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## Chapter

# Analysis of a Structural Model for Measuring Agro-Ecotourism Development in the Municipality of Jardín, Antioquia

*Diana Guzmán Álvarez, Mario Cerón-Muñoz  
and Holmes Rodríguez Espinosa*

## Abstract

The identification of factors that evaluate agro-ecotourism development (AD) becomes a necessity to plan tourism in rural areas and strengthen public policy guidelines. Therefore, the purpose of this study was to identify the factors that define agro-ecotourism development in the municipality of Jardín (Antioquia, Colombia) based on the potentialities and constraints evaluated in 149 rural properties and their owners, using a structural equation model. According to the findings, agro-ecotourism development is the reflection of individual capabilities (IC) with a weight of 1 and residents' perception (RP) with a weight of 0.72. However, infrastructural development (weight 0.44) and farm resources (weight 0.51) reflect this to a lesser extent. In conclusion, the AD is mainly determined by IC and RP, and it is necessary to improve infrastructure and diversify resources on the farms for greater prosperity in terms of AD.

**Keywords:** agro-ecotourism, indicators, structural equation model (SEM), tourism planning, agro-ecotourism potential

## 1. Introduction

In the new world scenario, rural tourism is presented as an opportunity and a competitive advantage to be developed in areas with low population density, natural spaces and a diversified supply of resources, which can be used to better position, communicate and market tourist sites [1].

Therefore, it is a good time to propose tourism development models that contribute to the quality of life of communities without being detrimental to their natural resources, are more respectful and inclusive of the local residents, allow action planning with the community to better develop tourism in each place, and gather the aspirations of tourism development (TD) from the local stakeholders [2, 3].

The proposed Land Management Scheme for the municipality of Jardín proposes the development of an agro-ecotourism model that integrates the agrarian cultural

landscape with the urban center diversifying the local productive structure so that it is more competitive and inclusive and guarantees the permanence of the peasantry in the territory [4].

Tourism development is related to promoting local community participation in decision making, responding to the characteristics and needs of individual destinations, and knowledge and understanding of the environments [5]. This development refers to the intention of stakeholders to establish relationships in a joint and coordinated manner to improve the conditions of a territory community [6], seeking to obtain benefits that equitably influence the entire community, and ensuring the preservation of the environment [7].

The measurement of TD has been carried out through qualitative indicators, inquiring about the material of tourism facilities, infrastructure, quality of human resources, social commitment, state management capabilities and tourism resources [8]. Therefore, TD requires the identification and analysis of qualitative and quantitative information of the factors that influence the development model's implementation [9].

Different studies have proposed models for the measurement of TD, as is the case of Mai et al. [8] who proposed a set of factors to measure it, such as: infrastructural development, equipment of tourist facilities, tourist resources, among others; or the study of Afthanorhan et al. [10] whose model included factors concerning the perception of tourism impacts and their influence on TD. Also, the analysis of Kim et al. [11] presented a model based on residents' attitudes toward community TD, concluding a positive relationship between these two variables. Moreover, Marzo [12] concluded in their model that support from local residents positively affects TD. Additionally, the doctoral research of Cañero [13] makes a significant contribution with a model based on latent variables related to positive and negative impacts, direct and indirect, at a social, economic, cultural and environmental level, on support for sustainable TD, while researchers such as Tien et al. [14] analyzed how farmers' skills influence TD.

Previous studies show in their findings that factors such as infrastructure, individual skills or capabilities, available resources, and the perception of residents, have a relationship with the TD. Hence, this study addressed the measurement of agro-ecotourism development (AD) as a modality of rural tourism, which serves as an articulating axis to strengthen the endogenous development of local communities, contributing to environmental conservation, income diversification in rural areas [15] and to strengthening public policies for tourism planning [9].

Now, the structural equation modeling (SEM) approach has been used to validate tourism models in order to test reliability, validity and to establish relationships between variables [8, 14, 16–18], because a better understanding of these relationships can help destination providers to better plan and design tourism sites, as well as assist governments and organizations in terms of sustainability [19]. Researchers such as Li et al. [20] demonstrated that SEM is ideal for assessing the relationship between the perceived positive impacts of rural tourism and the willingness to participate in its development. Studies such as that of Coelho and Gosling [21] found that through these models it was possible to determine factors related to attractiveness, like ease of access, infrastructure, resources, cultural attributes, among others, which are important for the development of tourism in rural areas.

