Jomat

Journal of multidisciplinary academic tourism
*2020, 5 (2): 143-155*
*www.jomat.org*

ISSN: 2645-9078
OLD ISSN: 2548-0847

# Environmental responsibility actions and technologies in hotels management at Fortaleza: The Case of Fortaleza-Ceará-Brazil

***André Perinotto*, Maria Ivonete Sousa***

***Keywords:***
*Hospitality,*
*Sustainable actions,*
*Sustainable technologies,*
*Environment*

***Article History:***
*Submitted: 13/07/2020*
*Accepted: 10/11/2020*

***ABSTRACT***

*This study aims to investigate the environmental responsibility actions and technologies adopted by managers at medium and large-sized hotels, of Beira Mar Avenue, in Fortaleza city. Our methodology is descriptive, using an inductive method with a qualitative approach. We applied questionnaires (structured interview) to thirteen managers of different hotels, having more than 50 housing units, classified as medium and large size, together with a systemic and non-participatory observation. Our results reveal that hotels develop clean sustainable actions and technologies as tools to mitigate the generated negative impacts. Finally, the conclusions point to the need of articulation between the public authorities, the hotel sector and the third sector, for the development of innovative technologies and the adoption of new behaviours in the management of hospitality facilities in Fortaleza-CE, Brazil.*

***Doi:*** *https://doi.org/10.31822/jomat.768792*

## 1. Introduction

Years ago, the accommodation sector was seen as places where comfort was almost synonymous with waste of natural resources. Those were spaces where guests could let the air conditioning on, even when they were not in the room, take long baths or enjoy daily changing of washed towels. By keeping those practices, such behaviours favoured the waste of energy, water, as well as the waste generation by keeping those practices (Dias, 2017).

In that context, in the Brazilian hotel industry, we observed a new attitude of managers regarding the implementation of actions aimed at environmental management and guests' awareness for conscious consumption of natural resources (EMBRATUR, 2018).

In view of this new national panorama, we highlight the need to investigate which sustainable technologies have been implemented in the hotels of Fortaleza. Being the capital of Ceará, Fortaleza occupies the fourth place in national ranking tourism, according to the Brazilian Tourism Institute (EMBRATUR, 2018). The city has the largest hotel park of Ceará, concentrating its lodging facilities in the geographic region of the coast, especially in *Praia de Iracema* and *Praia do Meireles*, which stand out for their high standard hotels, as well as bars, restaurants and busy nightlife (Sousa, 2013).

New policies encouraging the adoption of responsible practices and technologies have stimulated the use of an Environmental Management System (EMS) that presents competitive advantages for the hotel market, in accordance with environmental laws and the ISO 14001, to establish management means that aim to minimize the polluting potential of companies (Coltro, 2005).

Therefore, we pose the question – why are environmental responsibility actions and technologies necessary for the management of a hotel? Our purpose is to investigate the environmental responsibility actions and technologies adopted by managers at the medium and large-sized hotels, of *Beira Mar* Avenue, in Fortaleza city. That way, we justify that by adopting a set of environmental practices in the hotel industry of Fortaleza, it is possible to improve the conditions of services offered to tourists, guests and employees, as well as the quality of life of residents. Those practices need to be planned and understood as an activity that preserves the

**Corresponding Author*

***Research Paper***

***André Perinotto:*** *Full Professor, ,Universidade Federal do Delta do Parnaíba, São Sebastião Av. 2819, Reis Veloso, Parnaíba- Piauí-Brasil, CEP 64202-020, Email: perinotto@ufpi.edu.br, Orcid Id: 0000-0001-7094-3758*

***Maria Ivonete Sousa:*** *Professor, Instituto Federal do Ceará, São Sebastião Av. 2819, Reis Veloso, Parnaíba- Piauí-Brasil, CEP 64202-020, Email: ivonetece@gmail.com , Orcid Id: 0000-0003-2873-608X*

environment by taking advantage of present opportunities and thinking about the future of new generations.

## 2. Environmental aspects and impacts in the hotel management in Ceará

The hotel activity is a market segment that needs natural resources in order to develop and thrive, by the means of offering products and services that directly interact with environmental aspects, which generates impacts, whether positive or negative.

The dynamics observed in *Table 1* reinforce the need for a critical look related to establish environmental precepts for products and services, since, even the simplest activity, such as the reception work, can generate environmental impacts.

It is also opportune that hotel managers establish strategies to attract consumers who, nowadays, value environmentally friendly attitudes, services and products, and consider human essentiality, quality and the adoption of environmental seals as a differential.

In Brazil, among the ecological seals programs, the High Environmental Quality (AQUA), the Leadership in Energy and Environmental Design (LEED), the National Electricity Conservation Program (PROCEL), the Clean Energy, the ISO 14001 and the Nature Guest Program (PHN) are the most chosen. This last one aims to increase the awareness of the hotel entrepreneur about his role in collaborating to natural resources preservation. It also offers specialized consultancy in socio-environmental management, training in human resources, provides support material and maintains a database for products, equipment and services suppliers that cause the least possible impact on the environment. There is also the ABIH of Socio-environmental Responsibility Seal, which can certify the environmentally sustainable enterprise.

In our study, we will focus on ISO 14001 seal, which has the necessary requirements to achieve our goal. Thus, ISO defines the EMS as a set of procedures, controls and human, financial, material resources that guarantees the sustainability of products and activities of a certain enterprise. Their guidelines are related to organizing, planning, assigning responsibility, foreseeing material and human resources, as well as to determine procedures to meet the environmental policy requirements, according to ISO 14001 (ABNT, 2001).

An EMS should allow a hotel establishment to develop and implement a policy with objectives and goals that comply with the premises of the Environment National Policy (PNMA). It should also consider the other legal requirements, together with information regarding the significant environmental aspects of the place, in order to reduce cost and to improve the quality of life of residents, employees and guests.

