning and control, efficient information, and indicators. Based on this understanding, we seek the theoretical framework elements to understand how the scientific literature has treated aspects related to the *Environmental Sustainability* theme.

### 3 METHODOLOGY

This research is exploratory and descriptive in nature, and it aims to identify in the literature the aspects related to the topic and to describe the profile of the publicati-

ons. Following we present the methodological procedures, the assumptions and the research instrument.

For a better understanding of the procedures adopted we used the instrument of intervention Knowledge Development Process – Constructivist (Proknow-C), since this method specifies the stages of the research.

The Proknow-C has its origin in 2009, in the Multicriteria Decision Aid Laboratory (LABMCDA) of the Department of Production Engineering at the Federal University of Santa Catarina, consolidating from 2010, when the first publications in the current format appeared. The ProKnow-C is composed of four macro-steps. The first step, the review stage, consists of entering a portfolio of articles to be reviewed in a structured and justified way, then we proceed to step two:

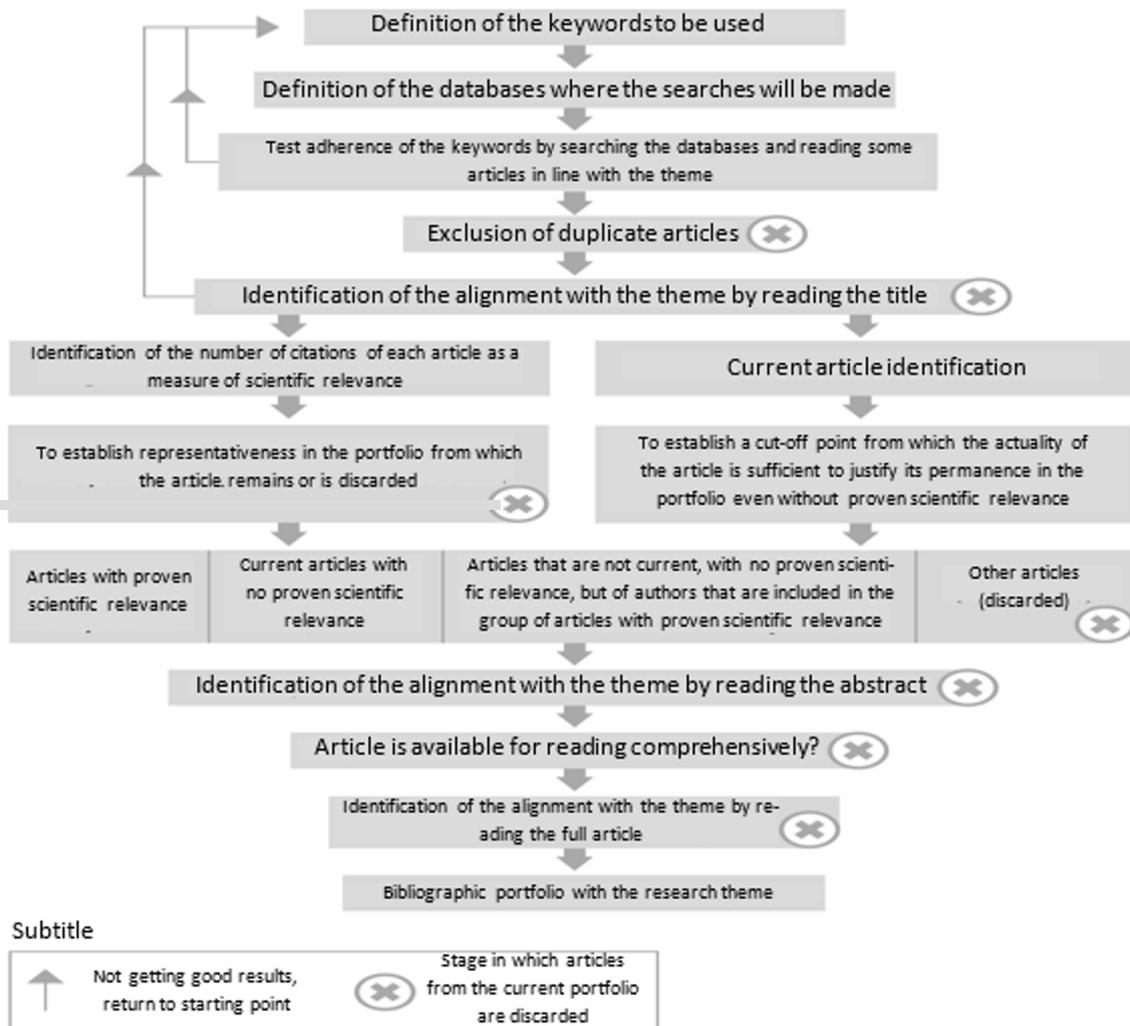
Bibliometrics; step three: Systemic Analysis; and step four: Research Question.

In the current study, we searched the database Web of Science from 1996 to 2016 for collection of items, and using the keywords: "sustainability"; "hotel".

In order to meet the objective of this

research, i.e. to conduct a mapping of the theme of sustainability management in hotels we began with the first step of ProKnow-C. The process of selection of the Bibliographic Portfolio (BP) in the ProKnow-C is briefly exposed in Figure 1.

**Figure 1** – Selection Process of the Articles of the Bibliographic Portfolio (BP)



Source: Chaves et al. (2012, p. 9)

After the process set out in Figure 1, the researcher has a set of scientific material that represents the subject, according to their own criteria.