Based on the components above, this study intends to identify the factors that define agro-ecotourism development (AD) in the municipality of Jardín, based on the potential of the farms and their owners, contributing to tourism planning in rural areas and strengthening public policy guidelines for the sector.

In the rest of the manuscript, the authors initially present the methodology with the design, variables, and data analysis; subsequently, the results focus on explaining the structural equation model; following is the discussion where the authors explain the relationship between agro-ecotourism development (AD) with the latent factors, finally highlighting the factors that define AD to a greater extent.

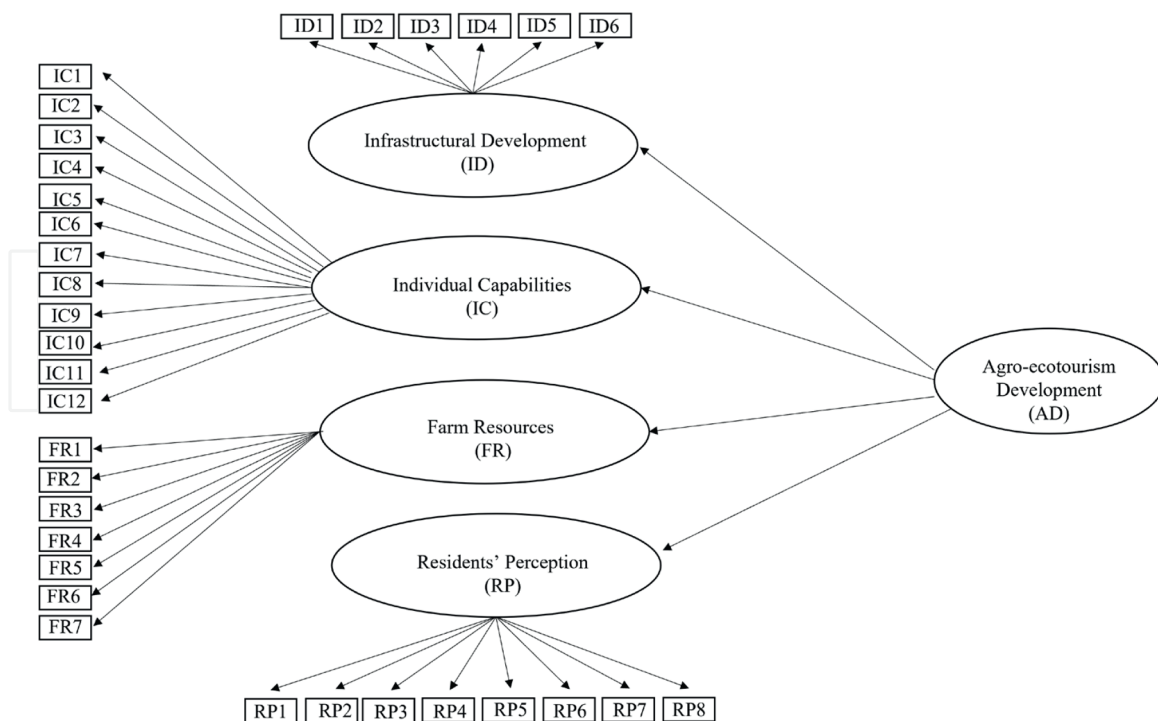
## 2. Materials and methods

This study was conducted in the municipality of Jardín, Antioquia, located in the southwestern subregion of Antioquia (5°35'58" N to 5°30'29.73" N and 75°50'05" W to 75°53'33.9" W) in the villages of San Bartolo, La Casiana, Morro Amarillo, El Tapado, La Linda, La Selva, La Salada, La Herrera, Serranías, Verdún, Gibraltar, La Arboleda, Río Claro, Alto del Indio, Santa Gertrudis, Macanas and La Mesenia. This territory has altitudes ranging from 1500 to 3000 meters above sea level, with a broken topography and steep slopes. Temperatures average between 19 and 25.8°C.

The population of this study consisted of 149 farms and their owners, corresponding to the total number of members of the Organization Campesinos Construyendo Futuro (OCCF), in the municipality of Jardín, Antioquia. Inclusion criteria consisted of being owners of their farms and willing to participate voluntarily in this research.

