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Articles and essays

Contributions of Eco-Innovations for the Sustainability of Tourism Activity: an exploratory study in a Brazilian city

Gesinaldo Ataíde Cândido[a]
Pedro Vieira de Brito[b]

Abstract

This article aims to analyze the benefits of the eco-innovations adopted by the components of the tourist trade of the city of Areia – PB and its contributions to the sustainability of tourism activity in the region. In methodological terms, it is an exploratory and descriptive research conducted as a case study, in which, from a set of eco-innovations for the tourist activity, it was possible to identify these practices with the organizations participating in the tourist trade in the municipality through non-participant observation and interviews with some of the main components of the trade. The results obtained indicate that the number of eco-innovations adopted is median. In addition, it was observed that the main reason for the use has a bias towards economic gains. The result of the sustainability assessment proposed classifies the city as partially unsustainable. In this case, given the incipience in the adoption of eco-innovations by companies in the sector, it is directly related to the low level of sustainability of the tourism activity in the municipality surveyed.

Keywords: Eco-innovations; Sustainable development; Tourism.

Resumo

Contribuições de ecoinovações para a sustentabilidade da atividade turística: um estudo exploratório em município brasileiro

O objetivo deste artigo é analisar os benefícios das ecoinovações adotadas pelos componentes do trade turístico do município de Areia-PB e suas contribuições para a sustentabilidade da atividade turística dessa região. Em termos metodológicos, trata-se de uma pesquisa exploratória e descritiva conduzida sob a forma de um estudo de caso, com o qual, a partir de um conjunto de ecoinovações para a atividade turística, foi possível identificar estas práticas junto às organizações participantes do trade turístico no município, por meio da observação não participante e entrevistas com alguns dos principais componentes do trade. Os resultados obtidos apontam que a quantidade de ecoinovações adotadas é mediana. Além disso, foi constatado que o motivo principal para utilização de ecoinovações tem um viés voltado para ganhos econômicos. O resultado da avaliação da sustentabilidade classifica o município como parcialmente insustentável. Nesse caso, a incipiência na adoção de ecoinovações pelas empresas do setor tem relação direta com o baixo nível de sustentabilidade da atividade turística no município pesquisado.

Palavras-chave: Ecoinovações; Desenvolvimento sustentável; Turismo.

a. PhD in Production Engineering from the Federal University of Santa Catarina (UFSC). Professor in the Postgraduate Program in Administration of Federal University of Campina Grande, Campina Grande, Paraíba, Brazil. E-mail: gacandido@uol.com.br

b. Bachelor of Business Administration from Federal University of Campina Grande (UFCG). Professor of Administration at the Federal University of Campina Grande, Campina Grande, Paraíba, Brazil. E-mail: pedrobrittu@gmail.com

Resumen

Contribuciones de eco-innovaciones para la sostenibilidad de la actividad turística: un estudio exploratorio en un municipio brasileño

El objetivo del artículo es analizar los beneficios de las eco-innovaciones adoptadas por los componentes del *trade* turístico del municipio de Areia – PB y sus contribuciones a la sostenibilidad de la actividad turística de la región. En términos metodológicos, se trata de una investigación exploratoria y descriptiva conducida bajo la forma de un estudio de caso, en el cual, a partir de un conjunto de eco-innovaciones para la actividad turística, fue posible identificar estas prácticas junto a las organizaciones participantes del *trade* turístico en el municipio, a través de la observación no participante y entrevistas con algunos de los principales componentes del *trade*. Los resultados obtenidos apuntan que la cantidad de eco-innovaciones adoptadas es mediana, además, se constató que el motivo principal para su utilización tiene un sesgo orientado hacia ganancias económicas. El resultado de la evaluación de la sostenibilidad clasifica al municipio como parcialmente insostenible. En este caso, la incipiencia en la adopción de eco-innovaciones por las empresas del sector tiene relación directa con el bajo nivel de sostenibilidad de la actividad turística en el municipio investigado.

Palabras clave: Eco-innovaciones; Desenvolvimiento sustentable; Turística.

INTRODUCTION

Considered today as one of the main economic manifestations of the services sector due to its great capacity for expansion and production, tourism stands out in the global scenario as one of the main sources of income generation, development, cultural and commercial exchange. Tourism benefits from the globalization of markets and the technological development of communication and transport.

Given the expressiveness of tourism in a destination's economy, its great growth capacity and the probable socio-environmental impacts associated with this activity, it is necessary to have socio-environmental management practices and adoption of innovations related to the principles of sustainability, with the objective of minimizing the social and environmental impacts resulting of tourism.

