



Discussion paper

Eco-innovation and organizational culture in the hotel industry



Reyes-Santiago María del Rosario^a, Sánchez-Medina Patricia S.^{a,*}, Díaz-Pichardo René^{b,c}

^a Instituto Politécnico Nacional-CIIDIR Unidad Oaxaca, Hornos No. 1003, Col. Noche Buena, Municipio de Santa Cruz Xoxocotlán C.P. 71230, Oaxaca, Mexico

^b Groupe ESC Troyes, Avenue Pierre Brosolette No. 217, Troyes, C.P. 10002, France

^c Université de Technologie de Troyes, ICD-CREIDD UMR 6281, CNRS, 12 rue Marie Curie, BP 2060, 10010 Troyes, France

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ABSTRACT

This study analyzes the relationship between organizational culture and eco-innovation in a sample of 130 hotels in Oaxaca, Mexico.

A theoretical model is developed to link the compatibility of the four types of organizational culture defined in the Competing Values Framework (CVF) (hierarchy, clan, market, and adhocracy culture) to different modes of eco-innovation (radical–incremental and component–architectural).

In order to test the hypotheses, regression and correlation analyses are conducted. Adhocracy culture and organization size are found to be significant in explaining the presence of eco-innovation.

The implications of these results for firms tend towards the convenience of adopting an adhocracy culture, which facilitates the implementation of eco-innovation at different levels and potentiates both environmental and organizational results.

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1. Introduction

According to Galpin et al. (2015), and Harris and Crane (2002), eco-innovation is based on an organizational culture that targets its beliefs, values and behavior towards sustainability. However, the relationship between organizational culture and eco-innovation is not addressed in the literature. There are some studies dealing with the impact of organizational culture on the implementation of green innovations. For example, Ramus (2001, 2002), Hillestad et al. (2010), Smerecnik and Andersen (2010), and Lin and Ho (2011) conclude that leadership influences the initiative and participation of staff in developing ideas and sustainable actions. Chang (2011) shows that corporate environmental ethics has a positive effect on the implementation of green innovations; while Chou et al. (2012) highlight the pressures that organizations place on employees to adopt green practices. However, even if the aforementioned studies show a link between various aspects of organizational culture and eco-innovation, they do not discuss organizational culture deeply, nor do they analyze it as an integral concept. Organizational culture is defined as a system that integrates symbols, values, ideas, meanings, languages, behaviors, and expectations, which is accepted and shared by the members of the organization in order to guide them

on how to think and act appropriately (Cameron and Quinn, 2006; Schein, 2004). Organizational culture is not monolithic; it is comprised of several types (see Cameron and Quinn, 2006; Quinn and Rohrbaugh, 1983), and the differences in these types may have an effect on the ways in which firms implement eco-innovation.

Regarding the relationship between organizational culture and eco-innovation, Linnenluecke and Griffiths (2010) indicate that sustainability is understood and adopted by each company differently, depending on the prevailing type of organizational culture. According to these authors, in a culture where the highest value is placed on internal processes (hierarchical culture), sustainability is understood as greater efficiency in resource use and the maximizing of production in order to obtain more economic benefits; a culture guided by the values of human relationships (clan culture) attempts to preserve the natural environment in order to achieve health, safety and welfare for human beings; an organizational culture based on the values of a rational system (market culture) makes an effort in order to achieve both greater efficiency in processes and higher reputation of the firm in terms of environmental issues; and finally, a culture guided by the values of an open system (adhocracy culture) tries to contribute to the overall ecological balance.

Outside of the ecological aspect, it finds that flexible and externally oriented cultures, as identified in CVF (Cameron and Quinn, 2006; Quinn and Rohrbaugh, 1983) are more predisposed to innovation, while stable and internally oriented cultures are not (see Ergun and Tasgit, 2013; Obenchain et al., 2004; Naranjo-Valencia

* Corresponding author.

E-mail addresses: mariadel.rosario@hotmail.com (R.-S. María del Rosario), psanchez@ipn.mx (S.-M. Patricia S.), renediazp@hotmail.com (D.-P. René).

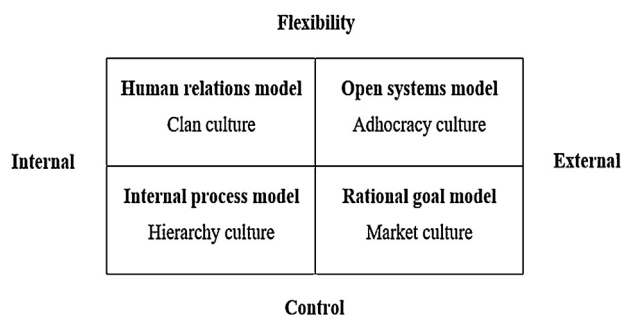


Fig. 1. Competing Values Framework.

Source: Adapted from Cameron and Quinn (2006); and Quinn and Rohrbaugh (1983).

et al., 2010; Naranjo-Valencia et al., 2011; Naranjo-Valencia et al., 2016, 2011, 2016).