A structured questionnaire composed of five latent factors and 33 indicator variables was applied as follows: (1) Infrastructure Development (ID) measured through six indicators adapted from studies conducted by López [22]; (National Administrative Department of Statistics (DANE) [23]; and Mai et al. [8]. (2) Individual Capabilities (IC) measured through 12 indicators, which were adapted from the study conducted by Tien et al. [14]. (3) Farm Resources (FR) measured through seven indicators, adapted from the study conducted by López [22]. (4) Resident perception (RP) measured through eight indicators, adapted from studies conducted by Cañero [13] and Hateftabar and Michel [24]. (5) Agro-ecotourism Development (AD), adapted from the study by Mai et al. [8].

The factors were measured by the following indicators: ID by means of access to the farm (ID1), condition of the access road to the farm (ID2), public services of the dwelling (ID3), construction material of the house (ID4), floor material of the dwelling (ID5), and type of bathroom of the dwelling (ID6). IC by community organization (IC1), community leadership (IC2), community empowerment (IC3), marketing of agricultural and livestock products (IC4), good agricultural practices (IC5), innovation of agricultural and livestock products (IC6), community agro-ecotourism development (IC7), agro-ecotourism businesses management (IC8), family finances (IC9), innovation in non-agricultural and livestock products (IC10), environmental management and conservation (IC11), IT tools (IC12). FR by resources of tree and shrub species (FR1), ornamental species resources (FR2), wildlife resources (FR3), agricultural resources (FR4), aromatic species resources (FR5), livestock resources (FR6), gastronomic resources (FR7). (4) RP by tourism employment opportunity for residents (RP1), tourism provides more business for the local population (RP2), tourism improving the economic situation of the region (RP3), preservation of local culture (RP4), tourism facilitates the development of cultural activities for the local residents (RP5), tourism has a positive impact on local identity (RP6), tourism creates an environment conducive to cultural maintenance (RP7) and tourism encourages the protection of natural resources (RP8). The model is shown in **Figure 1** nearby, with the following hypotheses: The AD is the reflection of ID (H1), IC (H2), FR (H3) and RP (H4).



**Figure 1.**  
Theoretical model for agro-ecotourism development in the Municipality of Jardín, Antioquia, Colombia.

The study was based on the structural equation modeling (SEM) methodology proposed by Hair et al. [29]. The Mardia's Kurtosis test was used to verify whether the data followed a normal distribution. The reliability of the scales was validated through Cronbach's Alpha and composite reliability statistics, for which satisfactory values greater than 0.7 were considered [25–28]. To determine the model's goodness of fit, the ratio between the Chi-square and the degrees of freedom was taken into account, being considered an acceptable fit if the values are from 2 to 3 and with limits up to 5 [29, 30]. Other indices, such as the root mean square error of approximation (RMSEA) with a value below 0.08 [31], the comparative fit index (CFI) with values above 0.90 [32], the Tucker-Lewis index (TLI) with values greater than 0.90 [33] and the standardized root mean square residual (SRMR) with a value less than 0.08 [32], were taken into account as criteria to define a good model fit. For SEM analysis, the lavaan [34, 35] library from the R-Project [36] software was used.

### 3. Results

The result of the first proposed model, in **Figure 1**, presented a barely acceptable fit according to the results of the fit indices: RMSEA equal to 0.072, CFI equal to 0.80, TLI equal to 0.79, and the SRMR presenting a value of 0.08. In addition, the ratio between the chi-square and the degrees of freedom ( $X^2/g.l$ ) was 4.62 m approximately equal to 5. Therefore, this ratio was used as a modification index; variables were eliminated to improve the model fit considering the theoretical support of researchers such as López [22], DANE [23], Tien et al. [14], Cañero [13], Hateftabar and Michel [24] and Mai et al. [8].