**Table 1**. The main environmental aspects and impacts in the hotel management

| Product / Service | Environmental aspects | Environmental impacts |
|---|---|---|
| **Reception** | Electric power consumption | Sewer of natural resources |
| | Household solid waste | Landfill occupation and soil pollution |
| **Restrooms and Locker rooms** | Water and gas consumption | Sewer of natural resources |
| | Organic effluents | Change in water quality |
| | Alkaline wastes | Sanitary landfill occupation and soil pollution |
| | Household solid waste | Sanitary landfill occupation |
| **Kitchen** | Water and gas consumption | Sewer of natural resources |
| | Oily effluents | Change in water quality |
| | Household solid waste | Sanitary landfill occupation and soil pollution |
| **Restaurant/bar** | Electric power consumption | Sewer of natural resources and soil pollution |
| | Household solid waste | Sanitary landfill occupation and soil pollution |
| **Elevators** | Electric power consumption | Sewer of natural resources |
| **Air conditioned** | Electric power consumption | Sewer of natural resources |
| | CFC emissions | Attack on the ozone layer |
| **Water heater** | Gas consumption | Sewer of natural resources |
| | CO, NO2 emissions | Change in air quality |
| **Electric power generator** | Fuel consumption | Sewer of natural resources |
| | CO, NO2 emissions | Change in air quality |
| **Machines maintenance** | Oil and grease residues | Soil or water contamination |
| **Laundry** | Water and gas consumption | Sewer of natural resources |
| | Organic effluents | Change in water quality |
| | Grease alkaline waste | Change in water quality |

***Source:*** *Adapted from Lima, (2008).*

Barbieri (2011) states that ISO 14001 establishes the following requirements for hotels:

- identify the environmental aspects arising from their activities to determine the significant environmental impacts;
- identify the applicable legal norms of the legislation;
- identify priorities and establish appropriate environmental objectives and targets;
- establish structure and programs to implement the policy aiming to achieve objectives and goals;
- facilitate the activities of planning, control, monitoring, preventive and corrective action, audit and analysis, to ensure that the policy is followed and that the EMS remains appropriate;
- adapt to circumstantial changes.

According to the environmental policy guidelines, one must define the general objectives, goals and principles that match the company's mission, vision, values and beliefs; execute actions following the local or regional conditions, such as the prevention of pollution, water and soil contamination, looking for a continuous improvement, in addition to compliance with the municipal, state and federal legislations.

By choosing to have a seal to certify the hotel as ecologically correct, the entrepreneurs start to assume the commitment to respect the natural spaces and the resident community, to invest in ecological technologies, and in addition to look to achieve cost reduction in their operations, such as electricity and water saving, and other practices described in *Table 2*.

Focusing on Ceará state, and its capital Fortaleza, the hotel market needs to adapt to those requirements, due to the local competitiveness and the phenomenon of seasonality of the touristic demand, which is considered regular in the medium and large tourist destinations in Ceará, having the highest flow in the months of January, July and December, as shown in *Table 2*.

The hotel offer has grown every year in the tourist centres of Ceará. The *Figure 1* illustrates that evolution from 2010 to 2017, with emphasis on the capital Fortaleza, that had 203 accommodations, 10,563 housing units and 26,853 thousand beds, in 2010. In the year 2017 the numbers increased to 237 lodging facilities, 11,767 housing units and 29,337 thousand beds.

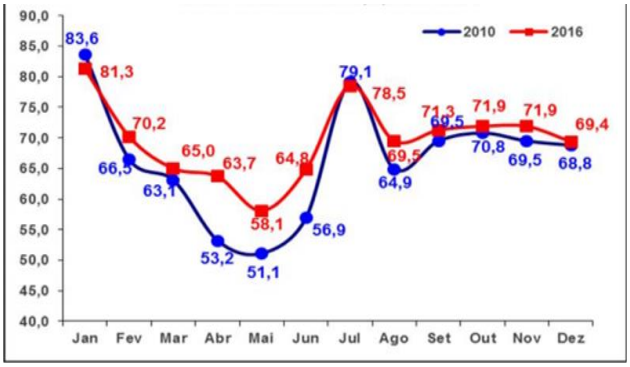



**Figure 1.** State of Ceará – Hotel offers: 2010/2017.
***Source:*** *SETUR, 2017.*

**Table 2.** Environmentally friendly practices through sustainable actions and technologies.

| |
|---|
| Use of energy-saving lamps |
| Usage of natural lighting |
| Buying durable products |
| Reduce the frequency of changing sheets and towels |
| Promote environmental education campaigns for employees and guests |
| Evaluation of possible environmental impacts |
| Selective garbage collection |
| Control of functions, activities and processes that may affect the environment |
| Electrical systems that automatically turn off lights in unoccupied areas |
| Definition of appropriate procedures for environmental management |
| Record of the achievement from environmental objectives and targets |
| Environmental practices training for employees |
| Purchase of recycled products |
| Composting of organic material |
| Recycling of materials and waste |
| Use of external consultancy to increase the environmental efficiency |
| Use of hydraulic system for the reuse of waste water |
| Use of taps that automatically stop the water flow |
| Preparation of manuals for the environmental programs implementation |
| Use of solar and wind energy |

***Source:*** *Adapted from Lima, 2008.*

**Table 3.** State of Ceará – Hotel offers: 2010/2017.

| Locality | 2010 | | | 2017 | | | Variation | | |
|---|---|---|---|---|---|---|---|---|---|
| | MH | Uhs | Beds | MH | Uhs | Beds | MH | Uhs | Beds |
| **Fortaleza** | 203 | 10563 | 26853 | 237 | 11767 | 29337 | 16.75 | 11.40 | 9.25 |
| **Região Metropolitana** | 51 | 1047 | 3284 | 79 | 2002 | 4508 | 54.90 | 91.21 | 37.27 |
| **Polo Litoral Oeste** | 308 | 4611 | 11583 | 446 | 6015 | 15192 | 44.81 | 30.45 | 31.16 |
| **Pólo Litoral Leste** | 231 | 4516 | 12709 | 258 | 5264 | 15081 | 11.69 | 16.56 | 18.66 |
| **Pólo Ibiapaba** | 47 | 887 | 2137 | 107 | 2443 | 5765 | 127.66 | 175.42 | 169.77 |
| **Pólo Sertão Central** | 52 | 1095 | 2946 | 91 | 2037 | 4986 | 75.00 | 86.03 | 69.25 |
| **Pólo Araripe/Cariri** | 94 | 2225 | 6063 | 166 | 4036 | 9040 | 76.60 | 81.39 | 49.10 |
| **Pólos Baturité** | 58 | 843 | 2465 | 71 | 1068 | 2872 | 22.41 | 26.69 | 16.51 |
| **Total** | 1044 | 25787 | 68040 | 1455 | 34632 | 86781 | 39.37 | 34.30 | 27.54 |

***Source:*** *SETUR, 2017.*

In Fortaleza, besides the hotels impacting the local economy positively, as shown in the data from 2010 to 2017, in *Figure 1* and *Table 3*, it is also worth to mention the inns, restaurants, beach huts and the formal and informal shops.

## 3. Methodology

In this study, we use an inductive method and a qualitative approach to investigate the sustainable actions and technologies applied in the medium and large size hotels of *Beira Mar* Avenue in Fortaleza.

In order to establish the selection research criteria, we choose the vision of Orfila-Sintes and Mattsson (2007), which emphasizes that sustainable practices are more common in hotels of higher categories, that are, upscale and midscale, when compared to hotels in lower categories, called low-scale.

