Revista Turismo & Desenvolvimento | n.º 48 | 2025 |[172-202]

DOI 10.34624/rtd.v48i1.35770

e-ISSN 2182-1453

Regional tourism sustainability index: Assessing the **Cávado and Ave** with expert and residents

Índice de sostenibilidad turística regional: Evaluando el **Cávado y el Ave** con expertos y residentes

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Abstract | This study presents the application of the Tourism Sustainability Synthetic Index (IS-SIS) in the North of Portugal, focusing on the Cávado and Ave Regions. Its aim is to assess the sustainability status of these destinations amidst the significant increase in tourist activity since 2013. Utilising a robust population sampling survey with over 1.200 responses and expert interviews, the research validates the IS-SIS, a tool recognised both nationally and internationally. By involving local society and experts, the study promotes dialogue among stakeholders, offering a fresh perspective often absent or overlooked in conventional methodologies. Through this approach, the research evaluates the sustainability levels of the analysed regions, identifying critical social, economic, political, and environmental dimensions in need of review. By examining both individual and collective indicators, the study identifies areas for improvement and offers insights for regional administrations. This inclusive methodology not only assesses the current state of sustainability but also facilitates informed decision-making for the future development of these tourist destinations. Ultimately, the research contributes to advancing the understanding of tourism sustainability and the importance of community engagement through participatory approaches to achieve responsible tourism.

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Keywords | synthetic sustainability index, sustainability indicators system, governance, Northern Portugal

Resumen | Este estudio presenta la aplicación del Índice Sintético de Sostenibilidad Turística (IS-SIS) en el Norte de Portugal, centrándose en las regiones del Cávado y del Ave. Su objetivo es evaluar el estado de sostenibilidad de estos destinos en medio del aumento significativo de la actividad turística desde 2013. Utilizando una sólida encuesta de muestreo de la población con más de 1.200 respuestas y entrevistas a expertos, la investigación valida el IS-SIS, una herramienta reconocida tanto a nivel nacional como internacional. Al involucrar a la sociedad local y a expertos, el estudio promueve el diálogo entre las partes interesadas, ofreciendo una perspectiva actual a menudo ausente o pasada por alto en las metodologías convencionales. A través de este enfoque, la investigación evalúa los niveles de sostenibilidad de las regiones analizadas, identificando dimensiones sociales, económicas, políticas y medioambientales críticas que necesitan revisión. Mediante el examen de indicadores individuales y colectivos, el estudio identifica áreas de mejora y ofrece ideas para las administraciones regionales. Esta metodología integradora no sólo evalúa el estado actual de la sostenibilidad, sino que también facilita la toma de decisiones informadas para el desarrollo futuro de estos destinos turísticos. En última instancia, la investigación contribuye a avanzar en la comprensión de la sostenibilidad turística y la importancia del compromiso de la comunidad a través de enfoques participativos para lograr un turismo responsable.

Palabras clave | **í**ndice sintético de sostenibilidad, **s**istema de indicadores de sostenibilidad, gobernanza, Norte de Portugal

1. Introduction

In the mid-1990s, the World Tourism Organisation already highlighted the challenge of establishing parameters to achieve sustainability in a generic way (UNWTO, 1997). Today, tourism sustainability, supported by reliable tools, remains one of the major challenges for the academic community and for tourism managers working in established or promising tourism destinations.

Achieving the development of sustainable tourism is the key objective in the contemporary tourism **industry and** therefore requires reliable and adjusted measurement and quantification processes (Ko, 2005). In this respect, Butler (2001) reinforces the need for indicators to give meaning to the concept of sustainability, a term that according to Pedro-Bueno, is significantly degraded at present (Agenda Urbana, 2024), which reinforces the need for empirical evidence that guarantees the rationalisation of a term that has been subjectivised according to the interests of each bidder.