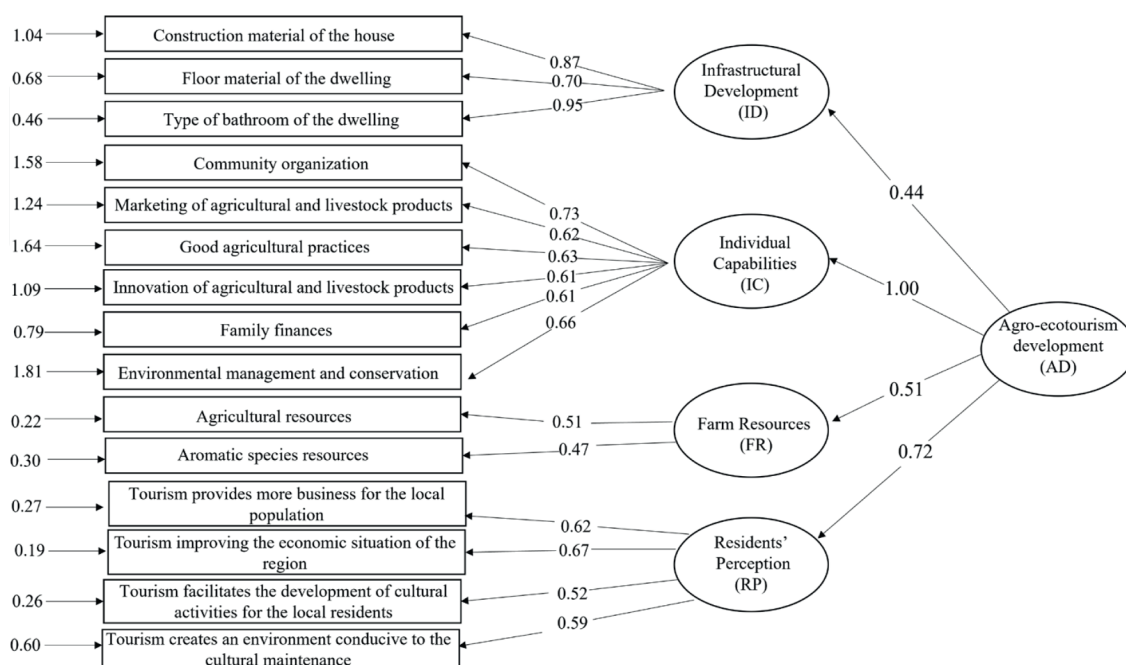
The original model was re-specified, resulting in a model based on five latent factors, as follows: ID measured by only three indicators, IC measured by only six

indicators, FR measured by only two indicators, RP measured by only four indicators; and AD is the reflection of the four factors mentioned above. The SEM model is Type 1: reflective–reflective [37], also called the hierarchical common factor model, Lohmöller [38] shown in **Figure 2**, with the following hypotheses: The AD is the reflection of ID (H1), IC (H2), FR (H3), and RP (H4).

The data set did not follow a multivariate normal distribution since a p-value of less than 0.05 was obtained. Cronbach’s Alpha and composite reliability statistics presented satisfactory coefficients for all the factors, greater than or equal to 0.7 (see **Table 1** nearby), which means that the indicators used to measure the ID, IC, FR, and RP factors in agro-ecotourism development are reliable. To accept the hypotheses of the latent variables, the significance level of the p-value was considered, which was less than 0.05; the ratio between the Chi-Square and the degrees of freedom presented a value of 1.60, indicating that the model has an acceptable fit. The SEM presented an RMSEA of 0.064, a CFI of 0.93, a TLI was 0.91, and the SRMR presented a value of 0.07, indicating a good model fit.

Performance of the variables related to infrastructure was between good and very good, which means that, in general, the infrastructure of each property was in good condition. Regarding the residents’ perception, it was possible to note positive appreciations on the impacts caused by tourism. However, in variables such as agricultural product trading and innovation skills, family finances, environmental management and conservation, these are all to be improved and strengthened. Regarding the diversification of resources of agricultural and aromatic species, they both should be diversified (see **Table 2** nearby).

The results obtained in the estimation of the proposed structural model and the acceptability of the global fit, according to **Figure 2**, provide the basis for affirming that the relationship between agro-ecotourism development (AD) with the latent factors: infrastructural development (factor loading of 0.44), individual capabilities (loading of 1.00), farm resources (loading of 0.51), and residents’ perception (loading of 0.72) is significant and positive, where the effects of IC and RP are those of greater weight in