Areia, city located in the state of Paraíba, in the Brejo micro-region, stands out for its great tourism potential, associated with the rich historical, natural and cultural heritage that compose the city's formation. After the inclusion of the city in tourist routes, the rural tourism, historical-cultural and ecological categories were developed, bringing various social, environmental and economic impacts to the region (Silva, 2015).

Even with so much wealth to be explored, and being included in government programs aiming to value such potential, Areia still finds difficulties due to the lack of local actions and strategies that involve all the parts that compose the region's tourism activity: lodging, food, transport, organized civil societies, services of tourism interest, tourism companies, educational and professional organizations, credit agents and public and private administration of tourism attractions.

Areia was chosen for this study because of its formal inclusion in the tourist route presented by the Program of Regionalization of Tourism, of the Brazilian government; because of the growth potential of its tourism activity,

which generates social and economic development for the city and the state, with national prominence; and because there are no studies that measure the impact of adopting eco-innovations on region's sustainability level.

In this context, it is necessary to adopt eco-innovations – technological and/or social processes - that cause systemic changes, starting from practical ideas which include improvement of environmental performance, not neglecting economic and social performance. Together with the characteristics of the sector and the existence of technological opportunities, such strategies play a strong role in application and development of eco-innovations (Könnölä, Carrillo-Hermosilla, & Gonzalez, 2008).

Efficiency in the use of tourist destination's resources, aiming at sustainable development, depends on changes that are, largely, closely related to development and adoption of eco-innovations (Farias, 2014). Based on this observation, it can be considered that the adoption of sustainable innovations contributes positively to a higher level of sustainability of the tourism. This presupposes that the higher the level of adoption of eco-innovations by the components of tourist trade, the greater the level of sustainability.

From these considerations, the objective of this article was to analyze the benefits of eco-innovations adopted by the components of tourist trade in the city of Areia-PB and their contributions to the tourism sustainability in this region. The present study took as theoretical and methodological references studies developed by Farias (2014) and Silva (2015), who, respectively, explored the proposition of methodology to evaluate the process of adopting eco-innovations and for the analysis of tourism sustainability.

In the theoretical basis, this article explores the themes: sustainable development, sustainability, eco-innovation and tourism. Subsequently, the methodological procedures used to carry out the study are explained. Afterwards, the results are presented and analyzed, followed by the final considerations.

THEORETICAL FOUNDATION

Sustainable development and eco-innovations

The idea of sustainable development contemplates, initially, only the environmental and economic principles, approaching the concept that it would be necessary to reduce countries' growth rate to reduce environmental impacts. Later, the concept of sustainable development included the social dimension, characterizing the Triple Bottom Line model, which deals with the real occurrence of sustainability, only when the three dimensions (social, environmental and financial) are contemplated. This model is widely used in studies regarding sustainable development (Elkington, 2001).

Sustainable development is based on ethical principles of perpetuation of humanity and life. When referring to sustainability, the idea is the responsible use of environmental resources, a situation that conflicts with the utilitarian and individualist ideas of neoclassical economics based on rationalization in maximization of individual utilities to generate efficiency in the use of resources, without a greater concern with the impacts generated, but with the reduction of costs and optimization of the productive process (Melo & Martins, 2007).

Discussions on sustainable development need to be converted into concrete actions that will bring positive environmental, social and financial results. In this sense, decision-making that makes sustainable practices viable is an essential factor. Practices that allow awareness and sensibility are also very important in this scenario. It is also important the use of tools that evaluate and classify sustainability in various localities and economic activities, such as sustainability indicator systems, which present a set of dimensions and various indicators with various possibilities for adaptation to sectors, territorial spaces and economic activities (Lucena, Cavalcante, & Cândido, 2010).

For Arundel and Kemp (2003), the competitiveness of companies and countries is directly related to the ability of social actors to seek and practice eco-innovation, in the perspective that their process reduces environmental impacts generated by companies and their local effects, through a set of actions related to environmental technologies, organizational innovations, innovative products and services and the creation of green innovation systems. The role of companies in this scenario is highlighted, because they can be great agents that transform and create impact on the environment. In this respect, the idea of environmental responsibility by companies focuses on "production with minimal negative impact, considering both technological availability and market demands" (Farias, 2014, p. 22).

Sustainability and eco-innovations

By inserting the principles of sustainability into the discussion of innovations, the idea of eco-innovations arises, which encompasses social, financial and, above all, environmental benefits. Hence the need of a sustainability-oriented approach, for the preservation of the social, financial and environmental conditions of a given place, an essential factor for sustainable development (Könnölä, Carrillo-Hermosilla, & Gonzalez, 2008).

