Unveiling the sustainability level of indigenous tourism initiatives: The perspective of tourism service providers in the municipality of Puerto Nariño, Amazonas

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ABSTRACT

Purpose: This study aims to provide valuable insights for stakeholders in Puerto Nariño, Amazonas enabling them to develop strategies tailored to their needs. Particularly, it assessed the sustainability of indigenous tourism initiatives in the municipality of Puerto Nariño, Amazonas.

Design/Methodology/Approach: This qualitative study involved pioneering indigenous family tourism initiatives and a sustainability framework with a set of 12 sustainability indicators to explore the perceptions of tourism service providers. Convenience sampling was used to collect data through questionnaires.

Findings: According to the findings, families are aware of the advantages of tourist activities with the culture-society component having the highest average score (3.13/5.00). However, it can be inferred that factors encompassing economic, governance and environmental dimensions such as employment and income generation (average 2.00/5.00), encouragement and convening spaces to promote participatory community decision-making mechanisms (average 1.75/5.00), reliable energy supply and enhancing knowledge of local wildlife, vegetation and sporting activities (average 1.70/5.00) remain critical in this indigenous context. Additionally, the initiative's governance component has been evaluated as having the lowest average (2.19/5.00).

Practical Implications: These findings contribute to the existing body of knowledge on ecotourism practices in indigenous settings particularly in South American ethnic communities.

Contribution to the Literature: These findings offer valuable insights for institutions seeking a deeper understanding of tourism practices within protected areas.

Keywords: *AMOEBA model, Community TICOYA, Indigenous tourism, Puerto Nariño, Sustainable tourism development, Tourism sustainability indicators.*

1. INTRODUCTION

The tourism sector is a faster-growing sector globally and has a significant influence on the social, economic and environmental aspects of tourism destinations (Marinello, Butturi, Gamberini, & Martini, 2023). Consequently, it is essential to track progress in the development of sustainable tourism (Ko, 2005). Studies assessing the sustainability levels of community-based tourism are scarce and this situation limits priority actions to be proposed in the long term (Ngo & Creutz, 2022). Additionally, the results from tourist sustainability models are not applicable to other places due to the possibility of destination variations (Ko, 2005). Identifying the requirements

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and circumstances is essential for assessing low-key tourism in protected areas (Jurkus, Povilanskas, & Taminskas, 2022).

Sun and beach tourism have traditionally been the most demanded by travellers in Colombia (Díaz, Mora, & Infante, 2013). However, cultural tourism has proven to be an appealing industry with its amazing rise due to the world's immense cultural diversity (Cardoso, Fanas, & De Araújo, 2021) and community involvement has proven to be instrumental in transferring local knowledge to visitors (Gastélum, May, Hernández, Canul, & Durán, 2020). Emerging destinations address environmental constraints and delicate ecosystems that may be more damaged by tourism activity than traditional tourism areas in order to meet the expectations of travellers who want to engage in cultural exchange activities and touch with nature outside of cities (Matos-Márquez & Pérez-Colmenares, 2019). The World Tourism Organisation (WTO) states that *"'indigenous peoples' distinctive culture and expertise may deliver creative experiences and new commercial prospects for tourism destinations and local communities"*(UNWTO, 2021). Although tourism related to wildlife and controlled by communities is proposed as a worldwide alternative, this activity must be promoted under sustainability guidelines because it may potentially become a problem (Victorino, Bello, & Gualdrón-Duarte, 2015). However, in terms of social transformation, community-based ecotourism has a more positive influence on the local community than negative ones (Kunjuraman, Hussin, & Aziz, 2022). In addition, ecotourism in an indigenous context has proven to conserve natural resources while assisting indigenous communities in their socioeconomic development (Das & Chatterjee, 2015). In the last ten years, sustainable tourism in the Amazon trapeze has been promoted as an alternate economic source for humans (Morales-Betancour, 2014). The municipality of Puerto Nariño in Colombia, inhabited by the indigenous ethnic groups Ticuna, Cocama, and Yagua (TICOYA) has been recognised in terms of national tourism attractions. The ecotourism potential in Puerto Nariño is summarised in terms of natural and sociocultural resources with a focus on the indigenous ethnic groups present in the municipality. Their culture, cosmology, uses of the territory and natural resources make them a tourist attraction (Duque-Escobar et al., 2007). Mincomercio (2012) defines the "Puerto Nariño Eco-Cultural" tourist activity in this municipality as an experience based on considering the landscape, observing geographical, natural and cultural icons, capturing nature and enjoying activities, festivities and events held in the capital of the Municipality of Puerto Nariño and its surroundings. The main attraction for promoting sustainable tourism in this town is the Tarapoto Lake Complex which was designated a wetland site classified as internationally significant by the Ramsar Convention on Wetlands of International Importance especially as a Waterfowl Habitat (called the RAMSAR Convention) in 2018 (Decreto 1573 de, 2017). Tourism activity in this area is important. Although it is carried out within the wetland complex, it provides money mostly for suppliers outside the region without the active participation of the 22 indigenous tribes(Páez-Vásquez et al., 2018). Community engagement is one of the factors that ensures the success of ecotourism in terms of natural resource sustainability by offering essential support in policymaking (Kunjuraman et al., 2022; Samdin, Abdullah, & Subramaniam, 2022). In 2012, the perspective of visitors accessing "Puerto Nariño Eco-Cultural" was low although there is huge potential for both national and international tourism (Mincomercio, 2012). Given this perspective, ethnic groups that comprise the TICOYA community have developed actions to consolidate the exercise of environmental governance within the framework of the life plan. It seeks to manage political autonomy and improve governance based on sustainable economic, social, cultural and environmental activities which constitute an opportunity for the effective participation of local communities (MADS, 2019). However, there is a disagreement between government agencies and the community of the TICOYA reserve regarding tourism plans (Molina & Rojas, 2021).

The existence of family initiatives in Puerto Nariño shows an interest in the indigenous communities involved in tourism. In 2012, Mincomercio (2012) found a micro cluster in development (i.e., small entrepreneurs) that provided complementary services for ecotourism and sustainable tourism. However, there is not a comprehensive, controlled system of tourist service in the Amazon region that enables travellers to make the most of their travels (Palacio-Castaneda et al., 2002). All strategic destination management assistance requires a greater focus on sustainability through indicators (Marinello et al., 2023). However, at the time of this research, there was no evidence in the literature review of relevant studies on the sustainability of community tourism initiatives in Puerto Nariño. This study presents a sustainability assessment of tourism initiatives in the TICOYA community. First, a description of the characteristics of the municipality and its initiatives is presented. Subsequently, the methodology and criteria considered to define the indicators and the formulation of the data collection instrument

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are summarized. In the results section, the sustainability of valued tourism initiatives is analyzed and the perception of service providers regarding their relationship with nature and its use, from productivity (self-sufficiency and food security) to tourism activities is consolidated. Next, the state of sustainability of the initiatives studied is discussed and the most relevant findings in the economic, governance, culture-society and environmental dimensions are summarized.