The beginning of the process shown in Figure 1 started with the identification of 214 articles, and following the whole process in which are taken into account mainly the rel-

evance of the articles and authors, and adherence to the theme, a bibliographic portfolio of **36 articles** was obtained: McElroy and Albuquerque (1998); Becken et al. (2001); Alho et al. (2002); Mbaiwa (2003); Grangsjö (2005); Trung (2005); Kumar (2005); Erdogan and Baris (2007); Schanetz et al. (2007); Ferreira et al. (2007); Mak (2008); Lei and Wang (2008); Bohdanowic and Zientar (2008); Chan; Hawkins (2010); Darcy (2010); Tortella and Tirado (2011); Filimonau et al. (2011);

Chan (2011); Grosbois (2012); Antón et al. (2012); Hsieh (2012); Zhang et al. (2012); Chan et al. (2014); Pérez and Bosque (2014); Barber and Deale (2014); Kim and Kim (2014); Zhang et al. (2014); Susskind (2014); Signes et al. (2014); Kasim et al. (2014); Michailidou et al. (2015); Kang et al. (2015); Pieri et al. (2015); Chen (2015); Stylos and Vassiliadis (2015); Styles et al. (2015); Michailidou et al. (2016), according to Table 2.

**Table 2** - Research Bibliographic Portfolio

(continue)

Title	Author(s)	Journal	Year of Publication
Tourism penetration index in small Caribbean Islands	McElroy and Albuquerque	Annals of Tourism Research	1998
Energy consumption patterns in the accommodation sector—the New Zealand case	Becken et al.	Ecological Economics	2001
Degree of threat to the biological diversity in the Ilha Grande state park (rj) and guidelines for conservation	Alho et al.	Braz. J. Biol.	2002
The socio-economic and environmental impacts of tourism development on the Okavango Delta, north-western Botswana	Mbaiwa	Journal of Arid Environments	2003
Hotel networks and social capital in destination marketing	Grangsjö	IJSSIM	2005
Resource use and waste management in Vietnam hotel industry	Trung and Kumar	Journal of Cleaner Production	2005
Environmental protection programs and conservation practices of hotels in Ankara, Turkey	Erdogan and Baris	Tourism Management	2007
Aquifer development planning to supply a seaside resort: a case study in Goa, India	Ferreira et al.	Hydrogeology Journal	2007
The learning tourism destination: the potential of a learning organisation approach for improving the sustainability of tourism destinations	Schanetz et al.	Tourism Management	2007
Corporate Social Responsibility in Hospitality: Issues and Implications. A Case Study of Scandic	Bohdanowic and Zientar	Scandinavian Journal of Hospitality and Tourism	2008
Energy synthesis of tourism-based urban ecosystem	Lei and Wang	Journal of Environmental Management	2008

**Table 2 - Research Bibliographic Portfolio** (continuation)

Title	Author(s)	Journal	Year of Publication
The future of the State-owned hotels in China: Stay or go?	Mak	International Journal of Hospitality Management	2008
Attitude towards EMSs in an international hotel: an exploratory case study	Chan and Hawkins	International Journal of Hospitality Management	2010
Inherent complexity: Disability, accessible tourism and accommodation information preferences.	Darcy	Tourism Management	2010
Implementing environmental management systems in small- and medium-sized hotels: obstacles	Chan	Journal of Hospitality & Tourism Research	2011
Reviewing the carbon footprint analysis of hotels: Life Cycle Energy Analysis (LCEA) as a holistic method for carbon impact appraisal of tourist accommodation	Filimonau et al.	Journal of Cleaner Production	2011
Hotel water consumption at a seasonal mass tourist destination. The case of the island of Mallorca B36	Tortella and Tirado	Journal of Environmental Management	2011
Use of different sustainability management systems in the hospitality industry. The case of Spanish hotel	Antón et al.	Journal of Cleaner Production	2012
Corporate Social responsibility reporting by the global hotel industry: Commitment, initiatives and performance	Grosbois	International Journal of Hospitality Management	2012
Hotel companies' environmental policies and practices: a content analysis of their web pages	Hsieh	International Journal of Contemporary Hospitality Management	2012
Exploring Resource Efficiency Benchmarks for Environmental Sustainability in Hotels	Zhang et al.	Cornell Hospitality Quarterly	2012
Tapping Mindfulness to Shape Hotel Guests' Sustainable Behavior	Barber and Deale	Cornell Hospitality Quarterly	2014
What drives employees' intentions to implement green practices in hotels? The role of knowledge, awareness, concern and ecological behaviour	Chan et al.	International Journal of Hospitality Management	2014
The importance of water management in hotels: a framework for sustainability through innovation	Kasim et al.	Journal of Sustainable Tourism	2014
The Effects of Message Framing and Source Credibility on Green Messages in Hotels	Kim and Kim	Cornell Hospitality Quarterly	2014
Sustainable development and stakeholder relations management: exploring sustainability reporting in the hospitality industry from a SD-SRM approach	Pérez and Bosque	International Journal of Hospitality Management	2014
The Impact of Environmental Certification on Hotel Guest Ratings	Signes et al.	Cornell Hospitality Quarterly	2014
Guests' Reactions to In-Room Sustainability Initiatives: An Experimental Look at Product Performance and Guest Satisfaction	Susskind	Cornell Hospitality Quarterly	2014
Eco-efficiency of Service Co-production: Connecting Eco-certifications and Resource Efficiency in U.S. Hotels	Zhang et al.	Cornell Hospitality Quarterly	2014
From sustainability to customer loyalty: A case of full service hotels' guests	Chen	Journal of Retailing and Consumer Services	2015
Corporate Social responsibility and sustainability balanced scorecard: The case study of family-owned hotels	Kang et al.	International Journal of Hospitality Management	2015