Tourism affects the natural environment negatively through the destruction of wildlife, pollution and waste generation (Andereck et al., 2005). This damage to the environment diminishes quality of life, especially for the members of host communities (Andereck et al., 2005; Gezici, 2006); threatens the competitiveness of tourist destinations (Melián-González and García-Falcón, 2003; Lozano-Oyola et al., 2012), and increases the vulnerability of the global system (Becken et al., 2014). Given these negative impacts of tourism, and due to lax or nonexistent environmental regulation (Carmona-Moreno et al., 2004; Sánchez-Medina et al., 2016), any environmental actions that a hotel implements are voluntary and implemented in order to obtain different benefits for the organization, stakeholders, and the environment (see Claver-Cortés et al., 2007; Fraj et al., 2015; Pereira-Moliner et al., 2012; Sánchez-Medina et al., 2016; Park and Kim, 2014).

Organizational culture provides a means for members of the organization to understand what happens in their environment (Cameron and Quinn, 2006); it lays the foundation for a hotel to create its own interpretation of “environment”, either in a favorable manner (as an opportunity) or unfavorable (as a threat); to implement environmental actions, and to determine the benefits that can be obtained.

This study aims to contribute to the literature by showing how organizational culture and eco-innovation relate to each other. With this purpose in mind, a research model is developed based on two axes of eco-innovation identified by Hellström (2007): incremental-radical and component-architectural; examples of their combinations (incremental-component, incremental-architectural, radical-component and radical-architectural) are identified in the hotel sector, and these axes of eco-innovation are linked to the types of organizational culture developed in the CVF (hierarchy, clan, market, and adhocracy culture).

Below, we describe the theoretical framework for the study and its hypotheses; later, we present the method, results, discussion, and; finally, limitations and concluding remarks.

2. Literature review

2.1. Competing values framework

The Competing Values Framework (CVF) is an analytical model of organizational culture based on the predominant values of an organization. Values are grouped along two axes: flexibility – stability, and external – internal focus. Each of the resulting four quadrants characterizes a type of organizational culture: hierarchy culture (internal process model), market culture (rational goal model), clan culture (human relations model), and adhocracy culture (open systems model) (Cameron and Quinn, 2006; Jones et al., 2005; Quinn and Rohrbaugh, 1983), see Fig. 1.

In the CVF, each type of organizational culture is based on particular values which are in opposition to each other. For example, clan culture, characterized by its flexibility and internal focus, contrasts with market culture which emphasizes control and external focus. Similarly, the flexibility and external focus of adhocracy culture is in opposition to hierarchy culture, which is characterized by control and internal focus; however, various types of culture may coexist in organizations, with one or more being dominant (Cameron and Quinn, 2006).

2.1.1. Hierarchy culture

Cameron and Quinn (2006) state that hierarchy or bureaucracy was the ideal form of organization at the beginning of the twentieth century, where the efficient production of goods and services was the main goal. Organizations based on a culture of hierarchy typically have a highly formalized and structured workplace where the daily activity is guided by clearly defined procedures. Leaders are typically good coordinators. The most appreciated values are stability and predictability in both activities and people in order to gain stability, control, and efficiency in the organization (Cameron and Quinn, 2006).

2.1.2. Market culture

In the mid 1960's, new forms of information use were developed which allowed managers to plan and act more efficiently using a systemic approach drawn from the link between the organization and its general environment (Barley and Kunda, 1992). Cameron and Quinn (2006) point out that with this shift organizations sought to be more effective through links to external elements. In such a scheme, the organization itself functions as a market where transactions with external groups such as providers, clients, contractors, concessionaires, unions and regulators take place in order to gain some competitive advantages.

Market culture is based on planning and setting goals. A work environment with high demands targeting competitiveness between people and organizations (within the industry) develops. In this type of organization leaders are tough, demanding, and have clearly defined goals. Success is defined in terms of market share and penetration; displacing competitors and becoming a leader are the intended goals (Cameron and Quinn, 2006).

2.1.3. Clan culture

Barley and Kunda (1992) point out that the paradigm of human relations is opposed to the rationalism and individualism of scientific management, since human relations theory sees employees as fundamentally social beings; therefore, social interaction and the need to belong to a group are required for human and labor fulfillment.

In this regard, clan culture is based on the cohesion and morale of human relations, turning the organization into a big family in which leaders play the role of mentors while adopting a paternal posture. A friendly work environment is highly valued, as are principles such as loyalty, tradition, and collaboration. The main goal is the development of the members of the organization (Cameron and Quinn, 2006).

2.1.4. Adhocracy culture

Cameron and Quinn (2006) state that as the world evolved from the industrial age to the information age, a new type of organization emerged, one that was more sensitive to frequent changes in the environment and the reduction of a product's useful life. In adhocracy, adaptability, flexibility, and creativity counter uncertainty, ambiguity, and information overload.