Yet, it is necessary to consider the classification in function of the hotel size (small, medium or large). Being small hotel, up to 50 rooms; medium-sized hotel, from 51 to 100 rooms; large hotel, over 100 rooms, according to the concept used by the Support Service for Micro and Small Enterprises in Ceará (EMBRATUR, 2018).

Based on the above considerations, we applied questionnaires (structured interview) to thirteen managers of different hotels, having more than 50 housing units, classified as medium and large size. Among those hotels, three of them correspond to the economic category (two stars), three compete in the tourist category (three stars), four are in the superior category (four stars), and three belong to the luxury category (five stars).

The number of hotels surveyed is considered satisfactory, since it amounts the total of 50 hosting facilities associated to ABIH in Fortaleza, and are among the large, medium and small categories (Cardoso and Figueiredo, 2016).

The data collection was carried out between May 10 and June 16, 2018, the necessary period to all managers being able to answer the questionnaires (structured interview). The reason is because, by starting the questionnaire application, it was found that not everyone could answer it at that moment. Therefore, it was necessary to let the questionnaire with the managers, in order to be answered at their convenience. This situation happened in nine of the thirteen hotels.

The applied questionnaire started with questions about the ISO 14001 certification seal. In the sequence, it was asked about the sustainable actions and technologies practiced in the hotels of *Beira Mar* in Fortaleza. For each question, the hotel manager should mark Y for yes and N for no.

For the data collection, we also applied systemic and non-participant observations, which were carried out in a planned manner, with caution, objectivity and clarity in its execution. For this process we used annotations and photographic records that subsequently served as a subsidy to identify information necessary for the foundation of this study.

In addition to data collection, our research presents a descriptive way applied to interpret our results, analysis and discussion of the found results, providing qualitative information. In the statistical data analysis that characterizes the qualitative approach, the reliability is guaranteed by the

application of the questionnaire to a group of specialized people and by analysing the results with the aid of the computer program – Excel. We also consulted the websites and social media of each visited establishment. Added to the statements of renowned authors, all those resources together provide a basis for the discussions presented on sustainable actions and technologies.

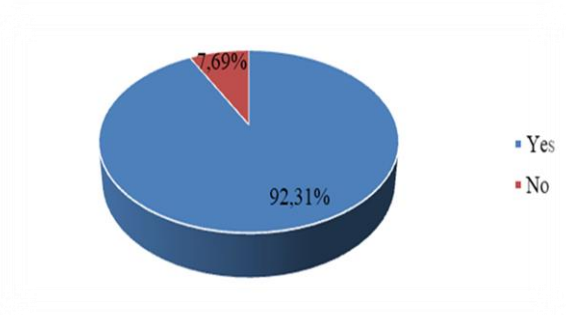
## 4. Results

Initially, we asked if the hotel has the ISO 14001 environmental certification. As results, two hotels claimed to have contracted the seal, due to their management philosophy in contributing to mitigate the negative effects projected on nature by human action. By the other hand, a total of eleven hotels declared they did not have this certification.

Based on this fact, we verified which of those hotels planned to acquire the referred seal or other similar certification. In total, four hotels showed interest in acquiring some type of environmental management seal, when other seven hotels said they were unable to implement a seal.

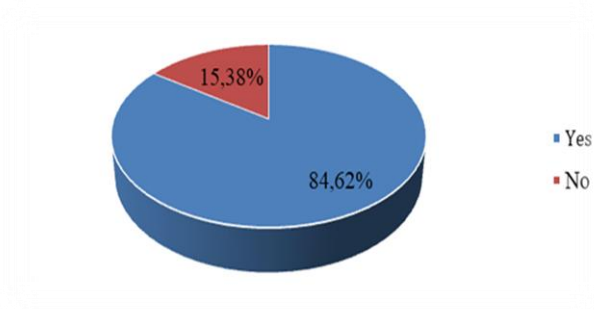
*Sustainable actions*

Second the Environment Policy and Management Council (Conpam, 2014), Fortaleza is one of the cities in Ceará that most generates urban solid waste, about 2.3 kg per day, for each inhabitant of the capital (Setur, 2017). This fact results in a challenging problem for the public sector and environmental policies, since the lack of proper waste treatment and destination, combined with the lack of awareness and participation of the population, can generate new diseases, pollution and cost. Therefore, 92.3% of the hotels are properly aligned with the selective collection, as shown in *Graphic 1*.



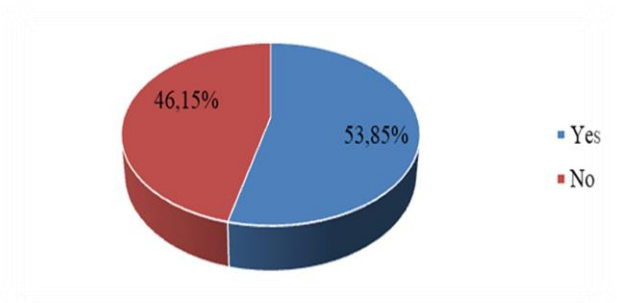

**Graphic 1.** Selective solid waste collection.
*(Prepared by the authors, 2018).*

Regarding the recycling of reusable materials and waste, 84.6% of hotels declared to work with recycling and reuse – see *Graphic 2*. Gripp (2004) stresses the importance of reusing materials through recycling, by bringing to it a new utility, returning to the production line, reducing the need for more virgin raw materials and, mainly, avoiding materials to go to landfills, and that way reducing the impact on the ecosystem.




**Graphic 2.** Recycling of reusable materials and waste.
*(Prepared by the authors, 2018).*

There are also plenty of alternatives to replace disposable glasses, cups, plates, cutlery, and plastic straws. Those can be made of metal, stainless steel, glass, paper or even edible materials. Such changes must align with the guidelines that have been managed worldwide regarding the use and disposal of plastic materials. The results are shown in *Graphic 3*.




**Graphic 3.** Replacement of disposable items with reusable ones.
*(Prepared by the authors, 2018).*

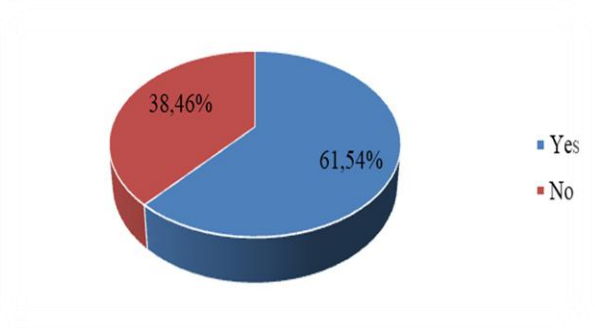
Currently, plastic materials are symbols of global campaigns and considered to be the major polluters, which end up in the sea, affecting the habitat and health of the marine biodiversity, causing the death of animals by the ingestion of plastics.