**Table 2 - Research Bibliographic Portfolio** (conclusion)

Title	Author(s)	Journal	Year of Publication
A methodology to assess the overall environmental pressure attributed to tourism areas: A combined approach for typical all-sized hotels in Chalkidiki, Greece	Michailidou et al.	Ecological Indicators	2015
Identifying energy consumption patterns in the Attica hotel sector using cluster analysis techniques with the aim of reducing hotels' CO2 footprint	Pieri et al.	Energy and Buildings	2015
Water management in the European hospitality sector: Best practice, performance benchmarks and improvement potential	Styles et al.	Tourism Management	2015
Differences in Sustainable Management Between Four- and Five-star Hotels Regarding the Perceptions of Three-Pillar Sustainability	Stylos and Vassiliadis	Journal of Hospitality Marketing e Management	2015
Life Cycle Thinking used for assessing the environmental impacts of tourism activity for a Greek tourism destination	Michailidou et al.	Journal of Cleaner Production	2016

Source: Research data

For the classification of the Bibliometric analysis the following elements were taken into consideration: period, journals, authors and featured articles. For the analysis of the objectives and the results the articles were sorted by researched subject. For the analysis of the indicators it was verified in

the content analysis the criteria used to put up methods and evaluation methodologies. Finally, to identify the research methodologies used, the classification of Birnberg et al. (1990) and Hesford et al. (2007) was adopted as depicted in Table 3.

**Table 3 - Classification of the research methodologies**

Research method	Definition
Analytical	It involves the in-depth study and evaluation of available information in an attempt to explain the context of a phenomenon.
Archive/documentary	It involves the use of information that has not yet undergone a scientific treatment.
Case	It involves the investigation of phenomena, including people, procedures and structures in an organization.
Experimental	It involves manipulation and treatments in an attempt to establish cause-effect relationships in the researched variables.
Field	It involves the investigation of phenomena, including people, procedures and structures in two or more organizations.
Framework	It involves the development of a new concept, of new perspectives.
Review	It basically involves synthesis and review of literature already known.
Survey	It involves the investigation of a group of people, generally carried through the application of questionnaire.
Others	Does not fit into any of the other methods.

Source: Adapted Birnberg et al. (1990); Hesford et al. (2007); Lunkes et al. (2012)

Based on the above-mentioned propositions we present next the results of the analysis of 36 articles which compose the bibliographic portfolio of this research.

### 3 ANALYSIS OF THE RESULTS

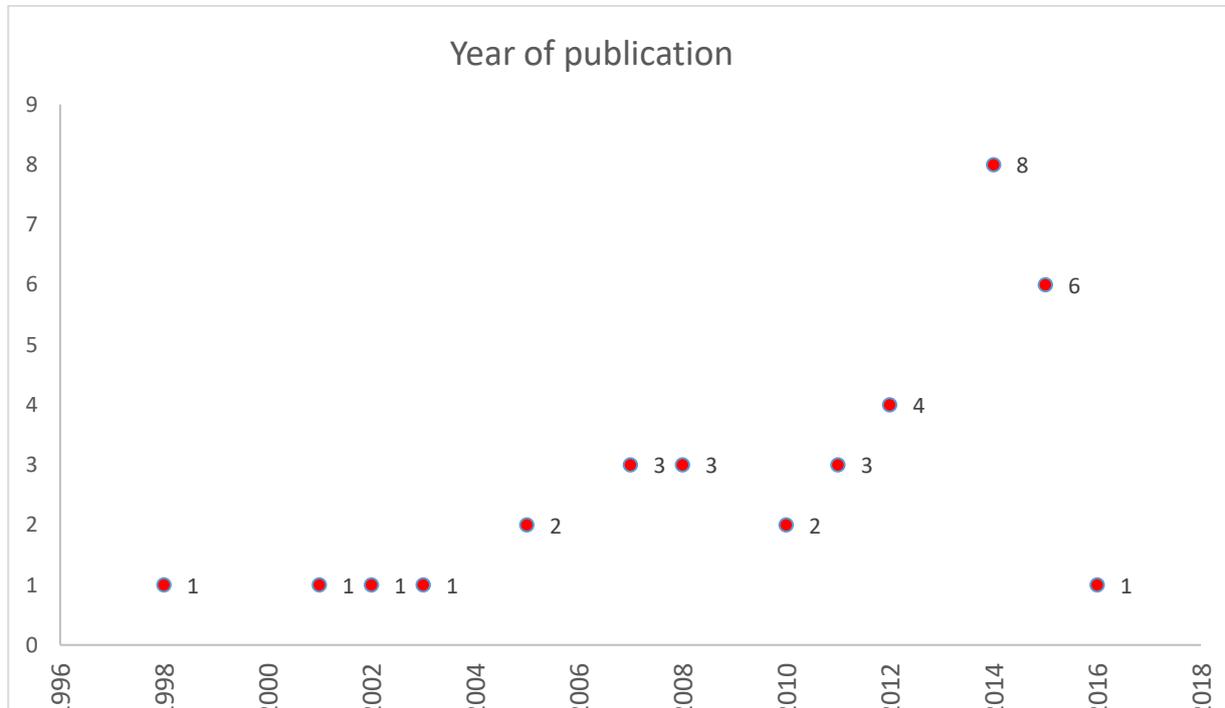
The analysis of the results is performed on five topics, with the aim of analyzing the theoretical and methodological contributions of the articles of the BP. The following five aspects of each of the 36 articles were examined: (a) Bibliometric analysis, (b) desired objectives and results achieved (c) research methodologies, (d) environmental indicators pointed to by the literature reviewed as relevant to the management of en-

vironmental sustainability in hotels.