The capacity of tourism to generate income and employment positions it as a pivotal economic activity in numerous destinations (Choi & Sirakaya, 2006). However, despite its benefits, tourism also has negative socio-cultural, economic, and environmental impacts, contributing to processes of environmental degradation. These impacts require responsible measures and alternative management options, as well as the design of good governance policies aligned with sustainable tourism development.

According to the latest data from the World Tourism Organization (UNWTO, 2024) World Tourism Barometer tourism activity reached a total of 1286 million international tourists in 2023 globally. It is anticipated that by 2024, tourism will experience even greater support, projecting a 2% growth over the pre-pandemic year of 2019.

Sustainable tourism should be part of processes that promote wealth and the conservation of resources, fostering cultural diversity and the well-being of residents, favouring the sustainable development of destinations. In this sense, management and good governance policies are often linked to decision-making processes based on reliable data and in line with the needs of the territory.

But how can sustainability be measured and quantified to ensure that the activity is sustainable?

According to Jones et al. (2019) and Pérez et al. (2009), the measurement of sustainability is the pillar of decision-making protocols, which facilitates the interpretation of information by stakeholders promoting sustainable development.

The aim of the present proposal is to assess the degree of sustainability of the territories that make up the Cávado and Ave, regions located in the North of Portugal.

The analysis is given through the application of the Tourism Sustainability Synthetic Index - IS-SIS (Pimentel-de-Oliveira & Pitarch-Garrido, 2022). A methodology proven in other tourism destinations, it presents high reliability indices and is based on the philosophy of weak sustainability and strong sustainability of Turner (1993) and Pearce & Atkinson (1993). The technique integrates the opinions of stakeholders, through a survey of the sample population, and the perspective of local experts, who participate in the validation of indicators adapted to the specific reality of the regions. The experts' contributions are obtained through personalised interviews, allowing for a detailed understanding of each area analysed, enriching the decision-making process with specialised and contextualised knowledge.

From another perspective, this study is based on the principles of sustainability, expressing its results through an analysis that encompasses four fundamental dimensions: social, economic, environmental, and institutional or political. These results are articulated through indicators aligned with the 17 United Nations Sustainable Development Goals (SDGs) (ONU, 2016).

As a result, on the one hand, the sustainability index of each region is evaluated, considering both the perception of the local population and the validation of regional experts. On the other hand, the sustainability levels of each indicator are detailed, providing the authorities with a meaningful tool that facilitates decision-making and the formulation of good governance and management policies adapted to the specific needs of each territory. In addition, the population is offered a valuable space for participation in the construction of a sustainable destination. This approach helps to optimise the allocation of economic, social, and environmental resources, avoiding their inappropriate use and thus contributing to a more efficient and responsible management.

The implementation of this proposal will open the possibility for future research to have updated data, facilitating new lines of research and better social and sustainable development proposals for the territories.

2. Theoretical framework

The discussion on the levels of tourism sustainability of a destination and how to achieve them using indicators is not new (Tyagi, 2024). For decades, sustainability has been sharing the stage with tourism development, proposing a triple alliance: 1. the stability of the sector, 2. the right balance between the population, its culture, and its environment, and 3. visitor satisfaction.

Despite the numerous studies carried out on the subject; (Ali Selim et al., 2021; European Commission, 2020; Peña-Alonso et al., 2018; Tudorache et al., 2017; Mendola & Volo, 2016; Blancas et al., 2015; Soto & Schuschny, 2009; OCDE, 2008; Munda & Nardo, 2003; among others), it has not yet been possible to establish a consensus that takes into consideration the principles of sustainability and, especially, that provides the necessary stability for the sector, while preserving the integrity of the territory and the resident's opinion (Zhu et al., 2023). Furthermore, when assessing the number of studies that do consider the opinion of the local population, the statistics reveal a lack of inclusion, leaving the local population as an unaccounted-for element in this equation (De Oliveira, 2022).