2. CHARACTERISTICS OF THE MUNICIPALITY OF PUERTO NARIÑO AND INITIATIVES

The population of Puerto Nariño is 7896 inhabitants with 73% of the indigenous population belonging to the Ticuna, Cocama, and Yagua ethnic groups (DANE, 2022). In 2013, it was estimated that 63% of the indigenous people of the Colombian Amazon region lived below the poverty line (Cepal y Patrimonio Natural, 2013). The major sources of income are *shifting cultivation (31%), fishing (24%), timber extraction (7%), hunting (4%) and collection of non-timber forest products (4%), livestock (4%) as well as some paid jobs (18%).”* (Trujillo-Osorio, 2008). TICOYA reserve is part of Puerto Nariño municipality, a socio-political unit established in 1990 of territorial character with the capacity to manage natural resources made up of 22 communities of the three ethnic groups, settled on the banks of the Amazon River and its tributaries, the Loretoyacu, Atacuari, Boyahuasú, and Amacayacu Rivers and the Lagos de Tarapoto Lake complex (Resolución 021 de 1990). Because of its geographical location (see Figure 1), the reservation has biological diversity and hydrological and cultural importance that have been recognized through the designation of the Tarapoto Lake Complex as a RAMSAR site (Páez-Vásquez et al., 2018). This lake complex Lagos de Tarapoto and the TICOYA reserve have extensions of 45463.96 and 86871.65 hectares respectively (Ruiz, 2008). Tourism is aimed at travellers interested in enjoying and learning about the Amazon rainforest and following environmental and cultural conditions and recommendations during their stay (Cepal y Patrimonio Natural, 2013). The public institutions present in the community are primarily of local order such as the mayor's office, governor's office, and regional autonomous corporation of the South of the Amazon (Corpoamazonia, 2016). Since 2016, our team has been researching and training community-based projects. This research allowed for the identification of 21 local TICOYA endogenous tourism projects of which four that had been operating for at least two years were chosen.

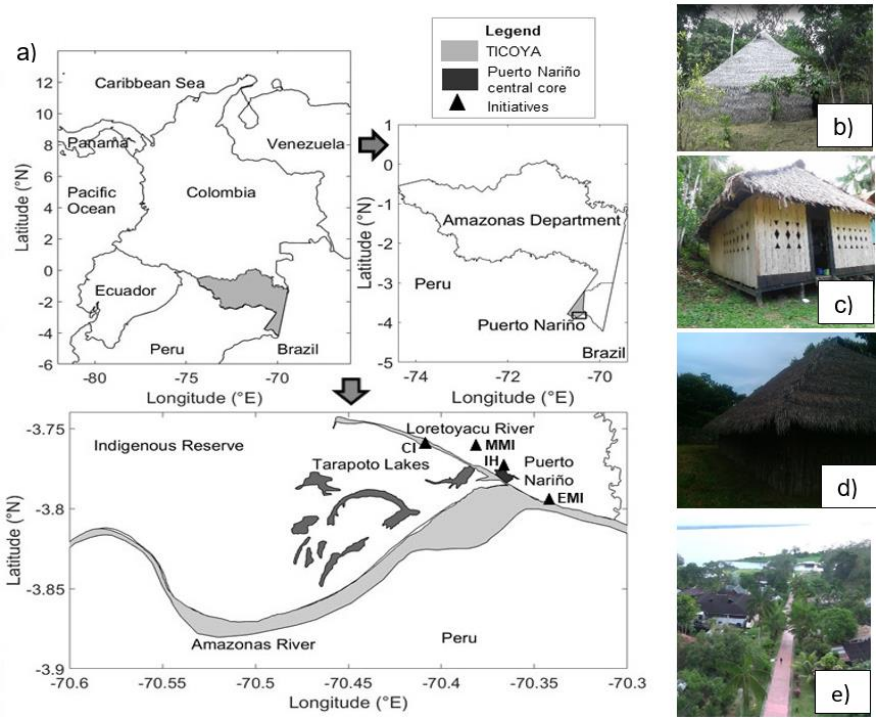

Figure 1. Location (a) and photos of initiatives: MMI (b), EMI (c), CI (d) and IH (e). Base sea coordinates were taken.
Source: ANLA (2023).

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The tourism initiatives valued Figure 1 is described in the following paragraphs where emphasis is placed on the tourism services they offer.

- Maloca Mahitú Initiative (MMI): This initiative is located on the borders of the urban perimeter of Puerto Nariño and is composed of a Maloca and the family Chagra (i.e., space where they grow their food; a privileged scenario to preserve the culture and food sovereignty of the Amazonian indigenous peoples. For this reason, it is intended to transmit the ancestral knowledge to children and young people so that it lasts over time and continues to be characteristic of their identity as Amazonian indigenous peoples in Colombia Visión Amazonia (2021). This space offers fish, farming activities, bird watching, guided tours, dance, storytelling of the Yagua ethnic group, rituals and food services.
- Ethnographic Museum Initiative (EMI): It is located in the Puerto Esperanza community. This initiative includes guide services, Yucuna dance, Ticuna storytelling and food. However, they do not have accommodation or endowment services (e.g., public toilets).
- Cabin Initiative (CI): This initiative is in the Villa Andrea community and offers food, accommodation in hammocks and guided tours. This project does not have any type of sanitary service.
- Initiative Huito (IH): It is in the urban area of Puerto Nariño and has shifting cultivation land. Its services are based on the rite of Huito (the use of the Huito (jungle fruit that paints the skin black) as a mythological element that responds to a set of traditional practices for the Ticuna people in the process of construction of the person Bolivar-Joaqui and Moya-Ortiz (2016) and its mythological tradition in addition to offering tours, lodging, food and transportation.

3. METHODS

In this study, a feasible and helpful tool for assessing tourism sustainability based on the quality criteria proposed by Ko (2005) was adopted as a previous step in developing a questionnaire. The two systems proposed by Ko (2005) (human and ecosystem; ibid.) were implemented and the following four phases were carried out:

- *Identify dimensions*: The four pillars of sustainability recently defined by Roberts, Reynolds, and Dolasinski (2022) were taken into account in this work and renamed economic, governance, culture-society (for the human system) and environmental aspects for the ecosystem (see Figure 2).
- *Identify indicators*: The indicators used in this research were derived by synthesizing the 36 metrics obtained by Rio and Nunes (2012). Based on previous research carried out in the study area (unpublished data), out of these 36 metrics, only 12 condensed system indicators (SIs) were applied to the Tarapoto area and thus defined for this study. The key elements determining tourism sustainability are presented in Figure 2.
- *Scale of the dimensions*: The 1-to-5-point scale was used to make questionnaire surveys easier to administer and this aligns with the five-point scale gradations of sustainability that have been suggested by several researchers (Dung & Hasan, 2022; Erazo, 2016; Ko, 2005; Ngo & Creutz, 2022; Rio & Nunes, 2012). The range of values on the 1–5 scale was as follows: potentially sustainable: 3.1–4.0; intermediate: 2.1–3.0; potentially unsustainable: 1.1–2.0; unsustainable: 0.0–1.0; sustainable: 4.1–5.0. The AMOEBA of tourist sustainability indicators (ATSI) or tourism sustainability assessment maps (TSAMs) were used to evaluate the data since they aid stakeholders in understanding the sustainability of each dimension (Ko, 2005).
- *Determine gradations of sustainability*: The five-point gradation is used to display the sustainability study since all indicators may be handled exactly. A qualitative study was carried out in addition to the four sustainability analysis phases. First, the value of the system indicators (*SI)* was calculated as the sum of the scores of each question associated with the indicator (Appendix 1) ranging from 0 to 5. Then, the value of the system dimension (*SD)* for each initiative was computed as the mean of all system indicator values associated with the dimension (e.g., SD_1 or economic dimension value is equal to the average of system indicators SI_1 and SI_2). Finally, the sustainability index (S) is calculated as a weighted combination of the degree of compliance with the requirements of the indicator. The generic equation is as follows:

$$S = \sum_{i=1}^{n} SD_i * w_i \quad (1)$$

Where S ranges from 0 to 5 and w_i is the weight of i^{th} system dimension SD_i. In this study, each system dimension was weighted with the same value, i.e., w = 0.25 which is consistent with a similar importance criterion adopted in several cases of studies on tourism sustainability evaluation (Ngo & Creutz, 2022; Sobhani, Esmaeilzadeh, Sadeghi, Marcu, & Wolf, 2022).