#### 3.1 Bibliometric analysis

Within the concept of a BP the next step of Proknow-C process is Bibliometrics, which can be understood as a process to depict the quantitative data relating to a Bibliographic Portfolio aiming to manage information (Ensslin et al., 2010a). In this sense, the Proknow-C is intended to perform a Bibliometric analysis on: period, journals, authors and featured articles. According to Figure 2 we verify that the publication of the articles on environmental management in hotels are concentrated in 2014 and 2015.

**Figure 2** - Year of publication of the analyzed articles

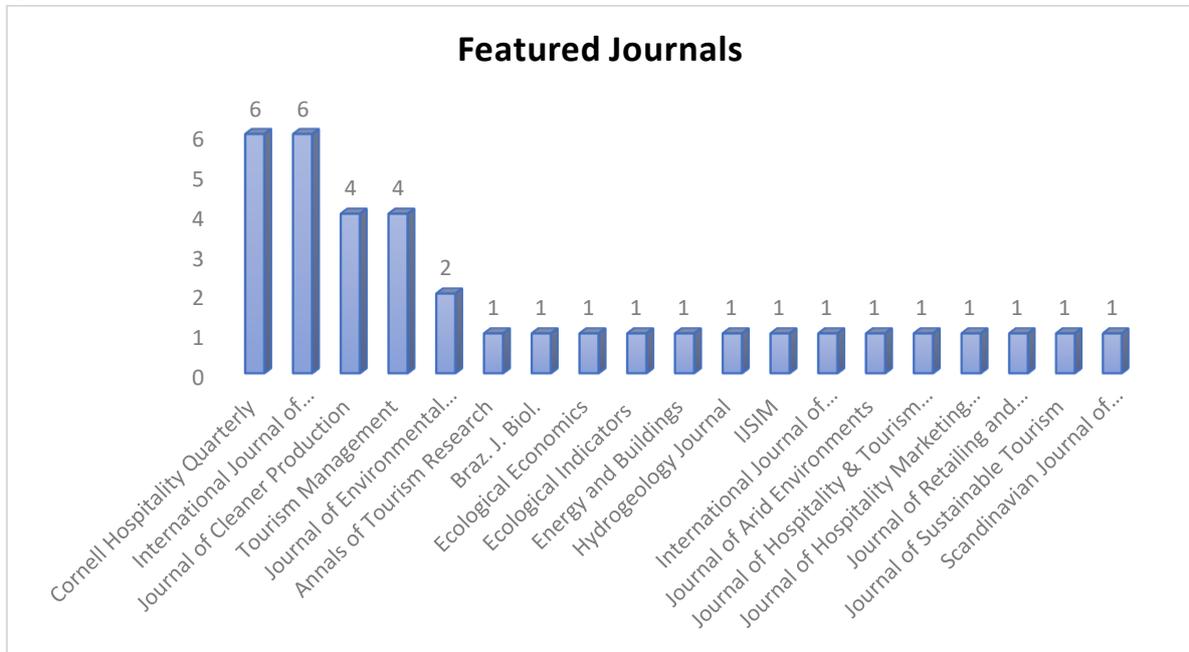


Source: Research data

Regarding the analyzed journals the following stood out: Cornell Hospitality Quarterly and International Journal of Hospitality

Management, Journal Cleaner Production and Tourism Management, as presented in Figure 3.

Figure 3 - Featured Journals



Source: Research data

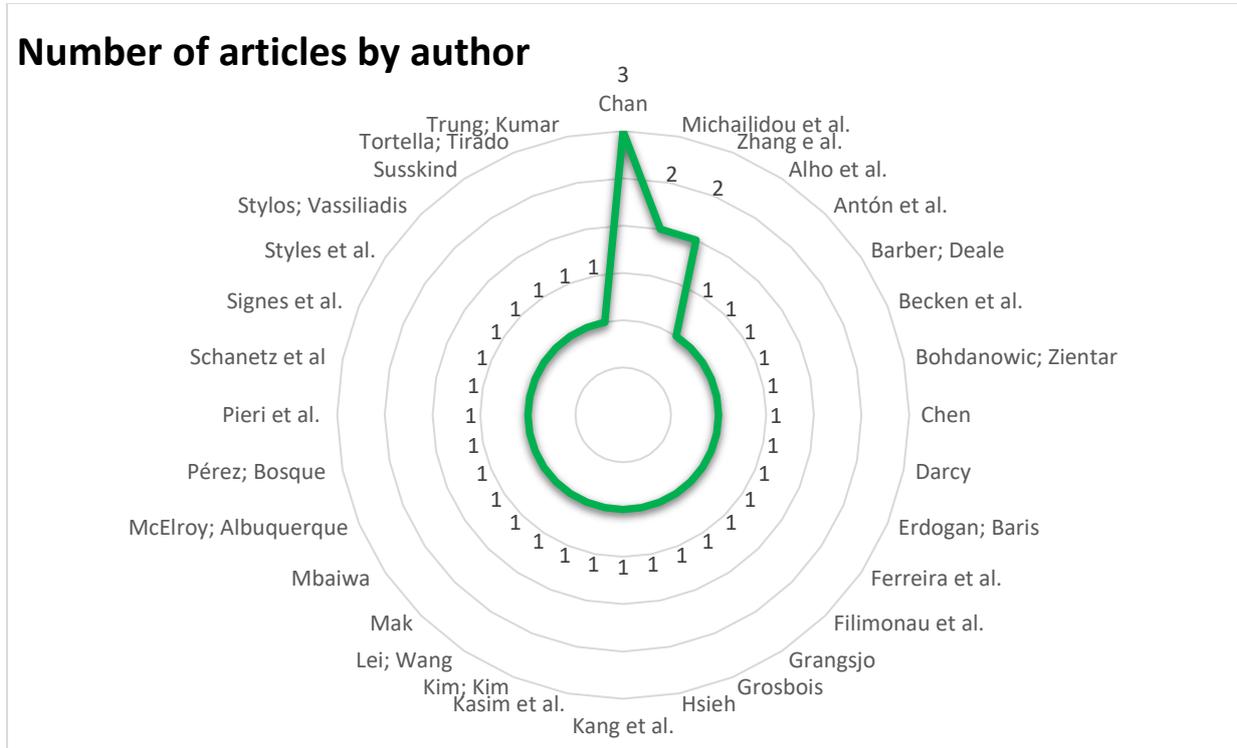
The continuation of the bibliometric analysis reveals that one of the authors, Eric S. W. Chan stands out with 3 articles in the bibliographic portfolio, as presented in Figure 4.