Adhocracy culture relies on flexibility in answers and availability for action. A dynamic, creative, and entrepreneurial environment in the workplace is promoted, where people can

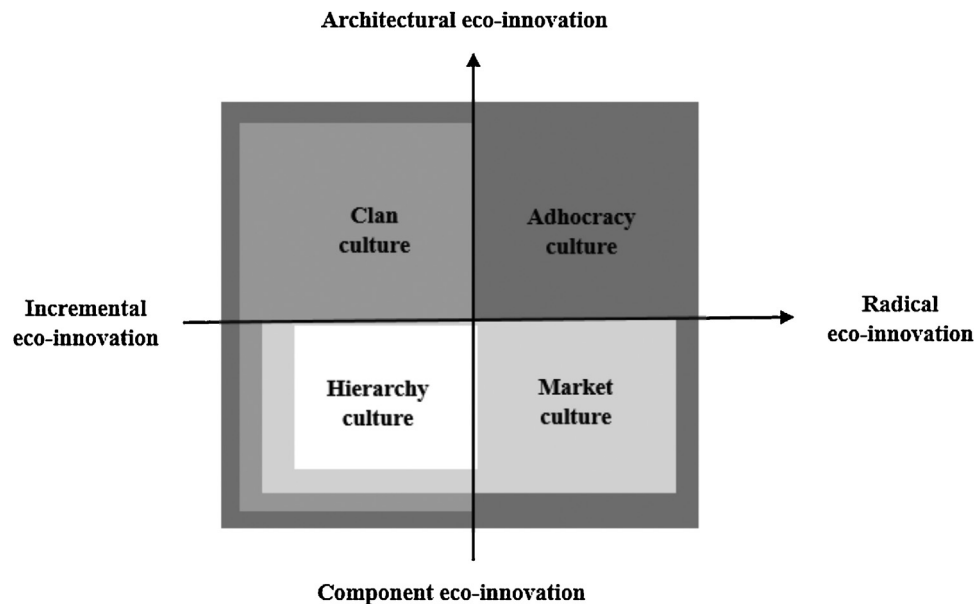


Fig. 2. Organizational Culture Types and Eco-innovation.

Source: Adapted from Cameron and Quinn (2006) and Hellström (2007).

develop new ideas and are encouraged to take risks. In this type of organization, leadership tends to be visionary and innovative, resulting in a high level of commitment to experimentation, innovation, and the development of both new knowledge and original products and services, in order to develop the enterprise in terms of growth and innovation (Cameron and Quinn, 2006).

2.2. Eco-innovation in hospitality industry

Eco-innovation refers to the development or modification of services, processes, organizational or marketing methods in order to contribute positively to the natural environment (intentionally or not) (Carrillo-Hermosilla et al., 2010; Rennings, 2000). Hellström (2007) develops two axes of eco-innovation: incremental-radical and component-architectural. The incremental-radical axis of eco-innovation describes the way in which eco-innovation takes place; eco-innovations are considered incremental when they involve improvements to existing elements, while radical eco-innovation implies the incorporation of new elements.

In tourism, different degrees of novelty in eco-innovation can be observed for hotels, guests, and tourist destinations (Hertog et al., 2011). Eco-innovation can be observed from small modifications up to including the adoption of new elements; for example, an incremental modification in energy use could involve implementing better practices in using existing heating systems (see Mak et al., 2013), while the acquisition of new technology to use solar energy would be described as radical (see Chan et al., 2008; Chan et al., 2013).

The component-architectural axis shows how eco-innovation may generate changes in one component or module, or may affect various elements of a system, and even modify a complete system (Hellström, 2007). Eco-innovations can generate both localized changes in products and services as well as more widespread changes affecting the entire organization, involving actors within the organization and beyond its boundaries. In the literature, processes, products or services, organizational methods, marketing methods and institutions, are identified on the component-architectural axis (Machiba, 2010; Rennings, 2000).

In tourism, innovations can be small and localized in processes and services, or can be large and involve widespread changes in the

hotel (Hjalager, 2010). Similarly, examples of eco-innovations can also be identified in smaller components such as the creation of websites and the use of social networks, as elements of green marketing (Chan, 2013; Mohd-Suki and Mohd-Suki, 2015; Stangl et al., 2016); while the implementation of a green business model, such as ecotourism, can involve not only the entire organization, but also governments and communities (Gurung and Seeland, 2008).

3. Hypotheses development

Based on the two axes of eco-innovation (incremental-radical, component-architectural) there are four possible modes of eco-innovation: incremental-component, radical-component, incremental-architectural and radical-architectural (Hellström, 2007). Accordingly, the research hypotheses which relate each type of organizational culture with the modes of eco-innovation in the field of hospitality are presented (Fig. 2).

3.1. Hierarchy culture and eco-innovation

Hierarchy culture shows the highest level of resistance to change (Zammuto et al., 2000), and places the highest limitations on creativity and experimentation (Büschgens et al., 2013). However, efficiency is one of the most valued parameters in hierarchy culture (Cameron and Quinn, 2006); in this regard, Linnenluecke and Griffiths (2010) suggest that the quadrant of internal processes, which corresponds to hierarchy culture, focuses on economic sustainability by concentrating its efforts on growth and profitability; for this reason, hierarchy culture could favor incremental eco-innovation. This form of eco-innovation generates benefits for the organization in the short term, mainly economic benefits.

In tourism, eco-innovation has been associated with innovations for eco-efficiency (producing more goods and benefits investing less energy and fewer natural resources) and to cleaner production (reduction and correction of pollution) (OCDE, 2012). This type of eco-innovation can be considered incremental since these are among the first steps implemented on the route to sustainability (OCDE, 2012), and they generally involve technological modifications to products and processes (Machiba, 2010).