The term eco-innovation was first used in 1996 by Fussler and James in their book *Driving eco-innovation* (Maçaneiro & Cunha, 2015). In their book, the authors introduced the concept of eco-innovation related to the idea of sustainability. In this respect, they developed three "stabilities": ecological stability, which concerns the continuous functioning of the natural system and its resources; resource stability, which refers to people's accessibility to resources in sufficient amounts at reasonable costs that characterizes an efficient use of resources; and socioeconomic stability, which is the supply of goods and services that can be consumed by all, avoiding social inequalities (Fussler & James, 1996 apud Cherobim, Cunha & Mendonça, 2014).

From this concept, the strategic and financial benefits that an eco-innovation can provide stands out, besides the environmental benefits. The financial benefits stand out in the economy generated from the reduction of costs and the generation of new revenues; as for the strategic benefits, we highlight the improvement of the company's image in the market, in addition to providing greater diversity to its portfolio. Regarding the environmental benefits, the reduction of the use of natural resources and production of waste, preserving the environment (Farias, 2014) stands out.

The social contributions that an eco-innovation can provide, such as the generation of employment, social inclusion, improvement of quality of life

and the development of environmental education, are essential factors for the maintenance of sustainable practices, due to their capacity to raise awareness and sensitize the society, resulting in a group of individuals with critical eye on the environmental problems present in their geographic space.

Thus, it is important to emphasize that, to obtain an ideal situation of sustainability, it is necessary the benefits to be related to all the dimensions that sustainability works – social, financial and environmental – evenly, and not one rather than the other. Joint effort of all social actors, in the public and private sphere, is essential for such purpose (Farias, 2014). In this sense, eco-innovations can be considered as means to achieve sustainable progress, because they are involved with benefits that reflect the set of factors related to sustainability.

Rationality rather than the seek for a higher growth level, and the concern with learning processes, considering the danger of an approach with too much financial focus, are reasons that make it essential to analyze eco-innovations from an evolutionary approach, since this perspective involves the subsystems, such as social, ecological and institutional, pondering their interrelationships (Farias, 2014). It is necessary to typify and characterize more specifically the eco-innovations from the (co)evolutionary approach, and, then, justify the choice of the typology of eco-innovations to be used in the present study.

Typologies of eco-innovations

There are several typologies for analysis of search and practice of eco-innovations, with emphasis on the proposals of Rennings (1998); Andersen (2006); Kemp and Foxon (2007) and the typology of Könnölä, Carrillo-Hermosilla and Gonzalez (2008). Könnölä, Carrillo-Hermosilla and Gonzalez (2008) associate eco-innovation with an innovation that improves environmental performance, requiring a process of systemic change that includes various factors that interfere in an innovation's results, from the invention of an idea to its practical application. The authors present their typology from a set of dimensions, discriminated in Chart 1:

Chart 1– Design Dimensions of the typology of Könnölä, Carrillo-Hermosilla and Gonzalez

Design Dimensions	Component addition, Sub-system change.
User dimensions	User development, user acceptance.
Product service dimensions	Change in product service deliverable, change in value network processes.
Governance Dimension	Shared institutional solutions.

Source – Adapted from Könnölä, Carrillo-Hermosilla and Gonzalez (2008).

Although they present some peculiarities, the typologies of eco-innovation are relatively homogeneous, being possible to observe the complementarity of these theories, to enrich the concept of eco-innovation. However, the typology of

Könnölä, Carrillo-Hermosilla and Gonzalez (2008) is considered more robust, for being more detailed in its dimensions and highlighting the importance of users in the development process and eco-innovation diffusion (Farias, 2014) more appropriate for eco-innovations' qualification in the analysis of tourism activity in the city of Areia-PB. In this perspective, the typology was adapted to the context and characteristics of tourism in Areia-PB, including the Organizational Dimension proposed by Farias (2014), according to Chart 2.

Chart 2 – Dimensions and types of eco-innovations applicable in tourism activity

1. Design Dimensions: Use of technologies of: pollution control; noise control; waste management equipment; clean production. Use of environmental monitoring tool; secondary materials; alternative energy sources; green technologies; and waste as input to new processes. Increased efficiency (eco-efficiency); waste reduction; redesign of productive process; use; incorporation of principles present in natural ecosystem; and change in productive system's vision.
2. User Dimensions: Development of new products/services; modification of existing product/service; mechanisms of identification of leading users (or groups of users); identification of changes required in users behavior; introduction of eco-innovation in the consumer market.
3. Product and Service Dimensions: Changes in the way products and services are delivered to customers, in perception of the consumer relation, in the value chain and in processes of provision of products/services.
4. Governance Dimensions: Creation of a new institutional solution to solve conflicts over environmental resources; regulation of uses of authorized resources; mechanisms for monitoring the use of natural resources; form of relationship between organizations and government; relationships between the organization and other stakeholders.
5. Organizational Dimensions: Development of eco-auditories; new services that improve the environmental performance of companies; Environmental certification of products/ services.