Finally, looking at the amount of citations, the articles "**The socio-economic and environmental impacts of tourism development on the Okavango Delta, north-western Botswana**" authored by Mbaiwa and "**Energy consumption patterns in the accommodation sector – the New Zealand case**" au-

thored by Susanne Becken, Chris Frampton and David Simmons clearly stand out, with 253 and 187 citations, respectively.

The bibliometric analysis is just a short account of the quantitative aspects that stand out in the analyzed sample, however, the scientific merit goes beyond the number of citations, insertion of authors, and journals, therefore, the theoretical and methodological aspects that contribute to the topic searched are also analyzed.

Figure 4 - Main authors in the analyzed sample.



Source: Research data

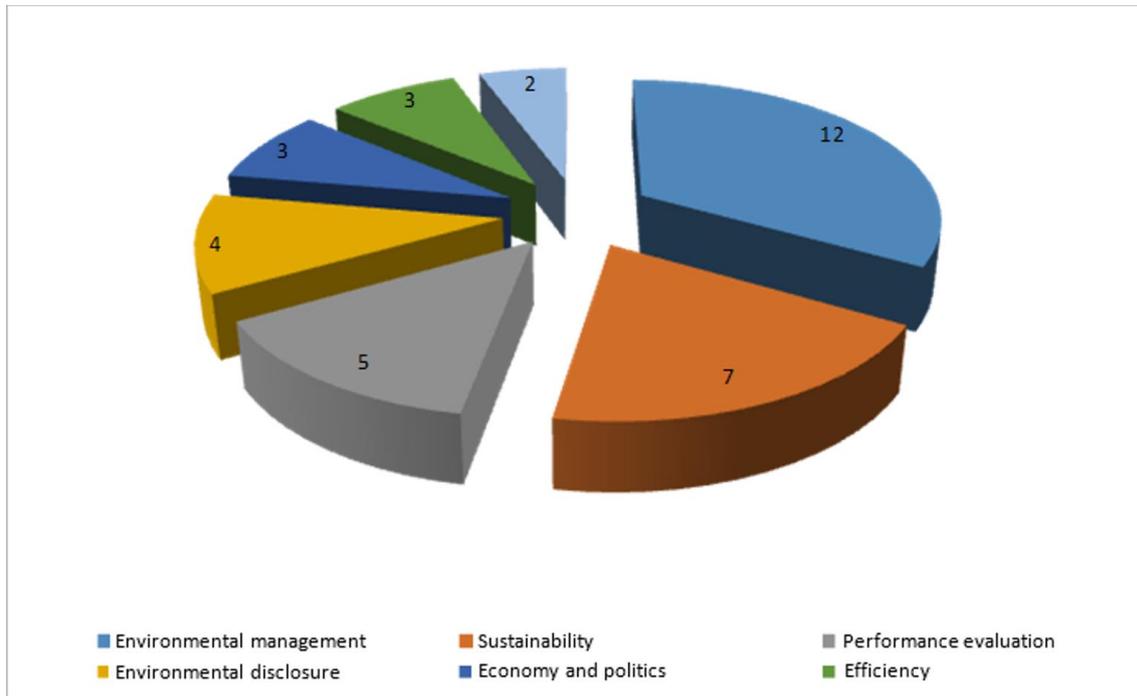
### 3.1 Analysis of the desired goals and achieved results

Initially, we identified the central themes related to the objectives of the proposals made in articles that make up the Bi-

bliographic Portfolio presented in Figure 5.

According to the Figure 5 the topics which stand out are: Environmental Management (12), Sustainability (7), Performance evaluation (5), and Environmental disclosure (4).