In the hotel industry, initiatives of this nature include technological alternatives and better practices for more efficient use of resources, such as water and electricity (see e.g. Chan and Lam, 2003; Chan et al., 2009). These innovations reduce the environmental impact of the organization and are linked to a cost decrease for the firm, yielding results in the short term (Rahman et al., 2012; Razumova et al., 2016).

Based on these arguments, we propose the following research hypothesis.

H1: There is a positive and significant relationship between hierarchy culture and incremental-component eco-innovation in processes (H1A) and services (H1B) among firms.

3.2. Market culture and eco-innovation

Linnenluecke and Griffiths (2010) state that for cultures dominated by rational goal values (market culture), the practices of sustainability are targeted towards the reduction of costs and the increase of operational efficiency. This efficiency approach leads to savings in the use of resources and reduction of ecological impacts by means of technological modifications to products and processes; but also through more radical actions that improve the image and reputation of the company.

However, these actions are done on the basis of an evaluation of their impact on the natural environment and society; for that, an organization needs far-reaching tools which allow potential consumers access to understandable and reliable information, since these elements can determine consumption choices, especially when the environmental attributes of goods and services are not easily perceived, as is the case with tourist services (Kang et al., 2012; Miao and Wei, 2013; OCDE, 2012). In the hotel industry, eco-innovations are also present in green marketing strategies (Rennings, 2000), such as advertising on the Internet and social networks (Chan, 2013; Mohd-Suki and Mohd-Suki, 2015).

Considering the aforementioned arguments, market culture can be compatible with eco-innovations which allow for efficiency in the use of resources, but also eco-innovations which broadcast the initiatives the organization carries out with the goal of preserving the natural environment. These eco-innovations can be incremental or radical; however, these changes are located in processes, services and marketing elements.

Based on these arguments we propose the following hypothesis:

H2: There is a positive and significant relationship between market culture and incremental-component eco-innovation in processes (H2A) and services (H2B), and radical-component eco-innovation in marketing methods (H2C) among firms.

3.3. Clan culture and eco-innovation

According to Zammuto et al. (2000), in organizational cultures that are considered to be natural systems, such as the clan culture, innovation is perceived as less threatening, and the resistance to implementation is minor. This organizational culture allows us to observe broader changes in the organization in comparison to those observed in hierarchy culture and market cultures.

Linnenluecke and Griffiths (2010) argue that organizations characterized by their valuation of human relations emphasize learning and development of skills in order to promote corporate sustainability since they accept the responsibility of contributing to the welfare of their workers and in general to social welfare. Büschgens et al. (2013) state that in the human relations model, creation and maintenance of knowledge take place through employee training and preparation, which leads to psychological security, courage, and cohesion among the group in order to face change and adopt and develop new initiatives.

In tourism, people are the center of the innovation process, and training people to innovate involves not only formal education but also the development of far-reaching skills which complement it (Chang et al., 2011; OECD, 2010) in a way that provides results for organizations that allow for the development of their workers and the improvement of their skills and knowledge (OCDE, 2012).

Therefore, given the support human relations provide to innovation (see Büschgens et al., 2013) along with alternatives which involve changes at the organizational level, organizational eco-innovation in terms of training and environmental education for employees can be developed (see Kasim, 2009; Moscardo, 2008). These eco-innovations are incremental; however, they go beyond eco-innovations localized in products and services because they involve hotel human resources and, thus, all areas of the organization. Consequently, we propose the following hypothesis:

H3: There is a positive and significant relationship between clan culture and incremental-component eco-innovation in processes (H3A) and services (H3B), and incremental-architectural eco-innovation in organizational methods (H3C) among firms.

3.4. Adhocracy culture and eco-innovation

Adhocracy culture corresponds to an open natural system which has broad links with the general environment and facilitates processes such as learning and adaptation (Zammuto et al., 2000). In this regard, Büschgens et al. (2013) suggest that these characteristics create an organizational environment favorable to experimentation, creativity, and implementation of innovation.

From this type of organization, sustainability is conceived as taking into account the existence of a broader and more dynamic social and economic environment where learning and adaptation are the means to the survival and success of the organization (Linnenluecke and Griffiths, 2010). An adhocracy oriented organization can favor the development of radical eco-innovation, which involves various functions and offers fast solutions according to particular circumstances.

Consequently, eco-innovation in adhocracy will involve initiatives which generate benefits in the medium and long term, and which can open new spaces for the success of the business and regard for the natural environment. Initiatives of this nature correspond to the radical-architectural mode of eco-innovation.

Examples of the radical-architectural mode of eco-innovation in hospitality are environmental certification programs, such as ECO-TEL and Green Globe. When a program of this type is implemented, managers and employees share philosophies and objectives that enable them to achieve and maintain environmental certification, thus affecting the entire organization; in addition, a foreign entity (auditors) is involved in assessing the efforts made (Geerts, 2014; Millar and Baloglu, 2008).

Another example is the eco-hotel, eco-lodge or green hotel, whose construction, equipment and services contribute to the preservation of the natural environment; these also often involve working together with governments and local communities (Erdem and Tetik, 2013). Note that adhocracy culture not only favors radical-architectural eco-innovations, but it also encourages incremental-architectural eco-innovations and incremental-component eco-innovations, such as those exemplified in previous sections.

Based on the aforementioned elements, we propose the following research hypothesis.