**Figure 2.** Factors that define agro-ecotourism development in the municipality of Jardín, Antioquia, Colombia.

Latent factor	Indicator variable	Mean	Median	CR
Infrastructure development (ID) scale from 1 "very poor" to 5 "very good"	Construction material of the house (ID4)	3.99 ± 1.4	5	0.78
	Floor material of the dwelling (ID5)	3.91 ± 1.24	4	
	Type of bathroom of the dwelling (ID6)	4.22 ± 1.13	5	
Individual Capabilities (IC) scale from 1 "none" to 5 "a lot"	Community organization (IC1)	3.38 ± 1.63	4	0.79
	Marketing of agricultural and livestock products (IC4)	2.01 ± 1.42	1	
	Good agricultural practices (IC5)	2.85 ± 1.56	3	
	Innovation of agricultural and livestock products (IC6)	1.81 ± 1.36	1	
	Family finances (IC9)	1.75 ± 1.25	1	
	Environmental management and conservation (IC11)	2.63 ± 1.65	3	
Farm Resources (FR) scale from 1 "none" to 5 "a lot"	Agricultural resources (FR4)	1.75 ± 0.74	2	0.70
	Aromatic species resources (FR5)	1.55 ± 0.77	1	
Residents' Perception (RP) scale from 1 "none" to 5 "a lot"	Tourism provides more business for the local population (RP2)	4.22 ± 0.93	4	0.87
	Tourism improving the economic situation of the region (RP3)	4.20 ± 0.94	4	
	Tourism facilitates the development of cultural activities for the local residents (RP5)	4.46 ± 0.83	5	
	Tourism creates an environment conducive to cultural maintenance (RP7)	4.08 ± 1.07	4	

Note: CR: Composite reliability.

**Table 1.**

Latent factors and measures of central tendency of the variables observed for the measurement of agro-ecotourism development in the municipality of Jardín, Antioquia.

n = 149				
Factor	Indicator variables	%	Performance	
Infrastructure development (ID) scale from 1 "very poor" to 5 "very good"	Construction material of the house	58	Very good	
	Floor material of the dwelling	42	Good	
	Type of bathroom of the dwelling	54	Very good	
Individual Capabilities (IC) scale from 1 "none" to 5 "a lot"	Community organization	36	Very good	
	Marketing of agricultural and livestock products	60	None	
	Good agricultural practices	34	A lot	
	Innovation of agricultural and livestock products	70	None	
	Family finances	68	None	
	Environmental management and conservation	45	None	

n = 149			
Factor	Indicator variables	%	Performance
Farm Resources (FR) scale from 1 "none" to 5 "a lot"	Agricultural species resources	45	Very few
	Aromatic species resources	58	None
Residents' Perception (RP) scale from 1 "none" to 5 "a lot"	Tourism provides more business for the local population	46	A lot
	Tourism improving the economic situation of the region	46	A lot
	Tourism facilitates the development of cultural activities for the local residents	60	A lot
	Tourism creates an environment conducive to cultural maintenance	44	A lot

**Table 2.**  
*Performance of the variables observed for the measurement of agro-ecotourism development in the municipality of Jardín, Antioquia.*

comparison with the ID and FR factors. Therefore, the four hypotheses, which establish that infrastructural development, individual capabilities, farm resources and residents' perception define agro-ecotourism development are accepted.

#### 4. Discussion

Individual capabilities were more relevant to local agro-ecotourism development, which is consistent with the results of Morozov and Morozova [39] and Tien et al. [14] who found that the development of people's skills allow improving tourism management, competitiveness and tourist satisfaction. Likewise, it goes hand in hand with the findings of Ariefianto and Hilmi [40] who reported that, when people master their skills through training processes, they become empowered when it comes to agro-ecotourism development.

The results of this study indicate that, in order to strengthen community-based agro-ecotourism, the development of individual capabilities of rural inhabitants is a fundamental aspect from which arises the importance of generating knowledge on issues related to community organization, trading of agricultural products, good agricultural practices, innovation of agricultural products, family finances and environmental management and conservation. This result matches the findings of Moreno de Souza et al. [41]; Policarpio and Martins [42]; Surmeier [43]; and Jamal and Higham [44], who found that individual capacity building through knowledge transfer is important for the development of skills and competencies that enable communities to thrive, alleviate poverty, and be fairly and equitably included in local tourism development systems.

Other studies such as those by Chaskin et al. [45]; Ritchie and Crouch [46]; Moscardo [47]; Mohamad et al. [48]; and Ghaderi et al. [49] agreed with this result, noting that the success of tourism destinations depends on the capabilities or specific abilities that the community has to do things, solve problems and meet proposed objectives, as well as accessing and managing their resources efficiently with greater empowerment for planning, evaluation and decision making, thus further improving the community's collective knowledge of tourism.