Source – Adapted from Könnölä, Carrillo-Hermosilla Gonzalez (2008) and Farias (2014).

In the next item, content related to the relationship between tourism and sustainable development is explored, based on what was explained about the typologies of eco-innovations and their adaptation to tourism.

Tourism and local sustainable development

Tourism is a phenomenon that historically accompanies humanity. From the earliest times, man needs to travel by various means, according to the personal needs and environment in which they live, whose interactions and mode of social, economic and political organization influence their decisions and often demand displacements (Theobald, 2001).

Due to the numerous ways of exploring tourism, its great capacity of growth is currently highlighted. Ways of tourism exploration are developed according to new technological possibilities and a destination's exploration, such as the categories

of tourism: ecological, cultural, historical, rural, religious, leisure, business and/or events and adventure (Fullana & Ayuso, 2002 apud Santos, 2013a).

One of the main difficulties related to the theoretical studies on tourism refers to the real measurement of its impacts, since the tourism activity presents an extensive and complex productive chain due to the great fragmentation of this process, in which the elements that compose the tourist trade interact of diverse forms, according to the characteristics of each destination.

Tourism is an economic activity that, to guarantee its survival, must take advantage of its potential for expansion – due to some characteristics of the modern world, such as the development of transport and communications technologies, the consequent improvement of quality and reduction of time and costs and the social labor gains, such as paid vacations – because they have a peculiar characteristic: they must be consumed at the place of destination, generating direct impacts in the region, which can be positive or negative, depending on the concerns and strategies aimed at local sustainable development (Theobald, 2001).

The interest of tourism in sustainable development is logical, since it is an economic activity that generates employment and income, capable of fomenting a broad productive chain with the involvement of multiple social actors. However, given its dynamics and intensity, in particular regarding its implications for the supply and consumption relationship and relations with environmental issues, the activity has some negative implications for sustainable development, which can be minimized by using some eco-innovation practices by the various agents involved in the activity, especially those most involved with the offer and demand of their attractions in terms of products and services.

Thus, it is necessary to develop strategies that seek, in short and long term, to minimize negative impacts on the environment, guaranteeing a sustainable development that contemplates the three principles of sustainability - financial, environmental and social, – to give authenticity to the process, while corroborating with the theoretical concepts regarding sustainable development. It is also essential to recognize the importance of a tourism management that involves the various stakeholders of the activity, aiming at an interrelationship for the construction of joint strategies that achieve positive results for the sustainable development of the destination. Because of its complexity, sustainable tourism ends up being an activity that requires the participation of several social actors to achieve sustainable results.

According to César-Dachary (1996), tourism is a complex economic activity and has broad relations with environmental issues, which can be classified in terms of their physical, biological and socioeconomic effects, as well as their real and potential effects. In this respect, the importance of tools that can measure the sustainability level of a destination's tourism activity is highlighted, since they help in planning and decision-making that seek to mitigate the negative impacts of this activity in the region.

The relationships between the pursuit of the sustainability of an economic activity and the practices of eco-innovations adopted by the companies of the sector become a powerful tool for generating financial, social and environmental results for the tourist destination. They are understood as a mechanism used for sustainable development, mechanism that should be in continuous application and not only as specific actions, becoming a concern that involves the various

social actors, such as tourists, destination's population, government authorities, companies, residents' associations, among others, in a long period of time, associated with the measurement and analysis of the results.

Eco-innovations in tourism

The practices of eco-innovations to generate sustainability in tourism are preceded by a set of agreements that should involve all members of the productive chain, especially opinion leaders in each chain link, also highlighting the role of governments as facilitators of adoption of more sustainable practices and assuming responsibilities in the agenda for generating sustainable development in the region (Buysse & Verbeke, 2003; Carlsen, Liburd, Edwards, & Forde, 2008).

Within the premise that the process of adopting eco-innovations contributes to the tourism sustainability, Menezes, Cunha, and Cunha (2013) cite some eco-innovations that can be applied to these establishments, proposing a classification based on four categories (waste, environmentally responsible products and services, energy and water) and from each of these categories specific types of eco-innovations. Based on the authors' conception, the present study also proposes a wider classification, including new dimensions and types of eco-innovations, which can be adopted by all tourist trade members, facilitating the visualization of the existence or not of eco-innovations adopted by a set extremely heterogeneous organization associated with a destination's tourism activity, such as hotels, inns, restaurants, snack bars, tourism companies, among others. Such classification is explained in Chart 3.