H4: There is a positive and significant relationship between adhocracy culture and incremental-component eco-innovation in processes (H4A) and services (H4B); radical-component eco-innovation in marketing methods (H4C), and; incremental-architectural eco-innovation in organizational methods (H4D).

Table 1
Factor analysis of the variable Organizational Culture.

Item	Component				Commun-ality
	1	2	3	4	
1. Clan					
The organization is characterized by its interpersonal bonds	0.939	−0.067	0.112	0.008	0.899
The leader is a tutor who instructs and provides what is needed	0.891	−0.074	0.167	0.049	0.830
Loyalty and trust keeps the organization united	0.937	−0.134	0.062	−0.017	0.900
The organization places emphasis on human development	0.884	−0.042	0.155	−0.118	0.900
2. Hierarchy					
The organization is a place which stands out because of structure and order.	0.169	0.599	0.166	0.295	0.502
The leader is a coordinator who assigns functions and distributes work.	−0.123	0.912	0.135	−0.020	0.866
In this organization, success is described in terms of efficiency and stability.	−0.249	0.766	0.097	0.068	0.663
3. Market					
This organization is a competitive place, where everybody seeks to stand out both individually and as an organization.	−0.134	0.441	0.768	0.027	0.802
The leader is a competitive leader focused on results.	0.249	0.091	0.883	0.047	0.851
Goal fulfillment and the search for success keeps the organization united.	0.460	0.057	0.740	0.092	0.771
4. Adhocracy					
The leader is an entrepreneur who is always in search of new challenges.	−0.071	0.252	0.013	0.806	0.719
Work is carried out based on the freedom for decision-making.	0.233	0.108	−0.005	0.710	0.570
In this organization, success is described in terms of new advances in technology and services.	−0.305	−0.132	0.131	0.711	0.633
Total Variance Explained	29.901	16.199	15.826	13.683	75.609
Cronbach's Alpha	0.950	0.717	0.800	0.620	0.749

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

3.5. Organization size and age, and tourist destination

In order to gain a better understanding of eco-innovation in the hotel industry, organization size, age, and type of tourist destination (beach and sun hotels vs. city hotels) are included as control variables in the regression models. Large organizations are expected to have human capital with a higher capacity to absorb external knowledge and financial resources that can lead to the generation of more eco-innovation than small organizations (Hjalager, 2002; Sundbo et al., 2007). Regarding the environmental aspect, larger organizations are found to adopt green strategies (Chan, 2013) and environmental management systems (Álvarez-Gil et al., 2001) more easily than small companies; thus the size of the organization can play an important role in eco-innovation.

With reference to age, old hotels have been found to have more difficulties in adopting either new alternative technologies (Sahadev and Islam, 2005) or environmental management practices (Álvarez-Gil et al., 2001) than newer ones. Therefore, it is expected that newer hotels will be more eco-innovative than old firms.

Finally, there are differences between “sun and beach” hotels and those located in cities: Vila et al. (2012) note that city hotels develop more innovations as a differentiation strategy given the competition and agglomeration of these units, while García-Pozo et al. (2015) suggest that hotels where the natural environment is part of the tourism product; that is to say, “sun and beach” hotels may be more concerned about reducing their environmental impact through eco-innovation as a long term sustainability strategy; therefore, the type of tourist destination has also been considered as an important variable in this investigation.

4. Method

4.1. Sampling and data collection

In order to obtain data for hypothesis testing, those tourist destinations in Oaxaca that have five, four, and three star hotels were considered: Oaxaca City, Huatulco and Puerto Escondido. These three destinations total 220 hotels (Instituto Nacional de Estadística y Geografía [National Institute of Statistic and Geography], 2015).

We have chosen this classification based on stars because businesses and tourists are familiar with this kind of rating (Muñoz-Piña et al., 2005), and we have chosen more highly rated hotels because research shows these businesses are environmentally more proactive (Carmona-Moreno et al., 2004; Pereira-Moliner et al., 2012); More highly rated hotels also have greater eco-innovation than those with lower ratings.

The sample is composed of 130 three, four, and five star hotels in Oaxaca, Mexico. This sample size allows for a 95% confidence level and a 3.33% sample error according to the continuous data sample formula. We used $Z = 1.96$ and $s = 0.776$ (eco-innovation standard deviation in our sample). Our sample was distributed as follows: 80 units in Oaxaca, 30 in Huatulco and 20 in Puerto Escondido. Hotels were randomly selected from the directory produced by Secretaría de Turismo y Desarrollo Económico (Ministry of Tourism) in www.oaxaca.travel.

For data collection, a structured questionnaire was created and administered in face-to-face interviews with the people each organization selected as suitable to answer the questions. The percentage of people that agreed to an interview was 75%. In general, answers were provided by managers and owners of the hotels. Almost 58% of the respondents were male and 42% female. They were between 25 and 64 years old and more than one-third (33%) were between 35 and 39 years old.

4.2. Measurement of variables

4.2.1. Organizational culture

For the purpose of this research, the Organizational Culture Assessment Instrument (OCAI), developed by Cameron and Quinn (2006), was used. Using a five-point Likert scale which ranges from ‘strongly disagree’ to ‘strongly agree’, the interviewees were asked to assign a value according to the degree of similarity between the proposed descriptions and the characteristics of their organization. In order to determine the internal validity and the explained variance of the variables, a principal component factor analysis with Varimax rotation and Kaiser normalization was conducted. Table 1 shows factor loadings for the four types of organizational culture. We can observe that all items charged in one single factor

Table 2
Factor analysis of Eco-innovation variable.