The assessment, as well as the understanding and perceptions of local communities, is becoming an interesting observation factor in different scientific investigations that have territory and resources as their backbone (Moniche & Gallego, 2023; Damian et al., 2023; Dabre et al., 2023; Akinci & Öksüz, 2022; Ochieng et al., 2021; Petheram & Campbell, 2010).

This tool, on the one hand, is being recognised as a key enabler in the design of more inclusive and acceptable social policies. It promotes efficient public management and an optimal allocation of economic, social, and environmental resources (Manea & Cozea, 2022). These findings reinforce previous scientific studies (De Oliveira, 2022; Nunkoo & Ramkissoon, 2011; Gursoy et al., 2009; Huete et al., 2008; Allen et al., 1993), which highlight the importance of public opinion in the growing support for tourism activity when the positive impacts outweigh the negative ones. This context drives the proposal of this research to implement Bottom-Up processes, which facilitate citizen participation in decision-making.

On the other hand, the use of indicators favours the establishment of objectives and helps to determine the parameters for action. In addition, indicators can serve as instruments of advice and guidance in public policy and good governance (Ministerio de Economía y Hacienda, 2007). They contribute to the precision of the development objectives of destinations, providing effective information to the actors in the process.

The IS-SIS methodology, used in this research, integrates these two key tools: the perspective of the local population and the accuracy of the data. This qualitative and quantitative combination facilitates a systemic view of territorial challenges at social, economic, and environmental scales.

2.1. The Cávado and Ave regions

This research aims to analyse the regions of Cávado and Ave (Figure 1), which have emerged as promising destinations in the tourism context of northern Portugal, as highlighted below.

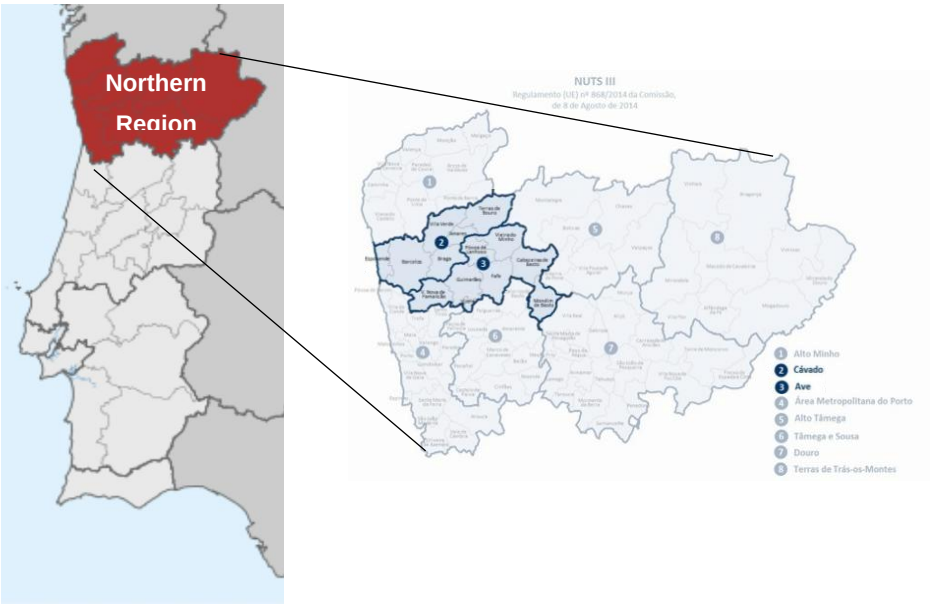

Figure 1. Location of the study area

Source: Own elaboration

This territory has experienced a significant annual increase in tourist arrivals since 2013, compared to the Lisbon Metropolitan Area (the leading destination for international tourist arrivals in the country, according to data from *Instituto Nacional de Estatística – Portugal* (INE-Portugal, 2023). Moreover, it has been showing, every year, a significant recovery after the COVID-19 pandemic period, even surpassing the pre-pandemic figures of 2022 (Figure 2).