Chart 3 – Classification of eco-innovations

Categories	Eco-innovations
Energy	Energy saving through the use of presence sensors that enable lights to be turned on or off; Use of energy savings in housing units (card system or electrical switch); Replacement of lamps by LED technology; Monitoring and monthly evaluation of energy consumption; Adoption of "green roofs" to help reducing ambient temperature and saving energy, avoiding air conditioning; Harnessing the natural sunlight for daytime lighting; Harnessing sunlight for heating the water or generating energy; Generation of electric energy by wind; Offering cellular recharge services (rechargeable batteries) with electricity generated in a renewable way; Optimization of airflows and natural ventilation systems rather than the conventional electric systems of ambient air conditioning; Substitution of desktop computers by laptops; Changing TV sets by models with technologies that consume less energy; Replacement of air conditioners for newer models using inverter technology; Replacement of minibar, fridge, microwave, electric oven with more than 10 years for newer and more economical models; Use of a system that allows to modify the intensity of light in the environment (*dimmer*).

(continues...)

Chart 3 – Continuation

Categories	Eco-innovations
Water resources	*Source:* Bed and bath sets washing in industrial laundries; Use of water flow reducers on faucets and showers; Use of automatic faucets; Installation of tanks to collect and store rainwater; Awareness of guests regarding the request of bed and bath sets to not be daily washed; Use of dry cleaning; Replacement of valves by enclosures coupled in bathrooms, saving water.
	Destination: Use of an effluent treatment network, reducing its pollution power; Reuse of cleaning and machinery water for various purposes.
Waste	*Solid Waste:* The company carries out the selective collection of waste, giving it a specific destination; Recycling of leftover soap; Installation of a collection point for batteries.
	Organic waste: Reduction of food waste through the charging for leftover food; Reuse of organic waste for composting, production of fuel or other application.
Transportation	Use of apps that show sustainable means of transportation with reward system for the client; Less fuel-efficient buses (biogas, hydrogen, electricity); Planning of itineraries to reduce the use of transport and inefficient displacements; Fleet maintenance and replacement plan for newer and more economical units; Replacement of fossil fuels for blends with biofuels.
Construction	Construction or remodeling of building with environmental concern, facilitating the capture and use of rainwater, better ventilation, lighting; installation of cold floors in the environment, keeping the room cooler; Constant concern with the maintenance of business facilities, avoiding wasted resources due to malfunctioning of the physical structure; Use of newspaper and plaster bricks in buildings or other ecological material; Installation of green walls.
Marketing	The company provides manuals and campaigns to help partners improve their environmental performance, disseminating their initiatives; Preferential consumption of local inputs; The company promotes its sustainable activities to its clients.
Employee awareness	Awareness of employees through campaigns, training and other courses in environmental management; Partnerships with educational institutions for courses or lectures on environmental and ecological management.
Products and services	Use of food of own production in menus of restaurants; Use of an app for smartphones for communication and purchase procedures; Institutional site with purchase and reservation options, check-in and check-out; Tablet at the front desk to communicate the invoice and use of electronic invoice; Availability of biodegradable *amenities*; Installation of *dispensers* for shampoo and soap in environments; Use of returnable bottles and package; Utensils manufactured with reuse of materials that would be discarded (picture frame, holder, bags etc.); New lodging modalities based on the use time of hotel rooms or services; Encouragement of restaurant clients to plant seedlings and seeds; Pencil seed implantation; Use of biodegradable or recycled detergents and soaps.
Sustainable practices	Decoration with works from local artists; Participation in environmental reforestation programs involving clients; Partnerships with suppliers for sustainable practices; Requirement of standardization and standardization stamps that prove the sustainable conduct of outsourced companies and partners.

Source – Own elaboration (2017).

METHODOLOGY

The present study can be classified as exploratory and descriptive, conducted in the form of a case study, having as geographic scope the city of Areia, and temporal scope. A cross-sectional study about the contributions of the practice of eco - innovation for the sustainability of tourism activity in the city surveyed.

The criterion to form the intentional sample was the proper identification of elements that integrate the tourist trade of Areia-PB, which have tourist relevance for the city and help in region's tourism development through its activities, verified by information from the city's tourist map (2017), the studies of Silva (2015), Almeida and Caldas (2010), Guardia (2012), and Santos (2013b), associated to the information collected in the local with region's tourism social actors. These procedures allowed to identify 56 components of the tourist trade in the city. Visits were then made according to the accessibility and displacement capacity of the researcher, to the survey of eco-innovations that some of these components could or not be adopting, constituting a sample of 25 components, equivalent to 44.64% of the population. Therefore, the sample is non-probabilistic, consisting of 25 components of the city's trade. It can be considered that this sample was formed by the main components of destination's tourist trade, because they stand out in the city through visibility, accessibility, investment in marketing and advertising, and the preference for most tourists who visit the city. The components of the tourist trade surveyed included: hotels, inns, bars, restaurants, tourist attractions, travel agencies, transport companies, associations, unions and commercial enterprises with activities to support tourists in the region.