Item	Component				Communality
	1	2	3	4	
1. Incremental-component eco-innovation in services					
Modifications in areas for:					
Efficient water use	0.845	0.229	0.156	0.167	0.819
Efficient electric power use	0.780	0.241	0.200	0.296	0.794
Natural light and heat use	0.778	0.133	0.397	−0.008	0.781
Solid waste management	0.803	0.066	0.055	0.291	0.737
Inclusion of organic products	0.885	0.195	0.062	0.070	0.831
Inclusion of local products	0.729	0.165	0.299	0.202	0.689
Modification of spaces ensuring the preservation of the natural environment.	0.852	0.072	0.237	0.048	0.790
2. Radical-component eco-innovation in marketing methods					
Incurion in green markets and consumers	0.204	0.865	0.148	0.178	0.844
Developed new ways to support of environmental actions (sponsorships, donations, social events, etc.).	0.141	0.854	0.047	0.169	0.779
Create new green commercial links	0.035	0.792	0.151	0.176	0.683
Introduction, promotion and sale of natural and/or local products	0.358	0.631	0.469	0.291	0.831
3. Incremental-component eco-innovation in processes					
Improvement methods and devices for water reutilization	0.243	0.151	0.845	−0.007	0.796
Conditioning of areas using natural and/or local materials	0.158	0.210	0.865	0.218	0.864
Use of more eco-friendly cleaning supplies	0.293	0.200	0.799	0.213	0.809
4. Incremental-architectural eco-innovation in organizational methods					
The organization has created new activities, awareness and training focused on guests, staff and volunteers on:					
Rational water use	0.463	0.424	−0.048	0.560	0.709
Rational electric power use	0.333	0.251	−0.030	0.761	0.754
Solid waste management	0.342	0.294	0.340	0.717	0.832
Maintenance of natural areas	−0.115	0.104	0.166	0.829	0.738
Development new methods for encouraging better environmental behavior	0.432	0.240	0.257	0.638	0.717
Total variance explained	28.430	19.136	15.267	15.196	78.030
Cronbach's Alpha	0.943	0.916	0.897	0.858	0.941

Extraction method: Principal component analysis. Rotation method: Varimax with Kaiser normalization. a. The rotation converged in 6 iterations.

as evidence of discriminant validity. Items with a ≥ 0.5 factor loading were kept. In order to determine the reliability of each factor, Cronbach's alpha was used.

In the factor analysis, four dimensions were identified corresponding to clan culture (factor 1), hierarchy culture (factor 2), market culture (factor 2), and adhocracy culture (factor 4), which explain 75% of variance. Cronbach's alphas vary between 0.620 and 0.95.

4.2.2. Eco-innovation

In order to measure eco-innovation, the interviewees were asked about the frequency with which they had developed or implemented initiatives in favor of the natural environment. The answers were based on a five-point Likert-type scale, ranging from 'never' to 'continuously' (see Table 2).

In the factor analysis four dimensions were identified corresponding to the variable eco-innovation. These dimensions are incremental-component eco-innovation in services (factor 1), radical-component eco-innovation in marketing methods (factor 2), incremental-component eco-innovation in processes (factor 3), and incremental-architectural eco-innovation in organizational methods (factor 4), which explain 78% of variance. Cronbach's alphas vary between 0.858 and 0.943.

4.2.3. Organization size and age, and tourist destination

Organization size was measured according to the number of employees in the firm, organizational age was measured according to the number of years in which the hotel had been in operation at the time of the interview, and type of tourist destination was classified using two groups: sun and beach hotels, and city hotels.

Hotels were on average 16.5 years old with a standard deviation of 10.2 years. The average size of the organizations was 18.7 employees with a standard deviation of 20 employees; these could be considered small and medium-sized businesses. In terms of type of tourist destination, 80 hotels were located in the City of

Oaxaca, a city destination; and 50 were located in beach and sun destinations—30 located in Huatulco Bay and 20 in Puerto Escondido.

5. Results

5.1. Hypothesis testing results

In order to test the research hypotheses, five linear regression models were estimated: Model 1 refers to eco-innovation as the dependent variable, and the other four models correspond to each of the eco-innovation dimensions as dependent variables. The results of the regression analyses are summarized in Table 3.

Results offer no support for hypotheses H1A, H1B, H2A, H2B, nor HC. Thus, neither hierarchy culture nor market culture have a significant impact on eco-innovation. Regarding clan culture, neither H3A nor H3C are supported; however, H3B, which significantly relates clan culture to incremental-component services is supported ($B=0.173$; $p \leq 0.1$). Adhocracy culture is found to have an influence on eco-innovation ($B=0.200$, $p \leq 0.05$), as well as on three types of eco-innovation: incremental-component eco-innovation in processes ($B=0.260$, $p \leq 0.1$), radical-component eco-innovation in marketing methods ($B=0.186$, $p \leq 0.1$), and incremental-architectural eco-innovation in organizational methods ($B=0.242$, $p \leq 0.1$); these findings give support for hypotheses H4A, H4C and H4D, respectively. However, as there is no significant impact of adhocracy culture on incremental-component eco-innovation in services ($B=0.110$, n.s.), H4B is not supported. These findings support hypothesis 4; thus, adhocracy culture has a significant impact on eco-innovation, whereas clan culture has only a marginal impact and hierarchy and market cultures do not significantly impact any type of eco-innovation.