**Figure 5** - Core topics in the analyzed articles



Source: Research data

The topic "**Environmental Management**" was addressed by the authors of the articles analyzed in order to **observe and propose improvements to the environmental management practices** (total or partial) of hotels in different parts of the world. Trung and Kumar (2005) analyzed the environmental management aiming to assess the use of resources in the hotel industry of Viet Nam. Tortella and Mak (2008) examined the critical issues that cause these problems faced by hotels; the factors that affect the development of hotels, and issues related to property, structure, and bureaucratic control. Tirado (2011) developed a model to analyze water consumption. Chan (2011) identified the barriers to the adoption and implementation of a formal environmental management system. Antón et al. (2012) acknowledged the existence of management systems in the hotel industry in Spain. Hsieh (2012)

has examined the environmental management policies and practices of major companies of 50 hotels as disclosed in their corporate websites. Barber and Deale (2014) analyzed the interaction of clients with sustainability practices in hotels. Chen (2015) examined how the technologies, innovations and sustainable effort factors have an impact on customers' perceptions, decisions, experience, and post-experience. Stylos and Vassiliadis (2015) looked at the perceptions and practices of environmental management. And Styles et al. (2015) presented a summary of best practices, key performance indicators and performance benchmarks for water management in hotels.

The topic "**Environmental sustainability**" is used in literature to deal with issues related to the interaction between hospitality industry and environment. With this perception Bohdanowicz and Zientar (2008)

found that social responsibility in the context of the hospitality industry, has had implications for human resources management, for the support of the local community, and the promotion of environmental sustainability in the surroundings of the hotels. Mbaiwa (2003) identified the environmental impact of the hotel industry of the town of Okavango Delta. Alho et al. (2002) identified the dominant landscape units (natural habitats) of the State Park of Ilha Grande and applied threat analysis in order to interpret and to propose guidelines for the conservation of the local biodiversity through the sustainable use of tourism potential. Erdogan and Baris (2007) analyzed the empirical aspects related to environmental protection, waste management, purchasing, energy use, and practices of hotels in Ankara, Turkey. Schanetz et al. (2007) argued, based on a review of six case studies, the potential of environmental sustainability of hotels. Ferreira et al. (2007) examined the methods of analysis of water resources of the coastal zone of Bardez in Goa, India. And, finally, Kasim et al. (2014) analyzed how tourism in general, and specifically hotels, may have contributed to the crisis in the quality and quantity of water resources.

The "**Performance evaluation**" has been used to assess by means of indicators and methodologies the environmental performance of companies in the tourism sector. Thus, McElroy and Albuquerque (1998) built an index of tourism to identify spending per capita/visitor, daily visitor density per 1,000 resident population, and the number of hotel rooms per square kilometer. Lei and Wang (2008) examined the flow of energy to investigate and characterize the urban evolution

and city development that have occurred in Macao from 1983 to 2003. Filimonau et al. (2011) discussed the potential of the Life Cycle Assessment for the environmental assessment of tourism accommodation facilities, and its contribution to the global carbon footprint. Pieri et al. (2015) presented the results of an energy audit that was conducted on a sample of 35 hotels focusing on their energy and environmental performance. Michailidou et al. (2016) identified the environmental load in areas of tourism activities by means of Life Cycle Assessment (LCA).

On its part, the "**Environmental disclosure**" is a topic used to assess the legitimacy of the dissemination of environmental information provided by companies in the sector of tourism and hospitality. Thus, Grosbois (2012) assessed the practice of corporate communications held (on websites and published reports) by the largest hotel companies in the world. Pérez and Bosque (2014) explored the sustainability reports of 170 hotels to identify sustainability practices in the hotel industry. Kim and Kim (2014) used an experimental approach to analyze the influence of source credibility and message framing on the attitudes of potential hotel clients, behavioral intentions in relation to messages about environmental protection. Kang et al. (2015) analyzed the benefits of Corporate Social Responsibility (CSR) to family-owned hotels.

The terms "**Economy and politics**" are used by Grangsjö (2005) to identify economic and political-institutional aspects that interfere in environmental sustainability of hotels. Darcy (2010) in turn, takes into account external aspects such as economy, politics, and

planning to study sustainability in hotel activity. And finally, Michailidou et al. (2015) promote a methodological scheme to combine the main environmental pressures that can be attributed to tourism activity, in order to characterize the environmental sustainability, and the study is conducted in 511 hotels in Greece.

The analysis of "**Efficiency**" is used by Becken et al. (2001) to analyze energy consumption within New Zealand accommodation sector. The main objective is to verify the differences in energy consumption according to the different hotel classifications and business sizes. Zhang et al. (2012) constructed a cost-based resource efficiency measure for environmental sustainability from reported financial data. This *approach links the environmental and economic performance outcomes, extracting information from expenses related with resources normalized by RevPAR (revenue per available room)*. And, finally, Susskind (2014) studied the effects of equipment replacement on the reduction of energy consumption.

Finally, "**Certification**" issues are used to verify how the certification helps with efficiency and environmental management in the hotel industry. In this way, Zhang et al. (2014) explored the relationship between eco-certifications and resource efficiency in the hotel industry of the United States, examining hotels which have become eco-certified. Signes et al. (2014) analyse the impact on hotels of the environmental certification system ISO 14001 from the customers' perspective. The study was based on a comparison of ratings of customers of 6,850 hotels in Spain, with and without ISO 14001 certifica-

tion.

The results analyzed from over 20 years demonstrate that the subject of environmental sustainability in hotels is relevant, and it is directly related to the global concerns with the survival of the planet itself.

The studies were developed in different countries, such as: United States, China, Brazil, Spain, New Zealand, Greece, Botswana, India, among others.

In addition, studies seem to corroborate each other's findings that the factors such as: size, classification of hotels, focus (Beach, business, field, etc.), governance, standards, and types of customers, can influence managerial decisions and environmental sustainability.