As for the collection of primary data, an own instrument was developed, consisting of a checklist of eco-innovations that can be used by several components of tourist trade and of a brief semi-structured interview script, which aims to analyze the understanding of some entrepreneurs, who were associated with projects that were part of the sample, regarding eco-innovations.

The checklist was elaborated from a brainstorming carried out by researchers of the Federal University of Campina Grande (UFCG) directly involved with the theme, linked to the area of sustainable innovations and tourism sustainability, who had access to readings on eco-efficiency and sustainability in the tourism activity. For the purpose of its application, visits were made *in loco*, where it was possible to observe the existence of the eco-innovations constant in the checklist and forms of their application.

The interviews took place in the physical space of the enterprises that are part of the tourist trade in the city of Areia-PB, where constant interactions were established with the managers, aiming to identify their personal vision regarding eco-innovations, their importance for sustainability and which innovations were being adopted in the enterprise.

The primary data were collected during field visits to main components of city's tourist trade. In this aspect, the non-participant observation had a primordial role in the identification of peculiar eco-innovations to the region's enterprises, in confirmation of interview data and in the weighting of the eco-innovations checklist developed by the researchers. Thus, the research instrument worked

to help researchers with the observation *in loco.* The collection was done in 25 components of the trade, in October 2016. In addition, three managers, representatives of some of the main components of city's tourist trade were also interviewed in the same period.

The data triangulation technique (Yin, 2005) was used to treat and analyze the data. With this technique, various data sources obtained were converged: primary data, secondary data and non-participant observation to signal the empirical analysis between the adoption of eco-innovations and tourism sustainability.

Variables related to the identification and classification of eco-innovations received a qualitative treatment – classification in nine categories – and quantitative treatment in obtaining the sum referring to the evaluation of eco – innovations use intensity of tourism activity.

To quantify the presence of eco-innovations in the tourism activity of Areia, we assigned 1 to record the presence of each type of eco-innovation found. Finally, to evaluate the presence of eco-innovations in Areia's tourist trade, it was possible to quantify the total of different eco-innovations used. In this aspect, the scale presented in Chart 4 served as reference to evaluate the presence of eco-innovations.

Chart 4 – Eco-innovations use levels in companies

Total of values attributed to eco-innovations variables related to productive activities	Use of eco-innovations
From 0 to 12	Very low
From 13 to 24	Low
From 25 to 36	Average
From 37 to 48	High
Over 48	Very high

Source –Adapted from Farias (2014).

Regarding the sustainability level of tourism activity in the city of Areia-PB, the results obtained by Silva (2015) were used, which involved a set of social actors differently connected to tourism.

PRESENTATION AND ANALYSIS OF RESULTS

Context and territorial scope of study

The city of Areia is located in the micro-region of the state of Paraíba, characterized by humid climate and favorable soil for sugar cane agriculture. The relief is characterized by mountains and valleys that form a beautiful mountainous landscape, contributing heavily to the tourism in the region. The *locus* - Areia - is located 122 km far from the capital of Paraíba, João Pessoa. Areia has a territorial area of 269 km2; approximately 23,829 inhabitants, 38.74%

of them live in the rural area and 61.26% in the urban area. The city's Human Development Index (IDH-M) is in the order of 0.594, considered low (low HDI goes from 0.500 to 0.599). The dimensions that contributed the most to the Index are: income, education and longevity (IBGE, 2010). The strong tourist appeal of Areia comes not only from its beautiful natural landscapes, but also from the presence of businesses that stand out in the city, such as mills and inns, as well as rich cultural and historical heritage.

Eco-innovations identified in the components of city's tourist trade

In total, 35 eco-innovations related to the components of the tourist trade in Areia were identified, out of 60 listed and classified according to the proposed typology. These 35 eco-innovations are associated to 11 different types of dimensions of the model proposed by Farias (2014), based on Könnölä, Carrillo-Hermosilla and Gonzalez (2008) and suitable for tourism in the present study: four types of eco-innovations of Design Dimensions; two types of Products and Services Dimensions; two types of Governance Dimensions; a type of Organizational Dimensions; and two types of User Dimensions. All the eco-innovations identified and the respective quantities practiced by the companies that form the tourist trade are listed in Chart 5.