Table 3
Linear regressions between organizational culture types and eco-innovation (non-standardized coefficients).

	Eco-innovation Model 1	Dimensions of eco-innovation			
		Incremental-component eco-innovation in processes Model 2	Incremental-component eco-innovation in services Model 3	Radical-component eco-innovation in marketing methods Model 4	Incremental-architectural eco-innovation in organizational methods Model 5
Constant	1.285***	1.881***	1.042*	0.723*	1.482***
Organization size	0.010**	0.012**	0.007	0.015***	0.005
Organization age	-0.009	-0.003	-0.015	-0.013*	-0.006
Tourist destination	-0.008	0.140	0.108	-0.196	-0.084
Hierarchy culture	0.046	-0.081	0.167	0.026	0.073
Market culture	0.103	-0.011	0.183	0.124	0.115
Clan culture	0.013	-0.078	.173*	-0.026	-0.017
Adhocracy culture	0.200**	0.260*	0.110	0.186*	0.242*
R	0.38	0.314	0.364	0.458	0.288
R ²	0.144	0.099	0.132	0.209	0.083
Standard error	0.73800	0.99412	1.07416	0.75306	0.93609
F	2.933	1.905	2.657	4.618	1.576
Sig.	0.007	0.074	0.014	0.000	0.149
Effect size (Partial Eta Squared) for statistically significant findings					
Organization size	0.03	0.002		0.188	
Organization age				0.088	
Clan culture			0.620		
Adhocracy culture	0.606	0.513		0.692	0.553

*Regression coefficient is significant at levels equal to or less than 0.1; **Regression coefficient is significant at levels equal to or less than 0.05; ***Regression coefficient is significant at levels equal to or less than 0.01.

Table 4
Partial correlations between organizational culture types and eco-innovation types.

	μ	SD	1	2	3	4	5	6	7
1. Hierarchy culture	2.859	0.854	1						
2. Market culture	3.553	0.940	0.345***	1					
3. Clan culture	3.209	1.036	-0.194**	0.253**	1				
4. Adhocracy culture	2.766	0.712	0.219**	0.070	-0.167*	1			
5. Incremental-component eco-innovation in processes	2.303	1.018	-0.017	-0.041	-0.098	0.176**	1		
6. Incremental-component eco-innovation in services	2.953	1.121	0.163*	0.241**	0.161*	0.080	0.432***	1	
7. Radical-component eco-innovation in marketing methods	1.657	0.823	0.123	0.162*	-0.030	0.189**	0.503***	0.324***	1
8. Incremental-architectural eco-innovation in organizational methods	2.684	0.950	0.144	0.141	-0.031	0.199**	0.569***	0.554***	0.713***

***. The correlation is significant at 0.01 level (bilateral); **. The correlation is significant at 0.05 level (bilateral); *. The correlation is significant at 0.1 level (bilateral). Organization size, organization age, and type of tourist destination are used as control variables.

5.2. Supplementary analysis results

Table 4 shows partial correlations between the various organizational culture types and eco-innovation types in hotels in Oaxaca; organization size, organization age, and type of tourist destination are used as control variables.

On the one hand, we can observe that all types of eco-innovation are significantly correlated ($p \leq 0.01$). This might indicate that when an organization implements any type of eco-innovation, it reinforces the possibility of being involved in any other type of eco-innovation, regardless of the size, age or type of destination of the hotel (sun and beach or city).

On the other hand, we observe that hierarchy culture, market culture, and adhocracy culture co-exist, but clan culture is only positively related to market culture, which indicates that when this type of culture appears it is practically isolated.

Hierarchy culture is linked to incremental-component eco-innovation in services ($r = 0.163, p \leq 0.1$); however, there is not a statistically significant relationship between hierarchy culture and incremental-component eco-innovation in processes ($r = -0.017, n.s.$).

Market culture is positively related to both incremental-component eco-innovation in services and radical-component eco-innovation in marketing methods ($r = 0.241, p \leq 0.05$; $r = 0.162, p \leq 0.1$, respectively); however there is not a statistically significant

relationship between market culture and incremental-component eco-innovation in processes ($r = -0.041, n.s.$).

Clan culture is linked to incremental-component eco-innovation in services ($r = 0.161, p \leq 0.1$); however, there is neither a statistically significant relationship between market culture and incremental-component eco-innovation in processes ($r = -0.098, n.s.$) nor between market culture and incremental-architectural eco-innovation in organizational methods ($r = -0.031, n.s.$).

Finally, adhocracy culture correlates with three of the four types of eco-innovation (incremental-component eco-innovation in processes, $r = 0.176, p \leq 0.05$; radical-component eco-innovation in marketing methods, $r = 0.189, p \leq 0.05$, and incremental-architectural eco-innovation in organizational methods, $r = 0.199, p \leq 0.05$); however, there is not a statistically significant relationship between adhocracy culture and incremental-component eco-innovation in services ($r = 0.080, n.s.$).