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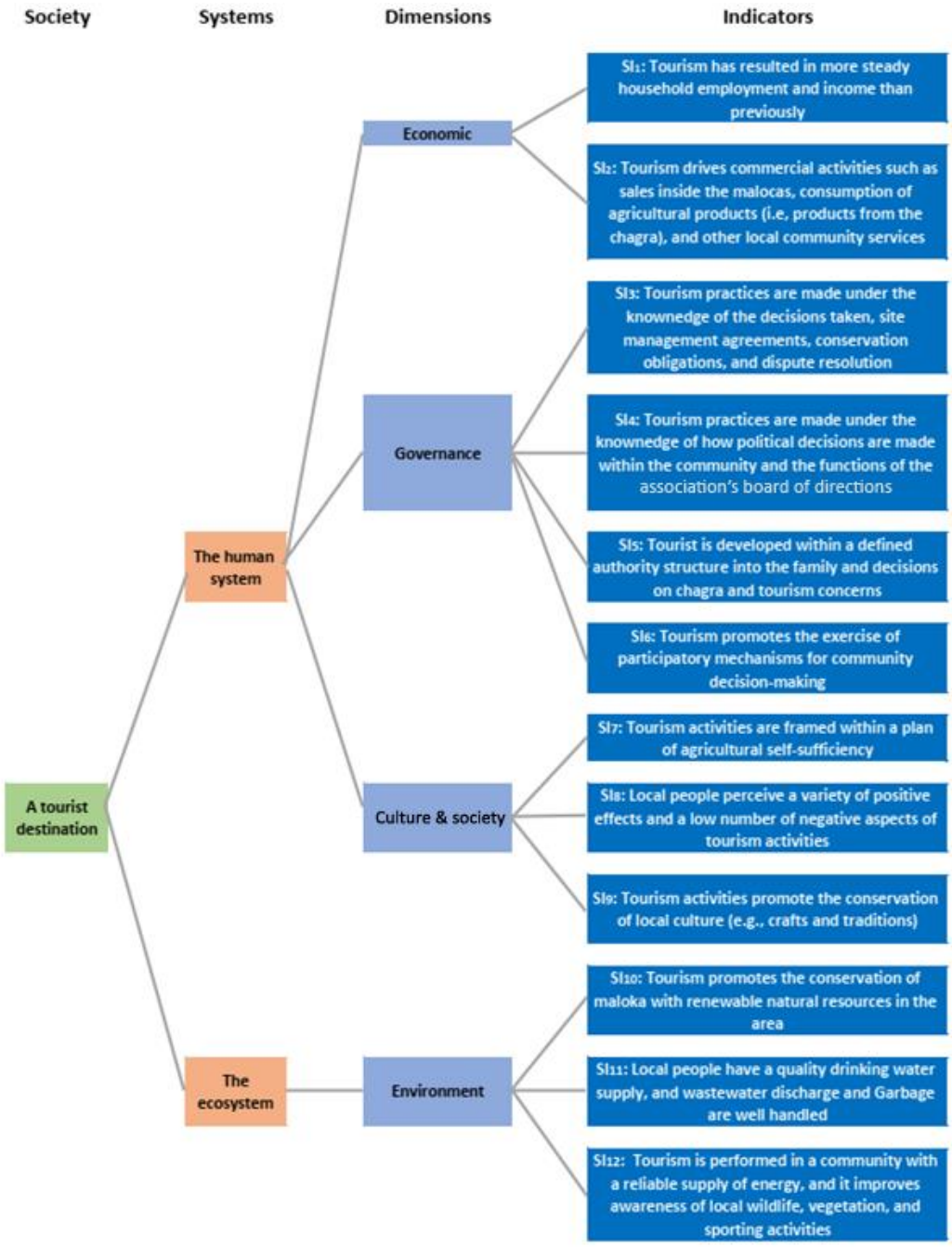

Figure 2. Components for tourism sustainability assessment.

The sustainability assessment involved 52 questions (i.e., 11, 13, 11 and 17 questions to examine the economic, governance, culture-society, and environmental aspects respectively) which were responded to in approximately 20 minutes. Each question received a score ranging from 0 to a maximum value ensuring that the sum of the scores equal to 5 for questions associated with the same indicator as the maximum value. Appendix 1 contains the complete list of questions ranking scores and criteria used for the score assignment. A value of 1 was assigned to most questions (33 questions). The survey encompasses various elements, including productivity, earned income, the number of individuals within family groups and other qualitative data essential for analysis. According to

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Torres (1998) , both structured and unstructured answer types were used to fully capture the interviewee's perspective.

4. RESULTS

This section presents the findings from the application of the survey to the four tourist initiatives on the indigenous reservation. Figure 3 shows the individual ATSI by initiative and the system becomes more sustainable as the AMOEBA size increases. It is noticeable that the IH initiative had the highest sustainability followed by the MMI initiative. The IH initiative showed the highest values for waste and garbage management at Maloca: SI_{11} (4.5), number of products harvested:SI_7 (4.4), commerce and networking: SI_2 (4.0) governance, family and production: SI_4 (4.0). On the other hand, the CI initiative presented the lowest values in the indicators of community governance: SI_6 (0.0), number of products harvested: SI_7 (0.0) governance, family and production: SI_4 (1.0). In addition, the AMOEBA has a unique shape by initiative highlighting the need for action in both systems (the ecosystem and the human system) and across all dimensions. Furthermore, initiatives expose problems in meeting one or more dimensions of sustainability because the center of the AMOEBAS falls far from the origin of the graph. In this sense, the CI initiative represents the biggest challenge to achieving permanence.