Chart 5 – Main eco-innovations adopted by components of city's tourist trade

Types of Eco-innovations	Number of companies using
Use of energy savings in housing units	1
Replacement of lamps by LED technology	2
Change of TVs to newer models	11
Replacement of minibar and fridges with more than 10 years by newer models	7
Bed and bath sets washing in industrial laundries	2
Use of automatic faucets	1
Installation of cisterns for rainwater storage	5
Replacement of valves by coupled boxes in bathrooms	9
Construction or renovation of the building with environmental concern	6
Use of newspaper and plaster bricks in buildings, or other ecological material	2
Utensils manufactured with reuse of materials that would be discarded	6
Harnessing sunlight for heating water or generating energy	1
Reuse of cleaning and machinery water for various purposes	6

(continues...)

Chart 5 – Continuation

Types of Eco-innovations	Number of companies using
Reuse of organic waste for composting, production of fuel or other application	2
Selective collection with specific waste disposal	5
Planning of itineraries to reduce the use of transport and inefficient displacements	1
The company promotes its sustainable actions to its clients	2
Institutional website with purchase and reservation options, check-in and check-out.	3
Own-produced food on restaurant menus	7
Harnessing natural sunlight for daytime lighting	7
Optimization of airflows and natural ventilation systems in detriment of conventional electric air conditioning systems	8
Awareness of guests regarding the request of bed and bath sets to not be daily washed	2
Reducing of food waste through charging for leftover food	1
Use of returnable bottles and package	1
Awareness of employees through campaigns, training and other courses in environmental management	2
Constant concern with the maintenance of business facilities, avoiding wasted resources due to malfunctioning of the physical structure.	12
Monitoring and monthly evaluation of energy consumption	5
Providing manuals and campaigns to help partners improve their environmental performance by publicizing their initiatives	2
Preference for consumption of local inputs	11
Decoration with works of local artists	9
Partnerships with suppliers for sustainable practices	1
Partnerships with educational institutions for courses or lectures on environmental and ecological management	2

Source – Own elaboration (2017).

From the contents of the Table above, it can be inferred that there are no eco-innovations present at the same time in all components of tourist trade that were part of the sample, since the activity's fragmentation level is high, unfolded in companies of different branches, making it difficult to establish similarities between these organizations.

The presence of eco-innovation, "Constant concern with the maintenance of business facilities, avoiding wasted resources due to malfunctioning of the physical structure" (eco-innovation cited in Chart 5), present in most components of the sample, indicates the predominance of an individual effort to offer better facilities to tourists, as there are enterprises of the same branch in the tourist area, characterizing a space of competition.

The least used eco-innovations are: "use of energy savings in housing units"; "implantation of green walls"; "use of automatic faucets"; "availability of biodegradable amenities"; "Harnessing sunlight for heating water or generating energy"; "planning of itineraries to reduce the use of transport and inefficient displacements"; "reducing of food waste through charging for leftover food"; "use of returnable bottles and package"; "Partnerships with suppliers for sustainable practices"; and "the requirement of standardization and standardization stamps that prove the sustainable conduct of outsourced companies and partners". Such eco-innovations were found in only one enterprise in the region. Such situation indicates the existence of few actions of implantation of eco-innovations that demand greater specific knowledge and investment from the enterprises.

These results indicate that the priority for adoption of eco-innovations by Areia's tourist trade companies that were part of the sample is to reduce costs and/or increase services quality. Such priority is justified by the greater number of eco-innovations in the Design Dimensions in relation to the others, due to the efficiency in the use of productive resources that these eco-innovations enable, reducing the costs in the offer of tourist products and services and increasing the productivity of the company, besides its competitiveness in the market, when there is a high level of competition.

Results indicate that, in all the eco-innovations identified in tourism, there were generation of financial benefits for the companies, in addition to environmental benefits. The social benefits were verified in only eight of the identified eco-innovations, from the market demands, since the tourism became an activity of great value for the region and the components of tourist trade understood the importance of implanting some sustainable practices.

In this sense, there is a greater number of eco-efficient technological innovations adopted by the sample components and a homogeneity in relation to the motivation for their adoption: the associated economic gains.

Of the 60 types of eco-innovations that may be being adopted by the sample components and were related to the typology adapted for application in tourism activity, only 35 were identified, which corresponds to an average level of eco-innovations use, according to the evaluation parameters described in Chart 4.

Eco-innovations use and city's tourist trade sustainability performance

In the eco-innovations typology analysis in the tourist trade of Areia, it was possible to associate the adoption of eco-innovations, by the majority of the components of the sample, to an interest of character much more financial than environmental and social. The most tourism relevant companies in the region seek to respond to tourists' demands, offering the whole apparatus to welcome

these users, without worrying about the environmental and social impacts that this activity can generate in the local.