Residents' perception also had a strong and direct impact on agro-ecotourism development, since the perception of the inhabitants revolved around the fact that tourism provides more business for the locality, improves the region's economic standing, facilitates the development of cultural activities and creates an environment conducive to the maintenance of endogenous culture, thus reflecting a positive disposition to participate in the development of rural tourism. This result was highlighted in the studies by Ko and Stewart [50]; Choi and Murray [51]; Rasoolimanesh and Jaafar [52]; Cañero et al. [53]; Gannon et al. [54]; Hateftabar and Michel [24]; Kanwal et al. [55]; Li et al. [20]; Kim et al. [56]; Nematpour and Khodadadi [57]; and Lee [58], who pointed out the fundamental role played by residents' perceptions on tourism development at the local level, due to the fact that having the community's support, sentiments and conscious acceptance of tourism carried out in their territory, with all the positive and negative impacts it entails, contributes to the progress of agro-ecotourism, as long as it is carried out in a planned manner, respecting the culture and ways of life.

According to the results of this study, infrastructure development had a lesser influence on agro-ecotourism development. However, it is no less important, since this study showed that the construction material of the house, floor material of the dwelling and type of bathroom of the dwelling are necessary conditions for tourism progress. This result coincides with the research conducted by Reyes [59]; Seetanah et al. [60]; Campesino et al. [61]; Trukhachev [62]; Jovanović and Ilić [63]; Catudan [64]; de Freitas y de Sevilha [65]; Mai et al. [8]; Durán et al. [66]; Ruiz et al. [67]; and Zeng et al. [68] who defined infrastructure development as a key factor that has a positive effect on tourism development, because it contributes to the competitiveness of destinations and the attraction of tourists.

Dalimunthe et al. [69] proposed that tourism development depends on the infrastructure available in the destinations due to the growing interest of the urban population in visiting natural spaces found in rural areas to have experiences with agricultural activities. Therefore, researchers such as Schaerer and Dirven [70] pointed out that potentially attractive places should improve their infrastructure, such as access, public services and lodging, among others, to guarantee such development.

The farm's agricultural resources had less influence on agro-ecotourism development. However, it was decided to leave this factor because the aromatic species resources and agricultural resources present on the farm contribute to agro-ecotourism development to some extent. This result matches the findings of Henri et al. [71]; Evgrafova et al. [72]; Riveros [73]; Masiero et al. [74]; Forje et al. [75]; Puška et al. [76]; and Ren et al. [77] who stated that fauna and flora biodiversity, as well as the natural landscape, are attributes for ecotourism development, generating economic surpluses for the inhabitants, and contributing to the conservation of the environment and local culture.

Ecotourism resources are key attractions to attract visitors, because people are looking for experiences with nature and its landscapes. This is in agreement with the study by Gültekin et al. [78] who took into account resources and the degree of their attractiveness as key factors for ecotourism development.

## **5. Conclusions**

The results of this study allow us to conclude, through the analysis of the structural model, that agro-ecotourism development in Jardín is defined by four latent

factors such as infrastructural development (ID), individual capacities (IC), resident's perceptions (RP), and farm resources (FR). The IC and RP factors define the AD to a greater extent and the ID and FR factors determine the AD to a lesser extent. According to the results, the variables that presented the lowest performance capacities in the commercialization of agricultural products and family finances, product innovation, environmental management and conservation, and diversification of traditional agriculture.

The theoretical implication of this study is that the capacities individual and resident perception factors determined agro-ecotourism development; producers do not have sufficient capacities to convert agro-ecotourism into a rural development initiative that does not compete with or supplant the agricultural vocation, but quite the contrary, that fulfills the complementary role to farm work. Similarly, it is essential to take into account the resident's perceptions since their wishes are important agro-ecotourism development.

As for the practical implications, this study serves as a tool for tourism planning and provides input for strengthening the public policy of the sector, however, the success or failure in the implementation of the above depends on the participation of the community and the management of the local government.

For future studies, it is suggested to determine SEM models that include aspects that measure the human impact, at the level of disturbance and erosion, in rural agro-ecological systems that serve for the efficient management of installed capacities and the sustainable uses of the resources of the territory. Likewise, it is recommended to attempt to construct models that include factors that measure the impact of the sectoral policies in tourism and the impact of the associative schemes with a territorial focus in rural development, since they can serve as a tool to verify the effectiveness of both in the social, economic, environmental, and the political improvement of a territory.

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## **Disclosure statement**

The authors report that there are no competing interests to declare.

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