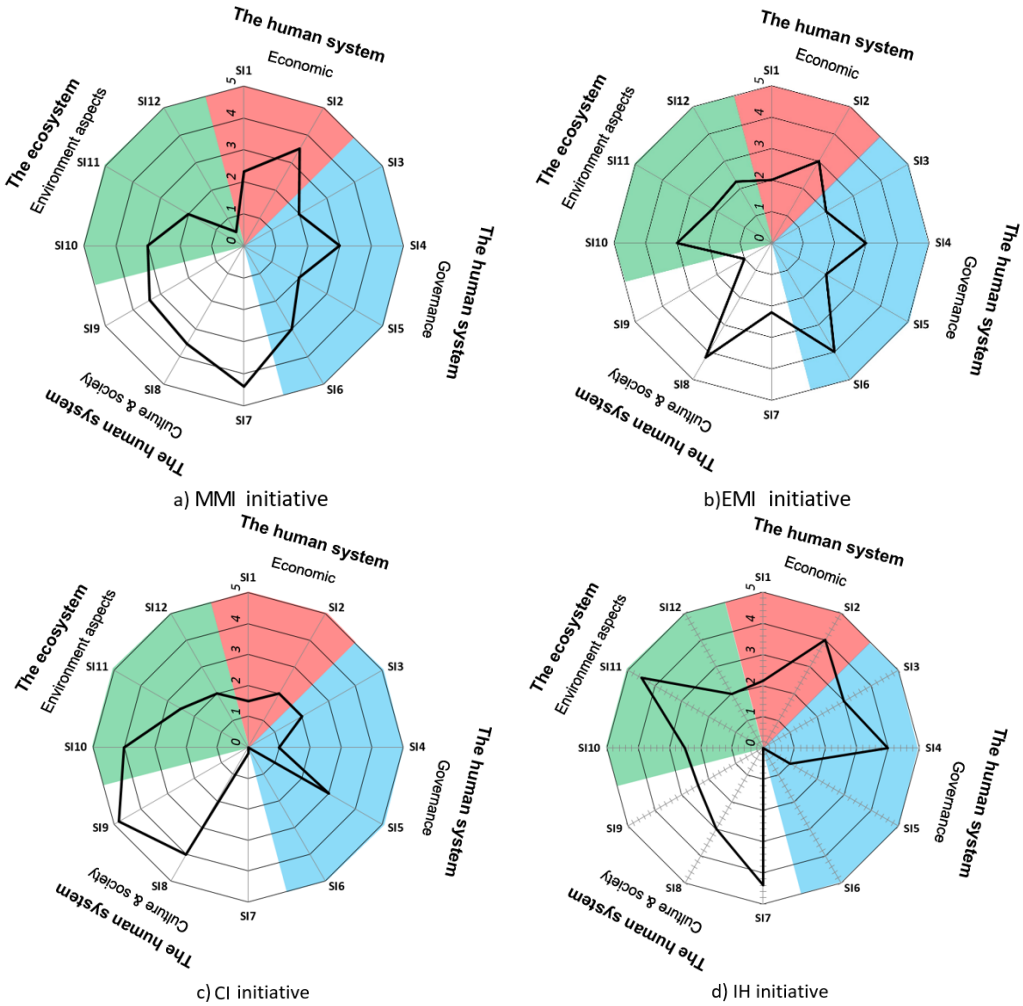

Figure 3. ATSI by initiative (sustainable: 4.1–5.0, potentially sustainable: 3.1–4.0, intermediate: 2.1–3.0, potentially unsustainable: 1.1–2.0 and unsustainable: 0.0–1.0).

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The subsequent sections highlight the principal attributes of families engaged in providing tourism services, encompassing aspects ranging from production (self-sufficiency and food independence) to the operational condition of tourism.

4.1. Economic (SI_{1-2})

The tourism initiatives are family-based, unemployed family members (of EMI, CI, and IH initiatives) are responsible for fishing, Chagra or forest activities. There are few sources of employment (e.g., the local government, reservations and tour operators). The dedication to tourism activities of the initiatives per week (total hours of all participants) ranges from only 24 hours (EMI) to 168 hours (IH). Families recognized the existence of similar tourism initiatives but reported minimal collaboration with each other.

In the sustainability analysis, participant perceptions regarding whether tourism initiatives have boosted the economy (SI_2) and generated stable jobs and income (SI_1) vary widely among participants. The IH initiative recognized that its tourism activities stimulate the economy (SI_2=4.0) and commerce (see Figure 3) with a moderate influence on job generation and stable income (SI_1=2.2). In contrast, the CI initiative perceives that these positive impacts have not occurred (SI_1=1.5 y SI_2=2.0). In the case of EMI and MMI initiatives, the reported contribution of their activities to the economy and employment generation is intermediate (average SI_1=2.2 and SI_2=3.3).

4.2. Governance (SI_{3-6})

The indicator for resource management and harnessing showed a dominant value of 2.0 (SI_3) because service providers indicated the existence of regulations and agreements about management who can use natural, cultural, heritage sites and how they can use them. In this sense, they expressed their recognition of the lake management plan, fishing agreements and agreements concerning forest cutting and waste management as protocols that define the use of natural, cultural and heritage resources for tourism. Nevertheless, the interviewees conveyed that they were not actively involved in the formulation of these agreements and lacked insight into the procedure for dispute resolution as well as their role in environmental protection. They emphasized that natural attractions are intended for use by the community or in collaboration with it. According to their accounts, the Curaca has responsibility for resolving disputes (i.e., the Amazonian indigenous communities view the Curaca as more than just a figure of authority). In cases where Curaca is unavailable, vice-curaca assumes power. The Association of Indigenous Authority (ATICOYA) serves as a platform from which the autonomy of the Amazonian indigenous peoples is strengthened since they are not directly reliant on the Colombian central government; (Gil-García, 2017) and the indigenous guard. Furthermore, in the words of one interviewee, "*the protective action is innate to indigenous knowledge and their way of taking care of the common house and obeying the ancestral wisdom*" (personal communication).

The indicator of self or internal governance (SI4) varies greatly (values between 1 and 4) due to the wide range of knowledge participants exhibit regarding the responsibilities of the association's board of directors and the life plan of the indigenous reservation despite the fact that every family involved in the initiatives claimed to understand how local politics operate. Because authority within the family is given to men only in most of the initiatives (3 of 4) with a slight increase in the participation of women at the same level as men in the distribution of tasks in the Chagra (2 of 4 initiatives) and only 1 of the 4 initiatives are decisions on tourism issues made by both men and women, the indicator of governance within the family and in subsistence activities (SI_5) obtained values between 1/5 and 3/5." The interviews indicate that authority (tradition), experience and knowledge of food production provide the framework for defining responsibilities within the family (personal communication).

Finally, the indicator corresponding to community involvement promotion (SI_6) had the lowest value among the governance measures. These scores varied from 0 to 4 and two of the four projects showed a lack of platforms for community engagement in decision-making. They also voiced doubt about the family members who were permitted to participate in these forums.

4.3. Culture and Society (SI_{7-9})

Indicators for the management of the Chagra as well as the positive and negative aspects of tourism activities on the indigenous reservation are discussed in this dimension. Because food production is extremely low in one of the

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initiatives (CI initiative), the agricultural capacity and food self-sufficiency indicator (SI_7) vary greatly among the initiatives with values between 0.2 and 4.4. The high values of this indicator are driven by the fact that 40% of the product types offered in the community are produced in 2 of the other 3 initiatives where the output is sufficient to meet the demand for the food service provided to visitors. Additionally, it was discovered that the food production levels in these three initiatives are sufficient to fulfil the food and medical demands of their families.

A positive attitude towards tourist activities in the community was indicated by scores ranging from 3.0 to 4.2 for the SI8 an indication of how locals perceive the impacts of tourism. Only one initiative reported an increase in community sexual exploitation. In particular, one of the families stated that *"the intervention of the authorities managed to put an end to a practice that had been developing in terms of sexual exploitation of children, young people and adults given the exotic nature of the practice for foreigners and some nationals"* (personal communication). The benefits of tourism activity to the community reached an average value of 65%.

The cultural shift indicator (SI_9) shows a wide range of perceptions among service providers. The indicator received values ranging from 1.0 to 4.8 because changes in customs were perceived in two of the four initiatives and these variations were reported in 40 to 100% of the consulted customs. It was acknowledged in three out of the four initiatives that the handicrafts sold experienced changes while maintaining their conventional raw materials. According to a unanimous response, all handicrafts were made by the locals.