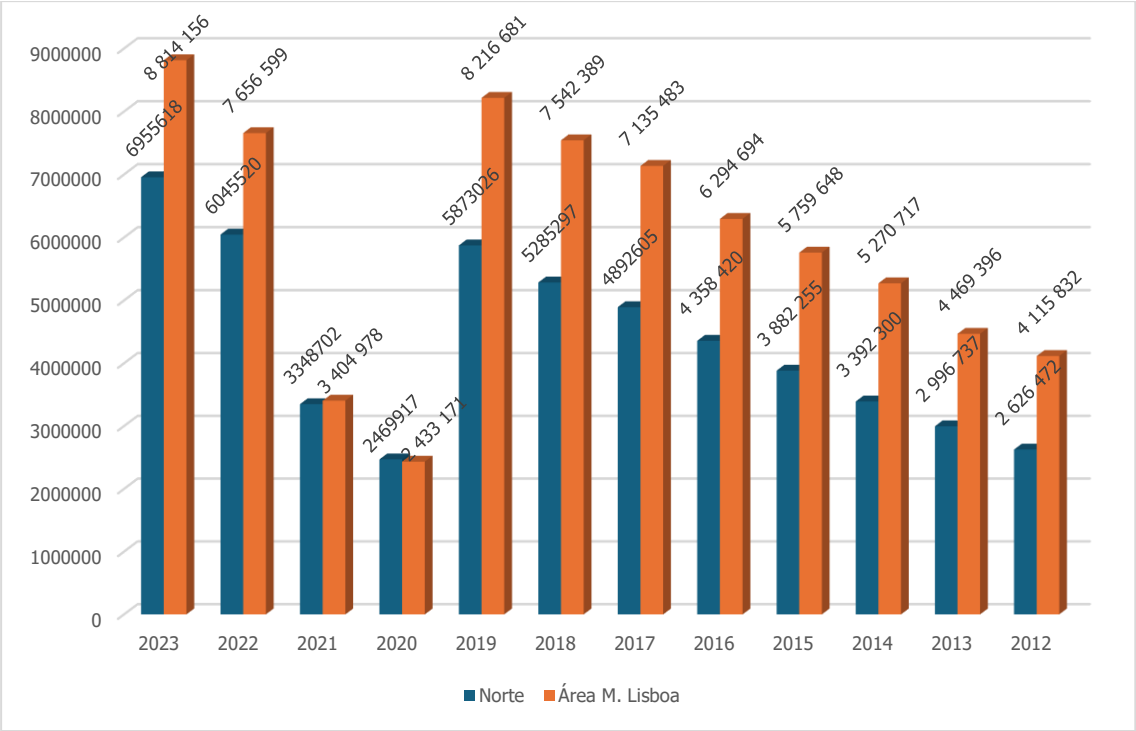

Figure 2. Tourist arrivals in the North of Portugal compared to the Lisbon Metropolitan area (nº)

Source: Own elaboration with (INE-Portugal, 2023) dates

This phenomenon raises the possibility that the territory in question may face, in the short term, a significant risk of touristisation, with undesirable impacts on a local scale, affecting social, economic, and environmental aspects.

2.2. The Synthetic Sustainability Index – IS-SIS

The IS-SIS is based on a Sustainability Indicator System (SIS) adapted to the particularities of the destination under analysis (Pimentel de Oliveira & Pitarch-Garrido, 2022; Pimentel de Oliveira, 2020). This system, aligned with the 17 SDGs of the ONU (2016), is divided into four dimensions: Social, Economic, Political and Environmental. Its purpose is to provide accurate information for decision-making, adopting a holistic perspective adjusted to the specific characteristics of the tourism territory. Furthermore, it involves the participation of regional experts and residents through personal interviews and satisfaction surveys, thus ensuring a complete understanding of sustainability in the tourism context.