6. Discussion and conclusion

6.1. Theoretical contributions and practical implications

In the literature, there is no research that analyzes the relationship between organizational culture and eco-innovation. This study has shown that eco-innovation is a tool that hotels are using. In this regard, we can observe that all types of eco-innovation are significantly correlated. This might indicate that when an organization

implements any type of eco-innovation, it reinforces the possibility of being involved in any other type of eco-innovation, regardless of the size, age or type of destination of the hotel (sun and beach or city). Besides, the presence of different types of organizational culture (hierarchy, clan, market, and adhocracy) described in the CVF (Cameron and Quinn, 2006) has also been observed in hotels; examples of eco-innovations that have been identified in this document can be located around the two axes of eco-innovation: incremental-radical, and component-architectural, identified by Hellström (2007).

Organizations with a hierarchy culture might be expected to implement eco-innovations for a more efficient use of resources in hotel services. This research confirms the lack of a link between hierarchy culture and innovation and coincides with other studies supporting the idea that this type of organizational culture inhibits the implementation of innovations (see Naranjo-Valencia et al., 2010). These results are aligned with the propositions of Zammuto et al. (2000), and of Büschgens et al. (2013), who stated that hierarchy culture limits creativity and experimentation in organizations.

Organizations with a market culture might develop eco-innovations oriented to the external factors of the organization according to changes in consumer preferences and new market conditions; such eco-innovations mainly consist of innovations in services, which can be considered incremental because they generate localized changes in the form of either the modification of service areas or the adoption of new elements like organic supplies and local suppliers. This research found no significant relationship between market culture and eco-innovation, in opposition to the proposition of Linnenluecke and Griffiths (2010), who stated that organizations with a market culture would pursue sustainability practices targeted towards the reduction of costs, the increase of operational efficiency, and the improvement of the image and reputation of the organization.

Organizations with a clan culture highlight aspects such as cohesion, loyalty and moral commitment. Although this kind of organization supports education, training and raising employee awareness on environmental issues, their main focus is usually on services among firms. This coincides with research which has found that leadership and staff participation is favorable for implementing innovations (see Hillestad et al., 2010; Lin and Ho, 2011; Ramus 2001, 2002; Smerecnik and Andersen, 2010). In this research, clan culture was found to be positively and significantly related to incremental-component eco-innovation in services, with a relatively large effect size (partial eta squared = 0.620). A large effect size accounts for the importance of the impact regardless of its significance. Partial eta squared measures the variance explained by the given variable of the variance remaining after excluding variance explained by other predictors.

Adhocracy culture is compatible with incremental eco-innovations in processes focused on more efficient water and electrical power use, for instance; but it is also compatible with more radical improvements, such as the development or acquisition of knowledge and technology for alternative energy use such as solar energy. Additionally, marketing and organizational eco-innovations can be observed in adhocracy culture, and they may be considered more radical since they go beyond technological and localized (processes and services) options, generating changes which involve various actors and relations and which affect several areas of the organization, the whole organization or even relationships outside the organization. This research shows a positive and significant relationship between adhocracy culture and different forms of eco-innovation, with relatively large effect size measures (partial eta squared from 0.513 to 0.692). These results coincide with similar studies on innovation (Büschgens et al., 2013; Ergun and Tasgit, 2013; Naranjo-Valencia et al., 2010, 2011, 2016). Thus, it might be convenient for hotels to start a process of cultural change

by which the hotel can identify and seize opportunities from outside the organization as well as create flexible structures that allow them to respond quickly to the changing environment.

6.2. Limitations and future research directions

This research has the following limitations: the sample was restricted to the main tourist destinations in Oaxaca, Mexico, considering only high-category hotels that are already expected to be more environmentally conscious; for these reasons, the results may not be generalizable to the hospitality industry in other regions or countries, and; in the measurement of eco-innovation, the institutional dimension was not considered. Therefore, it would be interesting in future research to include different destinations, less prestigious hotels, and the institutional dimension of eco-innovation. Given the fact that most of the relationships tested in this study were found to be relatively small, and the variance of the dependent variables explained in a relatively low proportion (R^2 from 0.099 to 0.209), subsequent research could analyze intervening variables that could better explain the relationship between organizational culture and eco-innovation.

6.3. Concluding remarks

This research shows that adhocracy culture is the type of organizational culture most closely related to eco-innovation, and it can explain the presence of eco-innovations in hotels. The practical implication is that hoteliers might focus on processes of cultural change towards an adhocracy culture in order to facilitate the implementation of eco-innovation. The change to a flexible and externally oriented culture could enable the hotel to take advantage of a better way to generate sources through managing relationships with stakeholders, and thus, encourage eco-innovation in the organization.

Changing to adhocracy culture can be favorable not only for large organizations, but also for small organizations. Small hotels, abundant in the Mexican hospitality industry, are lacking in financial resources (Sánchez-Medina et al., 2016), and as a result, certain forms of eco-innovation are difficult to afford (new technologies and supplies); in these cases, adhocracy culture would enable them to develop better practices in services and processes, as well as changes in marketing and organizational methods, which means less spending and greater competitive advantage.

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