In line with the world cities that are a reference in this topic, including Brazilian cities, such as Fernando de Noronha, São Paulo, Rio de Janeiro, Florianopolis and Salvador, the Municipality of Fortaleza approved the Project of Law 0366/2018 (Câmara Municipal de Fortaleza, 2018), which prohibits the supply of plastic made straws in "hotels, restaurants, bars, snack bars, kiosks,

bakeries, beach tents and other commercial establishments that make use of the utensil" in the municipality of Fortaleza, from June 2020. This project justifies its urgent implementation, in order to make Fortaleza a benchmark in sustainability, by claiming that:

> *Internationally, it is estimated that Americans use 500 million straws a day. According to a study by the Danish government, in 1964, we produced 15 million plastics; in 2014, there were 311 million. The expectation is to double the amount in the next 20 years. At this rate, the planet oceans will have more plastic than fish by weight, in 2050. France recently announced that it will ban the provision of plastic cups, bowls, plates and cutlery unless they substantially change their chemical composition. Scotland, meanwhile, will ban plastic swabs by the end of 2019. Other cities in the United States have announced similar measures.*

In regard to the waste sent to local collectors' cooperatives, as shown in *Graphic 4*, we highlight that there are several waste collectors associations in Fortaleza to link up. In resume, it is essential that hotels make the correct waste selection, whether through selective collection or the composting system for organic waste, developing ways to facilitate and strengthen the partnership among local recyclers.

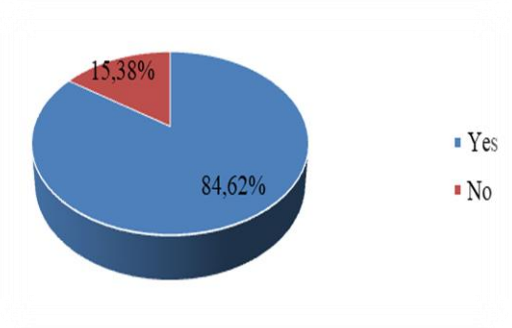



**Graphic 4.** Waste sent to local collectors cooperatives.
*(Prepared by the authors, 2018).*

Next, we discuss the storage and correct disposal of cooking oil, with results shown in *Graphic 5*. We suggest that those hotels establishments request support from the Nature Guests Program that focus on environmental responsibility, inspired by the Global Agenda 21, which constitutes a reference tool for building sustainable societies, seeking to promote environmental protection, social justice and economic development. All this, in accordance to its Art. 30.14, which aims to:

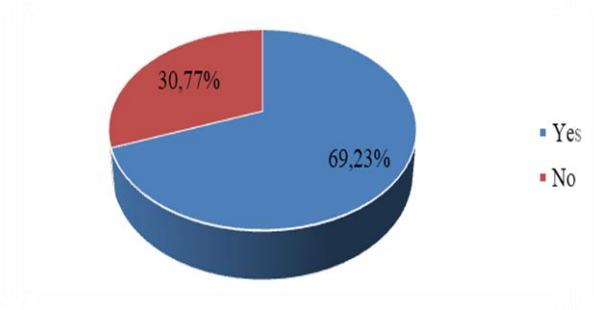
> *Developing the environmental policy to establish and treat the solid waste; reduce the quantities of waste, selecting products that generate less waste, reuse products whenever possible, recycle when waste reduction and reuse is not possible, and dispose of unavoidable waste responsibly. (...) Encourage employees and guests to apply the principles of waste reduction at home (Pacheco and Martins, 2004, p. 489 e 490).*

The actions of Agenda 21 were thought globally, but they advise each country, state or municipality to adapt them according to local needs, prioritizing social inclusion, the preservation of natural, cultural, historical resources, as well as the political ethics.




**Graphic 5.** Cooking oil storage and disposal.
*(Prepared by the authors, 2018).*

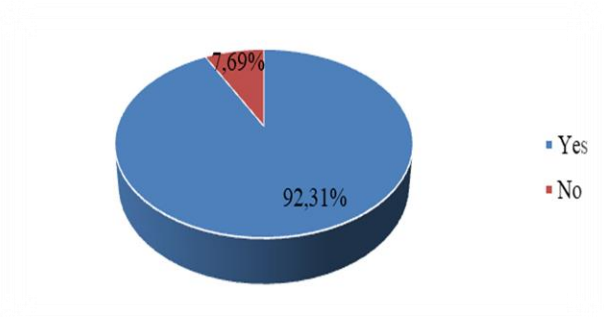
About the food waste control, for the percentage of 30.8% represented in *Graphic 6*, we suggest that training should be carried out together with the implementation of a daily control program, including: paying attention to the purchased, the product validity period, and consumers. The goal is to create solutions and legal requirements to manage and avoid waste and to contribute to the financial revenue of those establishments. It is also worth to mention the ordinance of the National Health Surveillance Agency (Anvisa), 2619/11 and RDC 216, which deals with food preparation at food units and argue that leftovers should be discarded.




**Graphic 6.** Daily check to avoid food waste.
*(Prepared by the authors, 2018).*

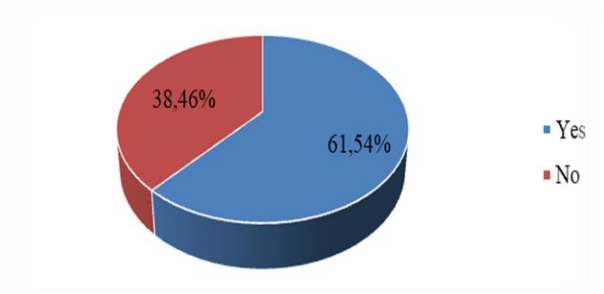
Regarding the reduction in the frequency of linen changes to guests, at the investigated hotels, about 92.3% of the hotels carry out campaigns directed to guests for this purpose. Therefore, it is registered, positively, those twelve hotels have a program to minimize the change of bed linen and towels in the

rooms, and only one hotel does not encourage this action. The results are shown in *Graphic 7*.



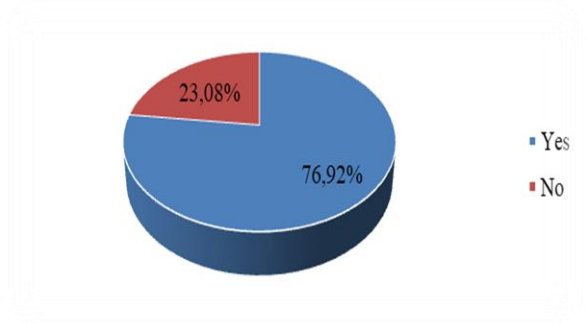

**Graphic 7.** Reduced linen change to guests.
*(Prepared by the authors, 2018).*

We call attention to the fact that, at no point of our investigation, we could find information to the public about reducing the frequency of changing linen via the hotels' social media, despite the fact that all establishments use some type of media on the internet, such as website, Facebook, Instagram and blog. As for on-site visits, we noticed some small advertisements within the rooms, about this issue and the rational consumption of energy and water. The results about this topic – information to guests about environmental issues and their impacts, are shown in *Graphic 8*.