The SIS is specifically adapted to each destination, maintaining the ability to compare with other environments, considering the territorial typology.

The IS-SIS technique is based on the double reference multicriteria method proposed by Ruiz et al. (2017), which integrates the concerns of residents and the validation and adjustment by local experts as weightings of the achievement function (Pulido-Fernández et al., 2011; Navarro Jurado et al., 2012; Ruiz et al., 2017; Luque et al., 2009). This makes it possible to calculate the sustainability or unsustainability index of the territory.

It is worth mentioning that this synthetic index has been awarded research prizes and has proven its effectiveness both nationally and internationally, being implemented in the Valencian Community in Spain, as well as in the Algarve region in Portugal.

3. Methods

Applying the IS-SIS methodology, developed by Pimentel de Oliveira & Pitarch-Garrido (2022), this research uses quantitative and qualitative techniques.

In a first stage, using qualitative techniques, an exhaustive analysis was carried out of seven sustainability indicator systems, both national and international, focused on inland and cultural tourism (Turismo de Portugal, 2017; Interreg Mediterranean, 2017; Arroyo, 2011; Allaire et al., 2007; Interreg Mediterranean, 2016; IBGE, 2007; ONU, 2016), was carried out, which added up to a total of 1342 institutional indicators analysed.

The selection criteria for the indicators used in the IS-SIS are based on studies by Caballero Duran et al. (2018), and were determined according to the following aspects:

(i) Relevance: does the indicator clearly and precisely reflect what is to be measured?

(ii) Functionality: Is it possible to monitor the indicator effectively?

(iii) Availability: Is the information needed for the indicator available?

(iv) Reliability: What is the source of the indicator data?

(v) Usefulness: Is the indicator relevant to what it is intended to measure?

Also using qualitative techniques, personalised interviews were then conducted with twelve regional experts selected based on their academic or professional credentials, aligned with one of the four dimensions of sustainability (three experts in the Social, three in Economics, three in Environment and three in Institutional or Policy). The purpose of these interviews was to validate the initial selection of indicators, which were chosen from the seven national and international indicator systems mentioned above.

In addition, according to qualitative methodologies for determining the degree of satisfaction, a questionnaire was applied both face-to-face and online to a representative sample of the population of the Cávado and Ave regions. The questions presented open, semi-open and closed characteristics with Likert-type scales (Alaminos & Castejón, 2006 and Horton et al., 2011). This questionnaire, inspired by the UNWTO (2005) Model C6 Local Questionnaire, was administered during the period from June to December 2022. As a result, a total of 1286 meaningful responses were obtained (744 respondents in the Cávado and 542 in the Ave), with a margin of error of 5% and a confidence level of 95%. The number of responses obtained exceeded the minimum required sample of 384 individuals per region.

The questions addressed various aspects: socio-demographic, economic, environmental, social, and political-administrative. Socio-demographic data included city of residence, age, gender, and profession. Regarding economic aspects, the perceived benefit of tourism, employment generation, impact on prices and economic income in the regions were explored. Regarding the environmental aspect, the generation of negative impacts on nature, the degree of satisfaction with the number of visitors and access to different areas were evaluated. In relation to social nuances, issues such as the stimulation of culture, encroachment of services, satisfaction with visitor attitudes and cultural identification were addressed. Finally, political-administrative aspects were explored, such as the administration's control over tourism, the degree of insecurity, possible improvements and factors of dissatisfaction or disquiet.

In the application of the methodology, the questionnaire has three specific functions within the research: I. to provide a platform for the local population to express their level of satisfaction with the tourism developed in the destination; II. to address indicators related to the social sphere that require this technique; III. to serve as a weighting element, once the satisfaction responses have been analysed in the calculation of the achievement function, applied to the synthetic index algorithm.

To analyse the data obtained in the questionnaires, the SPSS programme was used for quantitative considerations, and the ATLAS.ti programme was used to analyse the responses of the residents in terms of their degree of satisfaction with the tourism developed in the territory.