This finding is justified by only two dimensions, institutional and cultural, which have been favorable to the city's tourism activity's sustainability in Silva's analysis (2015). The factors that contributed to the favorable results of these dimensions are related to actions and offers of means to attract tourist's attention to the local, such as: events and festivities, a great offer of typical products, existence of historical buildings and concern with the preservation of these historical records through laws, made official after the city was designated in its entirety a national Historical Heritage (Silva, 2015). Thus, there is a predominance of interests in the financial yields that the region can generate, rather than environmental and social concerns, dimensions that did not contribute significantly to the sustainability level of the region.

Although there are environmental and social benefits as result of incorporation of eco-innovations by some components of the sample, they are very isolated and punctual occurrences, not bringing considerable results to the point of influencing the city's tourism sustainability level, which is partially unsustainable, according to Silva (2015). This conclusion demonstrates the importance of joint actions, among the various social actors, for the dissemination and sharing of sustainable ideas and practices that will achieve positive results for the region's tourism sustainable development.

When comparing the eco-innovations' adoption level, proven average, with the region's sustainability level, which was partially sustainable, the interference of eco-innovations' adoption of tourism sustainability is explicit. In this regard, from the data, information, typologies and classifications proposed, it can be inferred that the eco-innovations level of adoption by the components of tourist trade contributed to the region's sustainable development to be partially unsustainable.

This is a result of the non-contribution of the eco-innovations' adoption level by the components of Areia's tourist trade to a higher sustainability level, thus confirming the premise of the present study, which proposed a directly proportional relationship between the eco-innovations' adoption level and tourism sustainability. This result also demonstrates the importance of adopting eco-innovations for tourist destination's sustainability.

CONCLUSIONS

The results made possible to identify a set of eco-innovations that are being adopted by the components of city's tourist trade and quantitatively measure these innovations' adoption level, presented average in the region. In this regard, the greater interest in the financial benefits generated rather than environmental and social benefits was evident, thus contributing to a sustainability level to be considered partially unsustainable.

The results show that out of 60 eco-innovations, 35 were adopted by the sample components. In terms of categorization, we observed that the dimensions with the greatest number of eco-innovations adopted was the Design Dimensions, which had 17 adoptions, associated to the four types of eco-innovations of this

dimension that constituted the sample organizations. We noted that there are no eco-innovations present at the same time in all components of tourist trade, due to the high fragmentation level of this activity.

The occurrence of eco-innovations in the analyzed sample was also very punctual. Few establishments adopt innovations that demand greater technical knowledge and investments, which generate better environmental and social results for region's sustainability. We also noted a low level of theoretical knowledge about eco-innovations, since the tendency of most of the respondents was to associate eco-innovations with economic and financial business results.

Another fact verified from the analysis was the absence of greater inter-relationship between the components of city's tourist trade with the objective of developing joint actions and sustainable practices, which contributes to the tourism sustainability. In this regard, greater interference by public authorities, through projects and solutions for the tourism sustainable development in the region was not perceived.

As for the sustainability level of Areia's tourism activity, there was a greater contribution of the institutional and cultural dimensions, and lesser contribution of the tourist, environmental, economic and social dimensions, thus favoring a sustainability level classified as partially unsustainable, according to Silva (2015).

Based on this information, we concluded that the eco-innovations' adoption level by the components of tourist trade in Areia does not contribute to a higher tourism sustainability level, confirming the premise of the present study: "The adoption of sustainable innovations contributes positively to a greater sustainability level of tourism activity".

To carry out new studies, exploring the relationship between the themes addressed in the present work, in other geographic scopes, it would be necessary to study specific segments of tourist trade, involving segmentation studies of the sector, such as an analysis of lodging or feeding. Due to the great fragmentation of this sector, the whole analysis generalizes some aspects, contributing or not to the sustainability of such activity.

Finally, it is expected that the present results can be contributory for tourist trade companies to consider the use of eco-innovation, not only to generate greater organizational competitiveness, but also to contribute to the generation of greater sustainability for the city's tourism activity and, consequently, for the generation of sustainable local development.

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Gesinaldo Ataíde Cândido: Definition of the problem and objectives, development of the theoretical foundation, bibliographical revision and theoretical foundation, choice of methodological procedures, data analysis, critical review of the manuscript and writing of the manuscript.

Pedro Vieira de Brito: Definition of the problem of research and objectives, development of the theoretical foundation, bibliographical revision and theoretical foundation, data collection, data analysis, elaboration of tables, graphs and figures, computations and projections, writing of the manuscript, adequacy of the manuscript to the standards of the RTA.