**Graphic 8.** Information to guests about environmental issues.
*(Prepared by the authors, 2018).*

Given the analysis in *Graphic 9* about training on sustainable practices for employees, we emphasize that it is the responsibility of hotels to offer adequate professional training, according to the local reality, and to prepare their teams to be the transforming agents in their localities. That way, employees will be able to inform, assist and motivate tourists to participate in the process of good educational practices for the preservation and recovery of the natural and cultural heritage at every destination they visit.

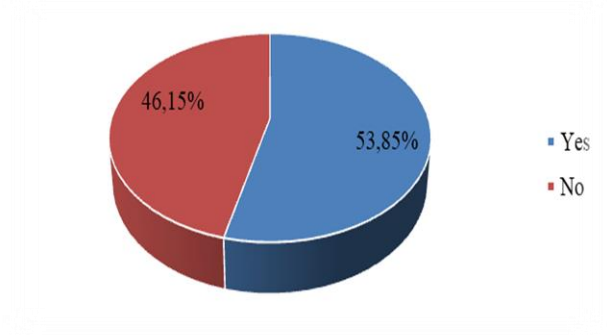



**Graphic 9.** Training on sustainability for employees.
*(Prepared by the authors, 2018).*

In the obtained results related to support given to Non-Governmental Organizations (NGOs) or local environmental projects, the 2015 edition of the National Tourism Competitiveness Index points out the challenges in the social aspects dimension (Barbosa, 2015), faced in Fortaleza, such as the absence of a formal policy to raise the tourist awareness on how to respect the local community at the traveling destination.

The data reinforce the research from Competitiveness Index of National Tourism, edition 2015 (Barbosa, 2015), which highlights, in Fortaleza, the challenges of social aspects, such as the employability of informal labour; lack of technical and administrative tourism professionals with adequate technical training; operational-level tourism professionals, focused on customer service, but without language skills and technical training; residents who are unaware of the positive and negative impacts of tourism to the destination.

Regarding the support for NGOs and / or local environmental projects, represented in *Graphic 10*, the entrepreneurs and the public sector should articulate actions and make the content available, in areas of public circulation at the hotel, as well as in digital media, highlighting the natural and protected areas, presenting tips on good practices for sustainable tourism, the use of rational energy, water savings, solid waste management, selective collection, recycling, food waste and reduction in the frequency of linen changes.

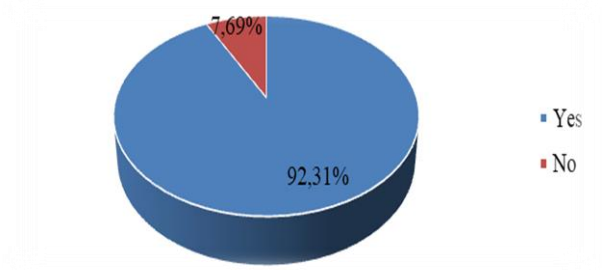



**Graphic 10.** Support to NGOs or local environmental projects.
*(Prepared by the authors, 2018).*

We also suggest the development of applications that offer content in an interactive and dynamic way, but based on research, strategies and goals of tourism, environmental and business plans at the local level. In addition to that, the promotion of campaigns on their own social networks, and in sectors such as reception, rooms, bars, restaurants, events department and in the leisure and recreation areas.

*Sustainable Technologies*

The energy efficiency in Brazil is always under discussion and a current topic, due to the importance of water and electricity issues. That is a reason to emphasize the importance of a rational use of energy, and highlight to hotel managers in Fortaleza how essential is the use of energy-saving lamps at the hotel. Our results were satisfactory with 92.3% of the investigated establishments using energy-saving lamps.

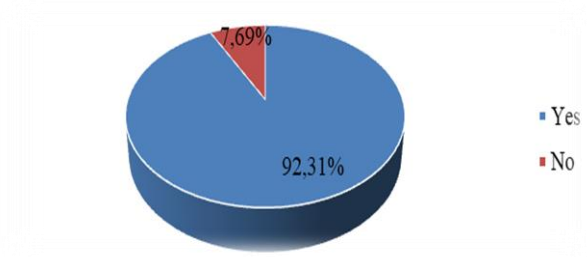



**Graphic 11.** Use of energy-saving lamps in all sectors.
*(Prepared by the authors, 2018).*

In the view of Santos et al (2015, p. 602), it is possible to evaluate the benefits of energy-saving lamps to the consumer and the environment, due to the following aspects:

> *Mitigating pollution is an alternative, since the composition of the LED lamp is not harmful to the environment, it has greater durability, minimizes the amount of lamps to be discarded. The incandescent lamp has less durability, increasing the number of changes and discards, and the glass is composed of small metal particles, which must be treated separately from recyclable glass. The fluorescent lamp is composed of Mercury and its decontamination is an expensive and time-consuming process. This decontamination is necessary, as the mercury disposed incorrectly compromises the quality of the soil and water bodies.*

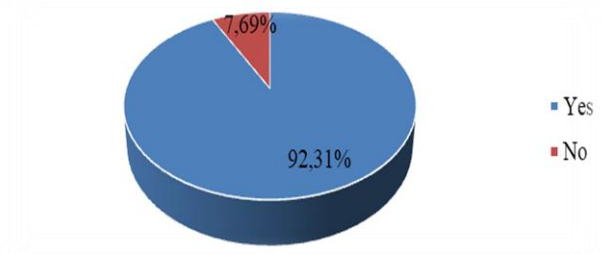
Regarding the installation of air conditioning to promote energy saving, we found that automation has been implemented to the daily life of hotels, which brings agility, economy, comfort and safety during the guests' stay. In accordance with *Graphic 12*, in 92.3% of hotels the operation of those devices is conditioned to the automatic shutdown by magnetic card.




**Graphic 12.** Low consumption air conditioning.
*(Prepared by the authors, 2018).*

From *Graphic 13*, we can observe that the investigated hotels combine planning with technological investments to minimize electricity cost and adopt ecologically correct measures. Some examples are: presence sensors in social areas and departments restricted to employees; automatic shutdown by magnetic card used in 92.31% of the rooms, and the apartment status flags, which facilitate the work of the maids and avoid embarrassing situations with the guests.