4.4. Environmental (SI_{10-12})

The three initiatives offering Maloca (MMI, EMI, and CI) are wood-based and constructed using Cedar, Snail, Gliricidia, Espintana, Castaa, Marupa or Achapo. Some parts are changed annually since the wood has not been preserved. However, zinc roofing tiles are becoming popular since "it is necessary to travel longer and longer distances to collect the amount of palm or straw required covering the entire roof" (personal communication). The Malocas lack a potable water supply and thus, water is transported from the potable water treatment plant in the center of Puerto Nariño. Additionally, rainwater is collected during the dry season. When intended for domestic use, it is boiled. Wastewater is managed through septic tanks constructed using traditional methods without provisions to prevent spills or overflows into water sources. One project involves burning garbage that is not categorized at the source. Electricity for two Malocas is provided by a diesel-fueled electrical generation facility situated between Puerto Nariño and Puerto Esperanza which is managed by the community. The remaining two initiatives lack access to power.

4.5. Overall Sustainability Performance of Community Initiatives

Figure 4 shows the sustainability scores for dimensions and indicators. The variables with the greatest sustainability perceptions (see Table 1) are connected to the overall benefits of tourism (SI_8=3.7), commercialization and productive linkage (SI_2=3.1), and Malocas sustainability (SI_{10}=3.1). On the other hand, indicators with the lowest sustainability values were those related to access to adequate electricity supply (SI_{12}=1.7), low promotion or non-existent participation mechanisms (SI_6=1.8), minimal impact on employment and income generation (SI_1=2.0) and weak family structure providing tourism services (SI_5=2.0).

When all factors have values greater than 3.0, tourism may be classified as sustainable using the scale that was used. Only the culture-society dimension achieved a value greater than 3.0 (see Figure 4). The average of the remaining dimensions was 2.43. Individually, initiative results show that (see Table 2) the MMI initiative exhibited the highest sustainability value (2.76) whereas the CI initiative recorded the lowest value (2.27) all falling within the potentially unsustainable range.

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Figure 4. Sustainability score of dimensions and indicators.

Table 1. Calculated values of indicators by initiative.

Dimension	Economic		Governance				Culture and society			Environment		
Indicator / Initiative	**SI_1**	**SI_2**	**SI_3**	**SI_4**	**SI_5**	**SI_6**	**SI_7**	**SI_8**	**SI_9**	**SI_{10}**	**SI_{11}**	**SI_{12}**
MMI	2.3	3.5	2.0	3.0	2.0	3.0	4.4	3.6	3.4	3.0	2.0	0.5
EMI	2.0	3.0	2.0	3.0	2.0	4.0	2.2	4.2	1.0	3.0	2.2	2.3
CI	1.5	2.0	2.0	1.0	3.0	0.0	0.2	4.0	4.8	4.0	2.5	2.0
IH	2.2	4.0	3.0	4.0	1.0	0.0	4.4	3.0	2.4	2.5	4.5	2.0
Average	2.0	3.1	2.3	2.8	2.0	1.8	2.8	3.7	2.9	3.1	2.8	1.7

Note: Maloca Mahitú initiative (MMI); Ethnographic museum initiative (EMI); Cabin initiative (CI).

Table 2. Sustainability status of initiatives in Puerto Nariño.

Dimension / Initiative	Economic	Governance	Culture and society	Environment	Sustainability score	
MMI	2.92	2.50	3.78	1.83	2.76	Intermediate sustainable 2.10-3.00 (Average score 2.60)
EMI	2.50	2.75	2.47	2.47	2.55	
CI	1.75	1.50	3.00	2.83	2.27	
IH	3.08	2.00	3.27	3.00	2.84	
Average	2.56	2.19	3.13	2.53	2.60	

Note: Maloca Mahitú Initiative (MMI); Ethnographic Museum Initiative (EMI); Cabin Initiative (CI).

5. DISCUSSION

The tourism development plan for the department of Amazonas (Mincomercio, 2012) pinpointed several vulnerabilities such as (1) limited awareness of tourism potential within this sector and among citizens. (2) The risk of environmental and cultural degradation. (3) Issues related to isolation, poverty and a lack of regional identity among settlers. (4) The absence of integration and consensus among productive activities and (5) a precarious institutional framework and deficiencies in essential public services. Furthermore, the development plan identified

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two strengths: (1) the presence of a young population with labor potential and (2) the presence of scientific institutions. The study's results are limited to the number of tourism initiatives that meet the experience criteria (i.e., have been operating for at least two years). However, the perception of families offering services in these initiatives indicates a clear correlation with these aspects especially those related to low promotion or lack of mechanisms for participation and the relationship to dependable electricity supplies (i.e., deficiencies in public services). However, the findings of this study reveal additional positive elements such as an optimistic view of the impact of tourism and the sustainability of Malocas.
Further elaboration is provided on each of the dimensions studied below.

5.1. Economic

Tourism has not been as important for the Amazonas department's economy as expected in the past. Therefore, the department's productive apparatus is disproportionately dependent on government intervention (Palacio-Castaneda et al., 2002). The creation of tourist projects has been recognised for more than ten years as a means of reducing poverty in the department of Amazonas (Mincomercio, 2012). However, tourist activities conducted inside the wetland complex produce revenue mostly from suppliers outside the area without active participation from the 22 indigenous communities (Páez-Vásquez et al., 2018). This scenario is associated with the fact that the tourism plans established reduce the activities of the indigenous people as tour guides or the sale of handicrafts without an appropriate benefit-sharing scheme (Victorino et al., 2015). As a result, small-scale fishing controlled under a fishing agreement has been reported as the primary source of income for 22 indigenous communities living on the site (Trujillo-Osorio, Escobar, & Trujillo-González, 2017). The community has demonstrated its desire to be intimately linked to the tourist value chain by demonstrating the existence of family initiatives in Puerto Nariño. Nonetheless, this study found that the tourist activities generated by the examined initiatives did not have a major capability for employment and revenue development. Furthermore, it was discovered that none of the initiatives recorded revenues greater than the existing minimum monthly pay even though the initiatives devote an average of 2.7 days to this activity.
Another critical aspect of tourism activities is the capacity for associations and production chains. For example, although there is a permanent hotel offer in both Leticia and Puerto Nariño, there was no association representing this sector in 2012 (Mincomercio, 2012). The families of the initiatives are related to the association of indigenous authority (i.e., ATICOYA) in this study but there are no articulations, links or records with other recognized associations in the region as recently demonstrated (Páez-Vásquez et al., 2018). Furthermore, a poor degree of sustainability has been discovered in the marketing and integration with other ATICOYA initiatives. Additionally, a low degree of sustainability was found when promoting and linking other ATICOYA activities. This has led to a considerable degree of variety in how this indication is perceived because of the poor regularity in the chagra's production capacity which is necessary to fulfil the demands of tourism services with the potential for commercialization in the local market.

5.2. Governance

The low sustainability of tourist activities in Puerto Nariño has been partly attributed to a lack of governance (Duque-Escobar et al., 2007), *although governance is stated as one of the pillars in the TICOYA's life plan. This plan states that "It is our right and capacity to make our own decisions according to our uses and customs, internal regulations and laws of origi*n" Vieco-Albarracín (2020). *The* "Amazonias Vivas" institutional action plan of Corpoamazonia (2020) implemented over the current five-year period of 2020–2024 adopts strategies for the required relationship with institutions and communities in the region within the exercise of participation and decision-making. Alcaldía de Puerto Nariño (2023) stated that five initiatives, each aimed at encouraging public engagement in the development of communication with the government were implemented between 2020 and 2021. Although the average of all connected metrics falls short of potential sustainability, this study demonstrates that the governance aspect of the initiatives examined is the weakest (see Table 1). Even though various measures have been suggested to improve governance, the (SI_6) index for governance and resource usage reveals intermediate sustainability. This highlights the necessity of assessing the institutional approach in terms of the appropriateness and adequacy of the programs, the integration of the methods and the community's acceptance and involvement.