It was also verified that over time aspects such as: operational, legal, political, institutional, organizational learning, and stakeholders, have broadened the debate on sustainability in the hotel sector, also they have been incorporated in the systems of environmental management of hotels, thus improving the environmental performance management systems, employee training, and customer service.

Furthermore, some studies point out certifications as an ally to environmental sustainability and a way of legitimizing hotel activities with their customers.

Thus, the studies have contributed to the improvement of environmental management of hospitality, especially hotels, regarding aspects of sustainability of the tourism and hotel sector with note to the environmental and social impact of the activity, for customer management, employee training, operational efficiency and definitions of pu-

blic policy, and economic analysis.

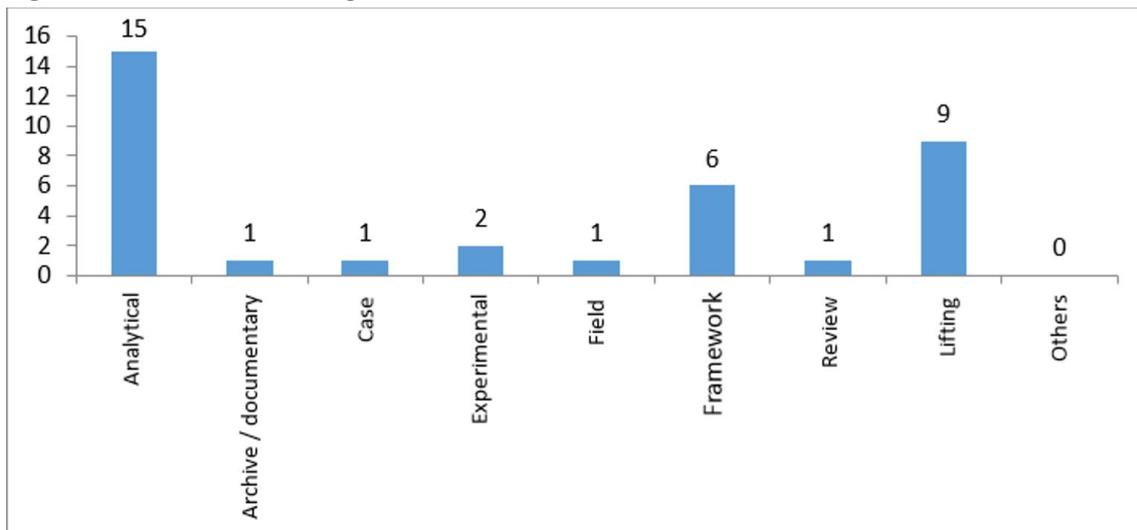
In this way, the studies show that the environmental sustainability theme is relevant and current, which can be observed both in the organizational scope and within the political and economic context. In this sense, academia has been exploring the various topics related to the environment and society within the hotel context, in order to observe economic, social, and environmental impacts of the activity, as well as to contribute to a matter of global concern: the environment.

After the identification of objectives and results, we sought to identify and describe the methodologies used, the main findings and research contributions to the topic of environmental sustainability in hotels.

### 3.2 Research Methodologies

To examine how the methodologies adopted by the researchers contributed to the research topic we present Figure 6.

Figure 6 - Research methodologies



Source: Research data

As shown in Table 6, the **Analytical** methodology is predominant, and it is possible to notice that this methodology was used in articles which explored topics related to performance evaluation (5 articles), environmental management (3 articles), sustainability (2 articles), environmental disclosure (2 articles), certifications (1 article), economy and politics (1 article) and efficiency (1 article). Demonstrating the relevance of empirical

studies for in-depth evaluation of the available information, in an attempt to explain the environmental sustainability in the hotel industry within the organizational and the economic and political contexts.

The **surveys** come next, with the application of questionnaires to customers, employees, and society to investigate issues related to environmental management (5 articles), economy and politics (2 articles), envi-

ronmental disclosure (article 1) and certifications (1 article).

The six (6) articles which developed **framework** methodology explored concepts and methods related to sustainability and environmental management aimed at theoretical and methodological innovation.

Two articles used **experimental** methodology, handling and treating data in order to establish cause and effect in the variables investigated about efficiency and environmental disclosure. Susskind (2014) sought to study efficiency by analyzing the effects of equipment replacement on the reduction of energy consumption. Kim and Kim (2014) used an experimental approach to analyze the influence of source credibility and message framing on the attitudes of potential clients, behavioral intentions in relation to messages about environmental protection.

Antón et al. (2012) conducted a study using **Documentary/ archival** methodologies on environmental management to analyze the existence of management systems in the hotel industry in Spain. Chan (2011) developed a **case study** on environmental management to identify the barriers to the adoption and implementation of a formal environmental management system, for a hotel in Hong Kong. Alho et al. (2002) developed a **field study** on sustainability whose main objective was to identify the dominant landscape units (natural habitats) of the State Park of Ilha Grande and applying a threat analysis, in order to interpret and propose guidelines for the conservation of local biodiversity through the sustainable use of high tourism potential. Finally, Schanetz et al. (2007) conducted a **review** of sustainability to present the concept of Learning Tourism

Destinations (LTD) and discuss, based on a review of six case studies, the potential of the environmental sustainability of hotels as a tool for the implementation and improvement of collective learning processes.

### 3.3 Used indicators

The studies also reveal indicators required to compose models or tools for assessing the environmental sustainability of hotels, see Table 4.