The status flags work with bright LEDs; when in yellow signifies the guests' presence in the room, in red signals do not disturb and in green indicates that the room is available for cleaning. It is also worth to emphasize that 100% of the participating hotels have an electrical system with a presence sensor.

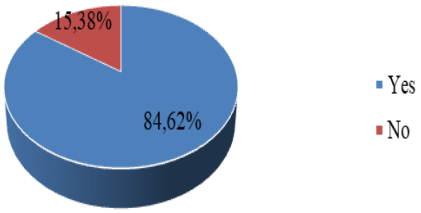



**Graphic 13.** Automatic shutdown by card at rooms.
*(Prepared by the authors, 2018).*

Amazonas (2018, p. 20) and Alexander and Kennedy (2002) present a case of mitigating technologies for energy consumption, which indirectly, generates financial savings for hotel managers, as follows:

> *The use of automatic shutdown equipment at the Hyatt Regency International hotel, in New Zealand, for the cost of $ 16,000.00, had a return on investment in 14 months, through an annual savings of $ 14,000.00. In this sense, the adoption of those technologies can be considered as a great competitive advantage for companies seeking environmental certifications and an important contribution to reduce cost.*

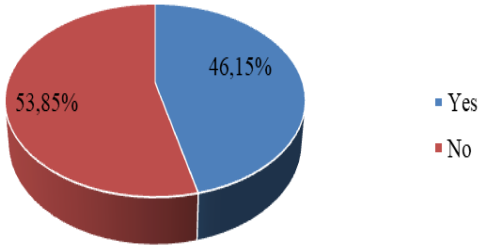
Pousada, Pinzan and Sugiyama (2005, p. 257) stated: "*it is estimated that, in an operation for a period of ten hours a day, a hotel with one hundred apartments and with a total occupancy of two guests per apartment, has an average consumption of water per day of 15 thousand litres of water*". Besides, according to the readings carried out, some equipment accounts for a significant portion of water consumption in hotels; among them is the sink, responsible for a large part of this consumption. As shown in *Graphic 14*, the 84.6% of the hotels surveyed have already implemented the water flow reducers in the taps, which corroborate the statement of Pousada, Pinzan and Sugiyama (2005, p. 257).




**Graphic 14.** Use of water flow reducers on taps.
*(Prepared by the authors, 2018).*

Based on results, shown in *Graphic 15*, the 53.85% of the hotels do not use the automatic taps on sinks in the bathrooms of their rooms. Due to that fact, we refer to John et al (2005, p. 33), who makes the following warning:

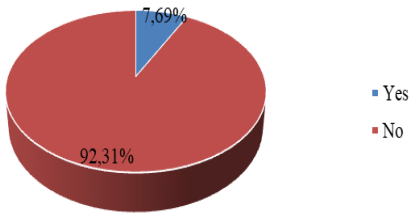
> *The rational use of water inside a building can be achieved, among other actions, with the use of hydraulic equipment and saving components, such as flow restrictors, reduced volume sanitary basins, aerators, among others. The equipment can be classified according to their use, in order to obtain optimization of water consumption. Examples are: control of the use flow and control of the time, or a combination of both variables.*




**Graphic 15.** Automatic taps in bathrooms.
*(Prepared by the authors, 2018).*

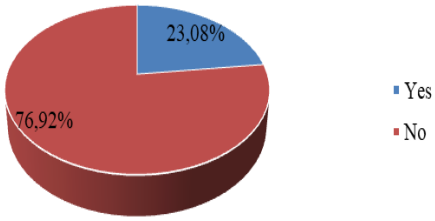
According to Sawin (2011), the countries that stood out the most in the installation of solar water heaters (SWH) were Germany, China, Greece, Japan and Turkey, in 2009. However, currently, Brazil has been showing rapid growth in this scenario, in addition to India and Japan. China is considered the country having the highest volume of production and sales of SWH, globally.

Although the use of water heating solar panels is a competitive advantage for the hotel industry, it has been a tool not frequently used by hotels in Fortaleza, according to the data illustrated in *Graphic 16*.



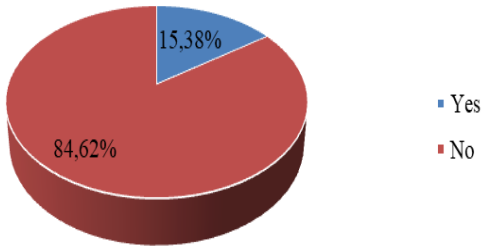

**Graphic 16.** Solar water heating.
*(Prepared by the authors, 2018).*

Concerning the use of natural lighting system, by analysing the information present in *Graphic 17*, the 76.9% of hotels do not use this natural resource, because the implementation of that system requires hiring consulting services for analysis, plus the installation cost. Therefore, these factors together are not compensatory at the moment, due to the cost they demand.



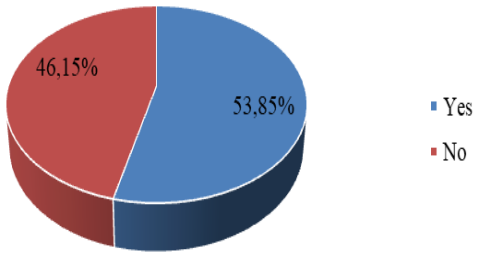

**Graphic 17.** System for utilization of natural lighting.
*(Prepared by the authors, 2018).*

When questioned about a water reuse system at the hotel, the managers defended the fact that the purchase of the equipment is still expensive, as well as the installation and maintenance. That justifies the total of 84.62% of hotels not using this type of system, seen in *Graphic 18*. In regard to hotels that have this system, the treated water is destined for gardening, washing sidewalks and floors.



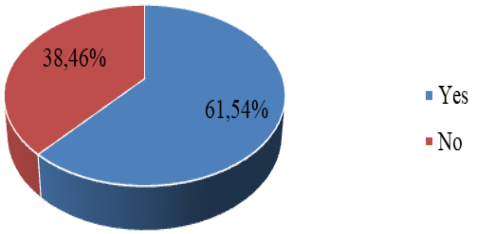

**Graphic 18.** Hydraulic system for reuse of waste water.
*(Prepared by the authors, 2018).*

Regarding to biodegradable cleaning materials, by analysing the *Graphic 19*, we agree with Falcão (2013) on the importance of thinking about that substitution, considering that biodegradable cleaning materials are products with a faster decomposition process in nature. They are manufactured with organic compounds that facilitate the action of natural biological agents in the degradation phases, avoiding soil and water contamination.