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The indicator "tourism activities promote the exercise of participatory mechanisms for community decision-making" reports the lowest values in this dimension reflecting a potentially unsustainable level. Although 50% of the participants indicated that they were aware of citizen involvement spaces, the information provided by participants did not match the existing strategies. This emphasizes the importance of plans that foster citizen participation.

The participation exercise of community and indigenous reserves is carried out according to space, in communities through the community assembly and for reserves through the highest authority within the TICOYA reserve (named WONE Assembly) (Vieco-Albarracín, 2020). The term WONE means "to live, reside or stay" in an indigenous dialect. The RAMSAR site management plan was developed through community participation (Páez-Vásquez et al., 2018) and its implementation was overseen by the TICOYA reserve's wetlands WONE board and the regional wetlands committee. According to a report on the implementation of the RAMSAR Convention on wetlands (MADS, 2018), the Tarapoto Lakes Complex has an intersectional management committee and has established and strengthened local communities and indigenous peoples' participation in wetland management. However, the findings of this study contradict those of the Ministry of the environment and sustainable development. Personal conversations with service providers revealed a lack of interest and distrust in the institutions as well as dysfunctionality in the procedures even though participation spaces were explicitly established in the region. For example, the WONE wetland board has not met in the last three years (personal communication).

5.3. Culture and Society

The TICOYA life span establishes a community-based economy (Vieco-Albarracín, 2020) centered on diverse food production and species breeding. In this regard, the municipal committee for food and nutritional security, autonomy and sovereignty of the municipality was established by Decree 0031 of 2023 with the following main functions: (1) "*to establish mechanisms to increase agricultural productivity using in good terms the self-sustainable production of the agro-municipality*", (2) "*to promote community-based food and food security programs* " and (3) "*to promote the appropriation and creation of community networks and associations for the production and distribution of food in the municipality* ".

Based on the sustainability study of the four tourism initiatives reviewed, food and production capacity (SI7) was the lowest indicator of the culture and society dimension. This result is explained by the fact that half of the initiatives generate a limited selection of items in the Chagra. However, the information compiled by this indicator does not allow us to conclude that the community's food security is ensured. The community's production capacity for self-sufficiency and to sustain the tourist population as well as items coming from other villages must be assessed.

Food security projects such as the Social Prosperity Program (RESA by its abbreviation in Spanish, i.e., Red de Seguridad Alimentaria) face challenges in their execution due to a lack of understanding of the TICOYA reservation context (Vieco-Albarracín, 2015). By 2023, the management plan for the wetland complex (Corpoamazonia, 2020) will include initiatives to ensure food security for communities such as (1) the recovery and promotion of seed diversity and traditional agricultural knowledge and (2) the promotion of agricultural production with short-cycle species (cassava, sugarcane, rice, corn, plantains, yams, etc.). According to personal communication, no notable results from these initiatives have been documented.

The initiatives perceive that the negative effects of tourism are low (less than 20% of the scale used in this study) and report that it generates benefits such as family cohesion, increased well-being and adequacy of the infrastructure for tourism. Indicator SI_8 received the highest score for any of the indicators examined (3.69/5.00) indicating a wide range of positive effects and a limited number of perceived negative elements of tourism activity in the municipality. This finding indicates that the image of tourism has shifted in the community of Puerto Nariño where it was previously seen as a negative element owing to the low levels of community participation in the socioeconomic advantages provided (Duque-Escobar et al., 2007). This creates a favorable atmosphere for reaching higher levels of sustainability in tourism activity driven by the synchronization of efforts between the communities, the enthusiastic adoption of this work by its members and the tangible benefits perceived.

Corpoamazonia and the company Artesanas de Colombia signed an agreement that promoted the value chain of handicrafts in the southern Amazon (Corpoamazonia, 2016) but it was not possible to determine a link between

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the agreement and family perceptions of handicraft commercialization in this study to preserve the cultural heritage of handicrafts.

According to the previous studies, the indicator of tourism supporting local cultural conservation (SI9 = 2.9) showed an intermediate level of sustainability because the families involved in tourism initiatives do not see any variation in the handicrafts or materials used in their own culture outside of those that are customarily used to elevate them to a positive status within the cultural dimension. According to the service providers, only handicrafts produced by the community are sold. However, when asked about variations in customs, they displayed a variable perception and reported variety in most of the customs consulted (e.g., dance, music, and sports). According to the families, these cultural changes can be seen in musical compositions, new instruments used, clothing, new choreographies and the forgetting of the local tongue (personal communication). In this regard, institutional efforts should continue to strengthen cultural preservation through initiatives such as the promotion and exhibition of indigenous artistic items as well as the incorporation of native language into schooling activities.

5.4. Environmental

The sustainability analysis presented in the environmental dimension refers to both the impact of initiatives on the environment and the capacity of the environment to sustain them. In the context of community tourism within reservation TICOYA, the impact includes an increase in domestic and transportation services (such as food provisioning, including fishing, food transportation, water consumption and discharge and the generation of solid waste). However, Puerto Nariño lacks the infrastructure to mitigate these impacts (SI_{11}=2.8). The declaration of the Tarapoto Lakes Complex as a RAMSAR site necessitates sustainable tourism. Increased tourism may boost the demand for wood used in the construction of Malocas which may become unsustainable over time. The watershed region is expected to have enough water supply so even with an enormous rise in tourism, there should not be a significant impact. However, an increase in tourism could affect the water quality of the Tarapoto Lakes if adequate wastewater treatment facilities are not implemented. The existing energy supply (diesel-powered electric plant delivered by the Amazon River) is unreliable (SI_{12}=1.7) and should be replaced with other power sources (hydrodynamic, solar and wind) in the medium term. The solid waste produced is not effectively handled. Due to the closure of the waste disposal site "Guhjhire Meane," the municipal administration reported the need to license, build and condition a sanitary landfill as well as to begin managing the three discharge points of the sanitary system on the Amazon River for the urban area of Puerto Nariño. At the time of this publication, this has not been carried out (personal communication).

5.5. Institutional Arrangements

The Mayor's Office of Puerto Nariño and the entities in charge have developed several projects to enhance the promotion, strategy and overall aims of tourism in Puerto Nariño based on the identification of a coordinated and collaborative effort by the TICOYA Reserve of Puerto Nariño indigenous communities (Duque-Escobar et al., 2007). There is evidence of the commitment of organizations committed to scientific research and species conservation such as the foundations Omacha, Entollano, Gaia and the Colombian Amazon Research Institute (named SINCHI, a term in the Native American-Quechua language that relates to warriors) and the Alexander Humboldt Research Institute (Mincomercio, 2012). Corpoamazonia (2020) has been marketing "nature tourism" for the last ten years since the department of Amazonas is one of the so-called "emerging destinations". In this direction, the current RAMSAR site management plan (2019-2023) contemplates the collaboration of 22 different organizations (ministries, governors' offices, mayors' offices, universities, institutions, etc.) within the framework of three international agreements or treaties (Páez-Vásquez et al., 2018) to meet the goals proposed in the wetland complex.