**Table 4** - Indicators of environmental sustainability

Indicators/ Authors	McElroy; Albuquerque (1998)	Becken et al. (2001)	Alho et al. (2002)	Mbaiwa (2003)	Grangsjö (2005)	Trung; Kumar (2005)	Erdogan; Baris (2007)	Schanetz et al. (2007)	Ferreira et al. (2007)	Mak (2008)	Lei; Wang (2008)	Bohdanowicz; Zientar (2008)	Chan; Hawkins (2010)	Darcy (2010)	Tortella; Tirado (2011)	Filimonau et al. (2011)	Chan (2011)	Grosbois (2012)	Antón et al. (2012)	Hsieh (2012)	Zhang e al. (2012)	Chan et al. (2014)	Pérez; Bosque (2014)	Barber; Deale (2014)	Kasim et al. (2014)	Kim; Kim (2014)	Zhang et al. (2014)	Susskind (2014)	Signes et al. (2014)	Chen (2015)	Kang et al. (2015)	Michailidou et al. (2015)	Pieri et al. (2015)	Stylos; Vassiliadis (2015)	Styles et al. (2015)	Michailidou et al. (2016)	<b>Total</b>				
Internal Strategic Management					1	1											1	1	1	1									1	1								11			
Organizational learning				1								1					1	1				1		1																7	
Water						1		1							1										1															6	
Energy		1			1						1				1												1													6	
External aspects (economy, politics and planning)	1										1		1	1									1														1				6
Waste (plastics, glass, batteries, ink cartridges)				1	1																																			3	
Food waste				1	1																																			3	
Certification																											1	1												3	
Environmental politics																	1		1																					3	
Emissions															1																									2	
Protected áreas			1							1																															2
Noise							1																																	1	
<b>Total</b>																																								<b>53</b>	

Source: Research data

As shown in Table 4, the studies indicate that for assessing the environmental sustainability of hotels the following elements are important: aspects related to the consumption of natural resources such as water and energy; the impacts generated in the hotel sector activities, such as noise, emissions, waste and impact in the areas of preservation; the interests of the different stakeholders; the influence of the Government and specific policies in support of sustainability; as well as aspects of management and strategy.

#### 4 CONCLUSION

In face of the decision-making process, its multidisciplinary nature and importance of the theme of environmental management in hotels, the research question has arisen: "How to conduct a mapping of *Sustainability Environmental Management in Hotels*, within the framework defined by the researchers?" which established the general objective of this work.

In this way, to perform the mapping of the environmental sustainability theme, a Bibliographic Portfolio (PB) was identified, according to the delimitations made by researchers, the keywords ("Sustainability" and "hotel") were used as filters on titles, abstracts and full articles. Later, the following aspects were surveyed: aim, results achieved, and environmental indicators highlighted as relevant to environmental sustainability.

Besides the importance for the decision-making process management and its presence in different areas of knowledge,

this research contributes to the development of a Bibliographic Portfolio concerning the theme of the environmental sustainability in hotels, enabling the generation of knowledge on related variables and concepts that guide environmental management in this type of environment.

This study carried out a survey on the available portals of Web of Science database from 1996 to 2016, and it is recommended, also, for future research an analysis of information about the BP, based on a theoretical affiliation.

The research revealed that the topic has gained importance recently, specifically in 2014 and 2015, the prominent journals are Cornell Hospitality Quarterly and International Journal of Hospitality Management, Journal Cleaner Production and Tourism Management. The author Eric S. W. Chan stands out with 3 articles on the analyzed bibliographic portfolio.

The articles that stand out are: "***The socio-economic and environmental impacts of tourism development on the Okavango Delta, north-western Botswana***" authored by Mbaiwa with 253 citations; and "***Energy consumption patterns in the accommodation sector - the New Zealand case***" authored by Susanne Becken, Chris Frampton and David Simmons with 187 citations.

The results of the analysis of the articles of the BP demonstrate that the most recurrent themes are: Environmental management (12), Sustainability (7), Performance evaluation (5), and Environmental disclosure (4).

The theme "**Environmental management**" was addressed by the authors of the

articles analyzed in order **to observe and propose improvements to environmental management practices** (total or partial) in hotels of different parts of the world. "**Environmental sustainability**" is used in literature to deal with issues related to the interaction of the hospitality industry with the environment. "**Performance evaluation**" has been used to assess by means of indicators and methodologies the environmental performance of companies in the tourism sector. "**Environmental disclosure**" is a topic that assesses the legitimacy of the dissemination of environmental information provided by companies in the sector of tourism and hotel industry. "**Economy and politics**" is used to identify economic and political-institutional aspects that influence the environmental sustainability. "**Efficiency**" is a topic that analyzes how the use and consumption of energy and resources, and the replacement of equipment assist in environmental efficiency. "**Certifications**" are analyzed to verify managers and customers' perception and about their impacts on environmental management of hotels.

Therefore, it is concluded that the subject of environmental sustainability in hotels is relevant, and it is directly related to the global concerns with the survival of the planet itself. The themes and methods presented in the 36 articles analyzed have contributed to the environmental management of the hotel industry, the sustainability of the tourism and hospitality sector and can even assist in the definition of public policy and economic analysis.

The studies also show that the environmental sustainability theme is relevant

and current. Environmental sustainability, therefore, can be observed within the organizational scope and in the political and economic context. In this sense the academia has been exploring various topics related to the environment and society within the hotel context, in order to observe economic, social and environmental impacts of the activity, as well as to contribute to a matter of global concern: the environment.

For future research, the paper recommends that further empirical research is carried out, based on a worldview in which the criteria for environmental sustainability management in hotels is presented, as well as the observation of how managers take their decisions on the criteria or elements needed to provide sustainability of the hotel sector.

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