**Graphic 19.** Biodegradable cleaning materials.
*(Prepared by the authors, 2018).*

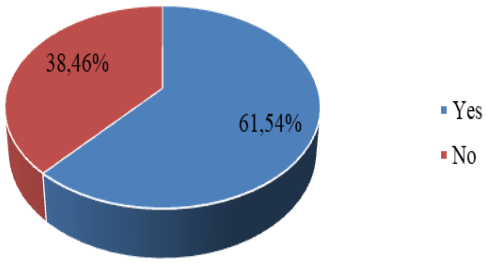
Regarding the topic about refillable packaging and the replacement of sachets in the bathrooms, from the thirteen hotels that are object of this study, eight managers revealed that they choose refillable packaging in the bathrooms (61.54%). The other five managers stated that they do not use this replacement, although they showed interest in the implementation of the process because they recognize the direct benefits, either for the environment and the hotel (38.46%).




**Graphic 20.** Refillable packaging to replace sachets in bathrooms.
*(Prepared by the authors, 2018).*

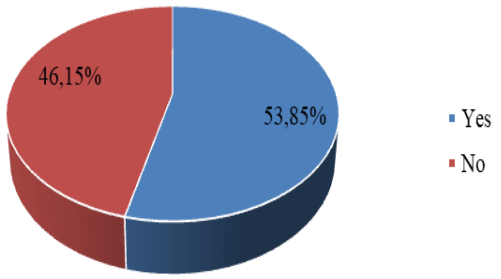
Approaching the topic – Equipment with the PROCEL seal, we emphasize that PROCEL is an Eletrobrás seal that aims to guide the consumer regarding the levels of electricity consumption, according to each equipment category. It aims to prevent the energy waste, to improve the quality of life of Brazilians and to reduce the environmental impacts (Eletrobrás, 2018).

By observing the *Graphic 21*, we agree with Amazonas (2014), that this program should be followed by the hotel industry, as a means to encourage the population to adopt a new behaviour in verifying the energy efficiency of the products that are purchased in the market, and, even unconsciously, contribute to the reduction of energy consumption.



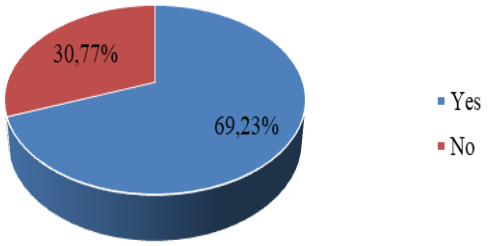

**Graphic 21.** Equipment with PROCEL seal.
*(Prepared by the authors, 2018).*

The results showed that the non-adherence to Environmental Impact Assessment Program by the hotels, as presented in *Graphic 22*, is due to the fact that the cost of implementing and operating environmental projects is high. It is not due to a possible lack of interest by the administrators. Based on that, we consider necessary an articulation between the private sector and public authorities, in order to provide support and incentives for financing and cost reduction of investments to the purchase, installation and maintenance of those systems.




**Graphic 22.** Environmental impact assessment program.
*(Prepared by the authors, 2018).*

In the end, we call attention to the Solid Waste Management Program – PGRS, which aims to implement techniques and procedures for the collection, handling, storage and recycling of waste, avoiding risks to man and to the environment. As seen in *Graphic 23*, the 69.2% of managers stated that they have already implemented this service in the hotels' administrative routine. However, 30.8% said they do not have that plan.




**Graphic 23.** Solid waste management plan.
*(Prepared by the authors, 2018).*

To this end, the Law No. 16,032, of June 20, 2016, which institutes the State Policy for Solid Waste within the state of Ceará (Ceará, 2016), states that:

> *§ 1º Are subject to the observance of this Law, individuals or legal entities, of public or private law, directly or indirectly responsible for the generation of solid waste and those who develop actions related to the integrated management or to the solid waste management, within the scope of the Ceará State.*

Therefore, for an integrated management of solid waste, the hotel sector must assume its role in the search for actions and procedures in the economic, environmental, cultural and social domain, which will allow it to serve current generations and guarantee better living conditions for future generations, without compromising the quality of the environment.

## 5. Conclusions

We consider that the objective of this study was achieved. We had access to the collaborators' means of accommodation, and the application of a questionnaire together with the non-participant observation was successful. From the results, we make the following considerations:

- It was found that the hotels develop ecologically correct actions and adopt clean technologies. However, not all sustainability practices that were mentioned in the questionnaire are present in the hotel management of Fortaleza. This fact can be exemplified by the lack of adoption to the ISO 14001 certification by hotels; only two hotels out of a total of 13 hotels surveyed had that seal;
- The sustainable actions involving selective collection, partnership with garbage collectors, replacement of disposable items by reusable ones, daily control to avoid food waste, information to guests and employees about environmental issues and their impacts, and support to NGOs or local environmental projects appeared to be insufficient, showing the lack of taking advantage of what the sustainable practices could provide, whether in the competitive or economic field;
- Therefore, we recommend a partnership with the Sustainable Hotel Program – ProCopa Tourism, from the National Bank for Economic and Social Development (BNDES), which financially supports hotels that have a sustainability certification.
- In relation to the sustainable technologies, which includes smart elevators, automatic taps in bathrooms, water heating by solar panels, rainwater catchment system, natural lighting system, hydraulic system for reuse of wastewater, biodegradable cleaning materials, refillable packaging to replace sachets in bathrooms, the use of equipment with PROCEL seal, and the evaluation program for possible environmental impacts, we consider that the administrative, organizational, corrective and preventive strategies are scarce to the insertion of environmental policy in an innovative and current perspective.

Based on that, we suggest the definition of an internal environmental policy, involving quality management with the acquisition of equipment, the implementation of technological processes and systems to minimize the negative effects generated by hotels, because in the economic domain, these are inducers to local development and source of revenue, taking into account the local productive arrangements. In this regard, it is necessary to foster partnerships between the government, the

hotel sector and the third sector to create technologies and methods that optimize the operating cost, by reducing the use of water and energy, avoiding the food waste and the impact of solid waste in the environment.

From Donaire (2013), we suggest that the hotel organizations represented by the percentage of 15.38% in *Graphic 2*, reuse the waste in the following ways: internally – implant portable treatment stations, which can be used either by the conventional hospitality, as well as by hotels linked to hotel chains; create waste bags in partnership with other companies; carry out bilateral negotiations; creation and sale of new patents; develop new productive arrangements that result in cleaner technologies and actions for the environment.

According to Carvalho (1997), by having a certification, the enterprise achieves reliability, either in the external and internal markets, enhances its production and increases its revenue. These requirements do not come only from the certification and regulation organizations, but mainly from the eye and approval of customers, who currently give preference to ecologically correct products and services, or to the ones that cause minimal impacts on the environment.