It is still believed that the institutional framework as a transversal axis has been weak in linking family initiatives to the tourism value chain, according to the results of the indicators despite the intervention of a variety of stakeholders, including the Amazonas Chamber of commerce, environmental Non-Governmental Organizations (NGOs) and tourism agencies among a variety of agents.

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6. CONCLUSION

This study makes a valuable contribution to the literature on the indigenous tourism services provided by local communities. It offers insights that are relevant to methodological research and have theoretical implications. It also facilitates the formulation of public and institutional policies and enriches the understanding of indigenous cultural phenomena related to the establishment of tourism initiatives. Consequently, the contributions of this study can be classified into two distinct dimensions: (1) it provides an alternative set of indicators to assess the sustainability of these types of community-based tourism initiatives considering specialties such as the Chagra and the Maloca, and (2) it makes management contributions to the development of programs tailored to indigenous communities that provide tourism services.

6.1. Theoretical Implications

The main implication of this study is its methodology. The four pillars of sustainability assessment, economy, governance, culture-society and environment proposed by Roberts et al. (2022) were explored in this study in relation to human and ecological systems. The introduction of a new set of 12 sustainability indicators allows us to adequately analyze the sustainability of tourism initiatives from a quality perspective. The results show that the proposed methodological assessment approach provides reliable data that reflects the situation in family initiatives. This approach represents in essence a systematic methodology for effectively organizing and summarizing indicators for a comprehensive sustainability assessment. Comparing the analysis of family tourism initiatives with the five issues identified in the diagnosis of tourism sustainability in the Department of Amazonas (Mincomercio, 2012), it is evident that challenges persist. Nevertheless, there was a perceived decrease in the likelihood of environmental and cultural degradation, and community ownership increased. Thus, this method serves as a tool for identifying specific problems and their corresponding communities which require immediate attention.

6.2. Practical Implications

In terms of management implications, our results provide relevant findings for stakeholders by highlighting the attributes on which they should focus their efforts and activities from the perspective of service providers' perceptions and consequently, their level of satisfaction (and trust) with the institutional or community support they receive. For example, the results show that there are spaces for citizen participation (e.g., the WONE congress and RAMSAR site management workshops) but governance is a particular challenge for the community. Activities and socialization are essential for the dissemination of management agreements and decisions collectively formulated by indigenous associations and authorities as well as for strengthening their ownership. On the other hand, this study showed that tourism initiatives operate under the precarious conditions of essential public services and without plans to increase production capacity and diversity of food (self-sufficiency) and awareness of local wildlife, vegetation and sporting activities. The perception of families tends to negatively evaluate formal employment opportunities, essential public services, government institutions and social cohesion. Nevertheless, families have reported improvements in hospital infrastructure, tourism services and family integration.

Moreover, service providers report that the weakest indicator is family income and subsistence in the economic dimension. Tourism strategies must emphasize that indigenous activities include more than tour guides and handicraft sales. Similarly, institutional programs should guarantee the integration of communities into the tourist value chain in their area. In the past, it has been advised to diversify tourism services by boosting socio-cultural resources (Duque-Escobar et al., 2007) to improve the conditions of communities in the Tarapoto Wetlands Complex. However, sustainability analysis does not indicate any discernible advantage between tourist initiatives, even the variation in the number of services provided by these initiatives (between three and five). In general, it is a critical opportunity for stakeholders to work in coordination towards common goals in terms of economic, governance and environmental dimensions in this indigenous scenario.

6.3. Limitations and Future Research

Future research could concentrate on various limitations of this study beyond those already mentioned. A single evaluation is not sufficient to draw conclusion regarding the impact or outcomes of the implemented programs. Measurements over a longer period (e.g., 5 or 10 years) are needed to determine among other things, (1) the

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sustainability impacts of policies, plans and programs on tourism initiatives, their families and communities, (2) the economic situation of the country, (3) the impact of different patterns of tourism seasonality (diversity of tourism occupancy) on the perceptions of service providers. Additional study in many cultural contexts is necessary to expand the results.

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The Ethical Committee of the Universidad Militar Nueva Granada, Colombia has granted approval for this study on 14 July 2019 (Ref. No. RAD-INV-C-DIS-09).

TRANSPARENCY
The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

COMPETING INTERESTS
The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS
All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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Appendix 1. Questions, ranking scores, and criteria used for the score assignment.

Dimension	Indicator	Q code	Stated question	Ranges of score	Max. score	Criteria / Remarks / Considerations
Economic	SI_1: Tourism has resulted in more steady household employment and income than previously	E11	How many days a week do you dedicate to tourism?	If > 3.5: Q=1; from 3.5 to 1.5: Q= 0.5; if <1.5: Q=0	1	3.5-day maximum criterion
		E12	What is your approximate income from activities other than tourism (Average) per capita?	If > 1 CMLW: Q=1; from 0.66 to 1: Q=0.66; from 0.33 to 0.66: Q=0.33; if < 0.33: Q=0	1	CMLW: Cause monthly legal wage in Colombia
		E13	How many family members are in formal employment?	If >=56%: Q=1; if <56%: Q=0	1	Survey to measure informal employment and social security at the national level
		E14	How many family members have been looking for a job in the last six months?	If <= 17.4%: Q= 1; if > 17.4%: Q=0	1	
		E15	What kind of payment do the employees receive?	If in cash: Q=1; if in kind: Q=0.5; if none: Q=0	1	Cash is the best option on a practical day-to-day spending basis
	SI_2: Tourism drives commercial activities such as sales inside the malocas, consumption of agricultural products (i.e., products from the chagra), and other local community services	E21	Does the "chagra" supply food for the productive tourism initiative?	If yes: Q=1; if no: Q=0	1	Not apply
		E221	Do you know what the other initiatives are up to?	If there is trading or services; Q= 1, if collaboration or other: Q=0.5; if none: Q=0	1	Trading or services shared
		E222	What kind of relationship do you have with these initiatives?			
		E23	Do you utilize any local community materials or services in the provision of tourism services?	If >=7: Q=1; from 6 to 3: Q=0.5; if <=2: Q=0	1	Services: Construction materials, arts and crafts, guides/Tour operators, travel agencies, transportation services, food and beverages, and accommodation.
		E24	Does the maloca have retail space?	If yes: Q=1; if no: Q=0	1	Not apply
		E25	Do you offer your own transportation service for tourist departures?	If own transportation: Q=1; if rent transportation: Q=0.5 if none: Q=0	1	Not apply
Governance	SI_3: Tourism practices are made under the knowledge of the decisions taken, site	G11	Are there management agreements for natural, cultural, and heritage sites for tourism?	If yes: Q=1; if no: Q=0	1	Not apply

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Dimension	Indicator	Q code	Stated question	Ranges of score	Max. score	Criteria / Remarks / Considerations
	management agreements, conservation obligations, and dispute resolution	G12	Does the organization to which you belong participate in decisions on how to manage natural, cultural, and heritage sites for sustainable tourism?	If yes: Q=1; if no: Q=0	1	Not apply
		G13	Are there any rules or agreements for handling conflicts between tourism service providers?	If yes: Q=1; if no: Q=0	1	Not apply
		G14	Do you have any responsibility for the conservation of tourism-related ecosystems, cultural and heritage sites?	If yes: Q=1; if no: Q=0	1	Not apply
		G15	Are there any regulations or agreements governing who can utilize natural or cultural/heritage places, and how?	If yes: Q=1; if no: Q=0	1	Not apply
	SI_4: Tourism practices are made under the knowledge of how political decisions are made within the community and the functions of the association's board of directors	G21	Do you know how political decisions are made within the community?	If yes: Q=1; if no: Q=0	1	Not apply
		G22	Do you understand the functions of the association's board of Directors (Main decisions taken in the last two years)?	If known and states functions: Q=2; If known, but not stated functions: Q=1; if not known = 0	2	Not apply
		G23	Do you know the plan de Vida of the reserve?	If yes: Q=2; if no: Q=0	2	Not apply
	SI_5: Tourist is developed within a defined authority structure into the family and decisions on chagra and tourism concerns	G31	Who exercises authority within the family?	If male: Q=0; if female and male: Q=0.5; if female: Q= 1	1	Women's empowerment
		G32	Who makes decisions about chagra topics?	If female and male: Q=2; if female: Q=1; If male: Q=0	2	Gender equity
		G33	Who makes decisions on tourism issues?	If female and male or the family: Q=2; if female: Q=1; If male: Q=0	2	Gender equity

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	SI_6: Tourism promotes the exercise of participatory mechanisms for community decision-making	G41	Are there areas for communal decision-making that allow for participation?	If yes: Q=1; if no: Q=0	2	Not apply
		G42	Who participate in community decision making spaces?	If all family members (women, men, seniors, youth, children): Q=3; If seniors: Q=2; If only men or only women: Q=1; If not known / no answer: Q=0	3	Family involvement
Culture & society	SI_7: Tourism activities are framed within a plan of agricultural self-sufficiency	A11	Do you raise the number of local items in your chagra?	If raise 81-100%: Q=1; if 61-80%: Q=0.8; if 41-60%: Q=0.6; if 21-40%: Q=0.4; if <=20%: Q=0.2; If none: Q=0	1	Bananas, cassava, corn, pineapple, chili pepper, pawpaw and lulo
		A12	Is the chagra producing everything required to meet the family's food, medication, and other needs?	If produce and covers all necessity Q=2; if produce and partially covers: Q=1; if does not Produce: Q=0	2	"Chagra" provides food for all purposes
		A13	Does the chagra supply food for the productive tourism initiative?	If supplies all: Q=2; if supplies partially: Q=1; If does not Supply: Q=0	2	Not apply
	SI_8: Local people perceive a variety of positive effects and a low number of negative aspects of tourism activities	T11	Do you feel tourism has had a detrimental impact on your community? Which ones are they?	If 81-100%: Q=0; if 61-80%: Q=0.4; if 41-60%: Q= 0.8; if 21-40% Q=1.2; if <=20%: Q=1.6; if not produce- /not have Q=2	2	Detrimental impact: Alcohol use, drug use, delinquency, sexual exploitation, abuse, and forced migration
		T12	Do you feel that tourism contributes to sexual exploitation in a variety of populations?	If homosexuals, lesbians and transvestites or don't know: Q=0; if 2 of the above: Q=1; if impact on 1: Q=2; if none: Q=3	1	Not apply

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		T13	Positive effects: In your opinion, do sustainable tourism activities generate benefits in your local area/Community in all aspects?	If aspects are 81-100%: Q=2; if 61-80%: Q=1.6; if 41-60%: Q=1.2; if 21-40%: Q=0.8; if <= 20%: Q=0.4; if not produce / Not have: Q=0	2	Positive effects: Environmental conservation, and improvement in: education, infrastructure (Hospital, schools, public services, tourism), promotion of local culture, institutions and government, health services, general welfare, family and social cohesion, and citizen security
	SI_9: Tourism activities promote the conservation of local culture (e.g., crafts and traditions)	T21	Has there been variation in the crafts of your culture?	If yes: Q=0; if no: Q=1	1	Not apply
		T22	Are handicrafts not produced in the community traded?	If yes: Q=0; if no: Q=1	1	Not apply
		T23	Are materials other than those traditionally used to make the handicrafts?	If yes: Q=0; if no: Q=1	1	Not apply
		T24	Have there been or do you perceive any changes in customs?	If yes: Q=0; if no: Q=1	1	Not apply
		T25	In how many of the traditions do you find variation in customs?	If 81-100%: Q=0; if 61-80%: Q=0.2; if 41-60%: Q=0.4; if 21-40%: Q=0.6; if <=20%: Q=0.8; If does not produce or none: Q=1	1	Traditions: Dancing, music, local festivities, traditional sports, and sport fishing
Environment	SI_{10}: Tourism promotes the conservation of maloca with renewable natural resources in the area	R11	What materials are utilized to construct the maloca for tourism?	If wood: Q=1; if clay brick: Q=0.5; other or does not have: Q=0	1	Autochthonous culture
		R12	How often do you change parts (In years)?	If <=1 year: Q=0; if from 1 to 5 years: Q=0.3; if from 5 to 10 years: Q=0.66; if >10 years: Q=1	1	Lifespan
		R13	What kind of materials are used for the roof?	If palm: Q=1; if tile or lamella: Q=0.5; other: Q=0	1	Not apply

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		R14	Does the forest allow them to get the amount of wood required for your constructions?	If buy it: Q=0; if bring from far away: Q=0.5; if near the house: Q=1	2	Forest supply capacity
	SI_{11}: Local people have a quality drinking water supply, and wastewater discharge and garbage are well handled	R21	What is the main drinking water supply?	If does not apply or is not answer: Q=0; if: 1. River = 0; 2. Aqueduct = 1; 3. Water well = 0.5; 4. Rainwater =1	1	Water quality by source
		R22	Do you practice any drinking water treatment?	If yes: Q=1; if no: Q=0	1	Not apply
		R23	What utilities does the maloca have?	If toilet or septic system: Q=1; if community toilet: Q=0.5; if don't have / No answer: Q=0	1	Not apply
		R24	Where does the wastewater go?	If sewer: Q=1; if pit: Q=0.5; if river or outdoors: Q=0	1	Not apply
		R25	Where is the waste produced by the household disposed of?	If outdoors or underground or burned: Q=0; if municipality collects them or disposal center: Q= 0.5	1	Not apply
		R26	Do you sort garbage at home?	If yes: Q=0.5; if no: Q=0		Not apply
	SI_{12}: Tourism is performed in a community with a reliable supply of energy, and it improves awareness of local wildlife, vegetation, and sporting activities	R31	Do you have a reliable supply of energy?	If yes: Q=1; if no: Q=0	1	Not apply
		R32	Is the electric power through Interconnection?	If solar panel: Q=1; if interconnection or own or municipality plant: Q=0.5; if not: Q=0.5	1	Source reliability
		R33	Is the energy from the plant?			
		R34	Is the power from solar panels?			
		R35	As a tourism service provider, do you reduce, recycle or reclaim water, energy and waste/Waste?	If yes: Q=1; if several: Q=0.5; if no: Q=0	2	Environmental care

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		R36	What species of fauna and flora are sighting activities defined in your tourism package?	If <=4: Q=0; if from 5 to 8: Q=0.25; if >=9: Q=0.5	1	species of fauna and flora: Dolphins, birds, snakes, monkeys, alligators, turtles, fish, timber, medicinal plants, lotus flower, "aguajales", and lakes
		R37	What sports activities do you do around tourism?	If <= 3: Q=0; if from 4 to 6: Q= 0.25; if >=7: Q=0.5		Sports activities: Hiking (Day and night), artisanal fishing, kayaking, canoeing, sport fishing, climbing, and tree climbing

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