We also propose the following actions: to open a dialogue with the local community, guests and employees, by developing educational and environmental awareness programs; the use of wind energy; the purchase of recycled products; composting of organic material; the use of biotechnology as an ally of control to the lack of water; specific places for collecting batteries; the creation of vegetable gardens for decorative purposes and internal consumption; partnerships with external consultants to increase environmental efficiency; the provision of bicycles for guests to replace means of transport that emit greenhouse gases; definition of responsibilities for employees in relation to the environmental impacts of their activities; preparation of manuals for guidance and awareness of local environmental impacts, for employees and guests.

About the proposed problem, and based on the theoretical review and field research, we consider that, the implementation of those sustainable practices is of great importance in the current reality, to minimize the negative damage caused to the environment and to contribute to the financial revenue of the hotels, by integrating the three dimensions of sustainability: environmental, economic and social.

## 6. References


ABNT. (2001). NBR ISO 1400 – Requisitos de um sistema de gestão ambiental. Associação Brasileira de Normas Técnicas. Rio de janeiro.

Alexander, S.; & Kennedy, C. (2002). Green hotels: Opportunities and resources for success. Zero Waste Alliance, v. 5, n. 7, p. 1-9.

Amazonas, I. T. (2014). Gestão Ambiental na Hotelaria: Tecnologias e práticas sustentáveis aplicadas nos Hotéis de João Pessoa – PB. Dissertação de Mestrado, Universidade Federal da Paraíba, João Pessoa, PB, Brasil.

Amazonas, I. T.; Silva, R. F. C.; & Andrade, M. O. (2018). Gestão Ambiental Hoteleira: Tecnologias e Práticas Sustentáveis Aplicadas a Hotéis. São Paulo, v. 21.

Barbieri, J. C. (2011). Gestão ambiental empresarial: conceitos, modelos e instrumentos. 3rd ed. Atual e ampliada. Saraiva. São Paulo.

Barbosa, L. G. M. (2015). Índice de competitividade do turismo nacional: relatório Brasil 2015. 92 p. Ministério do Turismo. Brasília, DF.

Câmara Municipal de Fortaleza. (2018). Projeto de Lei nº 0366 / 2018. Available at: https://sapl.fortaleza.ce.leg.br/media/sapl/public/materialegislativa/2018/41771/41771_texto_integral.pdf. Accessed on 03.jun. 2020.

Cardoso, M. L.; & Figueiredo, M. D. de. (2016). Práticas de inovações sustentáveis: Estudo qualitativo no setor hoteleiro em Fortaleza/CE. Caderno Virtual de Turismo.

Carvalho, C. L. (1997). Menos estrelas para os hotéis. Nova classificação privilegia o atendimento aos hóspedes, mas métodos gerenciais, equipamentos e instalações ainda têm peso. Revista OESP Hotéis, Restaurantes e Fast-Food, s.ed., Artigo 5. Fev/Mar/.

Ceará. (2016). Lei N.º 16.032, de 20.06.16 (Republicação por incorreção no D.O. 29.06.16) Institui a Política Estadual de Resíduos Sólidos no Âmbito do Estado do Ceará. Available at: http://www.mpce.mp.br/wp-content/uploads/2015/12/Lei-Estadual-n%C2%BA16.032-2016-Institue-a-Pol%C3%ADtica-Estadual-de-Res%C3%ADduos-S%C3%B3lidos-no-Estado-do-Cear%C3%A1.pdf. Accessed on 15 July 2018.

Coltro, A. (2005). Sistema de certificação ISO 14000: ganhos competitivos. http://www.ead.fea.usp.br/semead/8semead/resultado/trabalhosPDF/73.pdf. Accessed on 11.04.2017.

Conpam (2014). Conselho de Políticas e Gestão do Meio Ambiente. Plano Estadual de Resíduos Sólidos do Estado do Ceará. Fortaleza, Ceará.

Dias, R. (2017). Gestão ambiental: responsabilidade social e sustentabilidade. 3. Ed. 5.rei. Atlas, São Paulo.

Donaire, D. (2013). Gestão ambiental na empresa. 2. ed – 17. reimpr. Atlas, São Paulo.

Eletrobrás. (2018). Caderno de Boas Práticas - Eficiência Energética em Edificações Brasileiras. Programa Procel. Available at http://www.procelinfo.com.br/main.asp?Team=%7BFC2C2D0B-55B9-411E-A298ADBED177A088%7D. Accessed on 09.07.2018.

EMBRATUR (2018). Instituto Brasileiro de Turismo. Available at: htts://embratur.gov.br. Accessed on 23.07.2018.

Falcão, G. (2013). Produtos biodegradáveis. Revista Pensamento Verde.

Gripp, W. G. (2004). Gerenciamento de resíduos sólidos municipais e os sistemas complexos: a busca da sustentabilidade e a proposta de cobrança da coleta. Tese de Doutorado em Ciências da Engenharia Ambiental. Santo André, SP.

John, G; Clements-Croome, D; & Jeronimidis, G. (2005). Sustainable buildings solutions. Building and Environment, v. 40, n. 3, p. 319-328.

Lima, I. S. M. (2008). Apostila de Gestão Ambiental na Hotelaria.

Orfila-Sintes, F.; & Mattsson, J. (2007). Innovation behaviour in the hotel industry. Omega, v. 37, n. 2, p. 380- 394.

Pacheco, D. N.; & Martins, D. V. (2004). Restaurante como Empresa Socialmente Responsável. In: Turismo com responsabilidade social: coletânea do XXIII CBTUR, Congresso Brasileiro de Turismo, 2003. Organizador Miguel Bahl. Roca, São Paulo.

Pousada, A.; Pinzan, E.; & Sugiyama, M. S. G. (2005). Uso e reuso da água em São Paulo: uma reflexão para o lazer e o turismo. In: Dowbor, L.; Tagnin, Renato Arnaldo (Org.). Administrando a água como se fosse importante: gestão ambiental e sustentabilidade. São Paulo: Ed. Senac.

Santos, T. S. et al. (2015). Análise da eficiência energética, ambiental e econômica entre lâmpadas de LED e convencionais. Eng. Sanit. Ambient., v. 20, n. 4, p. 595-602. Rio de Janeiro.

Sawin, J. (2011). Global Status Report. REN 21 Secretariat, Paris. Renewable and Sustainable Energy Reviews 16 (1), 113-122.

Setur. (2017). Secretaria de Turismo do Ceará. Available at: http://www.setur.ce.gov.br/images/pdfs/estudos-pesquisas/evolucao-turismo-2006-2016-artigo.pdf. Accessed on 23.09.2017.

Sousa, C. C. B. (2013). Revelações sobre a satisfação do turista com os serviços ofertados nos meios de hospedagem: um estudo exploratório na Av. Beira Mar de Fortaleza –Brasil. Dissertação de Mestrado, Universidade Estadual de Fortaleza, Ceará, CE, Brasil.