The calculation of the Synthetic Index of Sustainable Tourism (IS-SIS) was carried out in six stages, which are detailed below.

Step 1. Double reference level.

To make it possible to set the limits for measuring sustainability, we opted for the determination of the reserve point, through the 33rd percentile and the aspiration point through the 67th percentile.

Values below the reserve point $q_{k,i}^{r}$ were be accepted. Values reaching the aspiration level $q_{k,i}^{a}$ are desirable.

Step 2. Direct and inverse classification.

Each indicator was classified as direct or inverse, bearing in mind the definition of the indicator.

- Direct indicators are those that demonstrate the best results with a high score. An example is the number of jobs related to tourism. The more jobs, the better the indicator will be rated.
- Inverse indicators are indicators that show better results with a low score. As an example, the economic losses attributed to COVID-19. The lower the economic loss, the better the indicator is rated.

Step 3. Achievement function.

In the collection of the indicator data, these are presented in different units of measurement (Km, Kg, Lts, Per Capta, Numbers, Volume, Seconds, etc.), which makes it impossible to analyse them, making it necessary to standardise them.

The normalisation is done by determining the achievement function with maximum ($q_{k,i}^{max}$), minimum ($q_{k,i}^{min}$) and the normalised value ($S_{k,i}^{j}$).

For calculation of $S_{k,i}^{j}$ with "i" Direct

$$S_{ki}^{j} = \begin{cases} 1 + \dfrac{q_{k,i}^{j} - q_{k,i}^{a}}{q_{k,i}^{max} - q_{k,i}^{a}}, & q_{k,i}^{a} \le q_{k,i}^{j} \le q_{k,i}^{max} \\ \dfrac{q_{k,i}^{j} - q_{k,i}^{r}}{q_{k,i}^{a} - q_{k,i}^{r}}, & q_{k,i}^{r} \le q_{k,i}^{j} \le q_{k,i}^{a} \\ \dfrac{q_{k,i}^{j} - q_{k,i}^{r}}{q_{k,i}^{r} - q_{k,i}^{min}}, & q_{k,i}^{min} \le q_{k,i}^{j} \le q_{k,i}^{r} \end{cases}$$

For calculation $S_{k,i}^{j}$ with "i" Inverse

$$S_{ki}^{j} = \begin{cases} 1 + \dfrac{q_{k,i}^{a} - q_{k,i}^{j}}{q_{k,i}^{a} - q_{k,i}^{min}}, & q_{k,i}^{min} \le q_{k,i}^{j} \le q_{k,i}^{a} \\ \dfrac{q_{k,i}^{r} - q_{k,i}^{j}}{q_{k,i}^{r} - q_{k,i}^{a}}, & q_{k,i}^{a} \le q_{k,i}^{j} \le q_{k,i}^{r} \\ \dfrac{q_{k,i}^{j} - q_{k,i}^{r}}{q_{k,i}^{r} - q_{k,i}^{max}}, & q_{k,i}^{r} \le q_{k,i}^{j} \le q_{k,i}^{max} \end{cases}$$

Source: Pimentel de Oliveira (2020)

When applying the above formulation, the indicators reach values ranging from -1 to 0; from 0 to 1 and from 1 to 2.

(i) -1: Value of the indicator is minimum;

(ii) From -1 to 0: indicator value is less than the reserve point;

(iii) 0: indicator value is equal to the reserve point;

(iv) Within 0 and 1: indicator value is between both reserve and aspiration points;

(v) 1: indicator value is equal to the aspiration point;

(vi) Within 1 to 2: indicator value is greater than aspiration point;

(vii) 2: indicator value is maximum.

For a positive response, the value of 1 is sought to be exceeded, to approach the maximum point, but a value greater than 0 would also be positive. The interpretation is clear and useful for decision making (Figure 3).

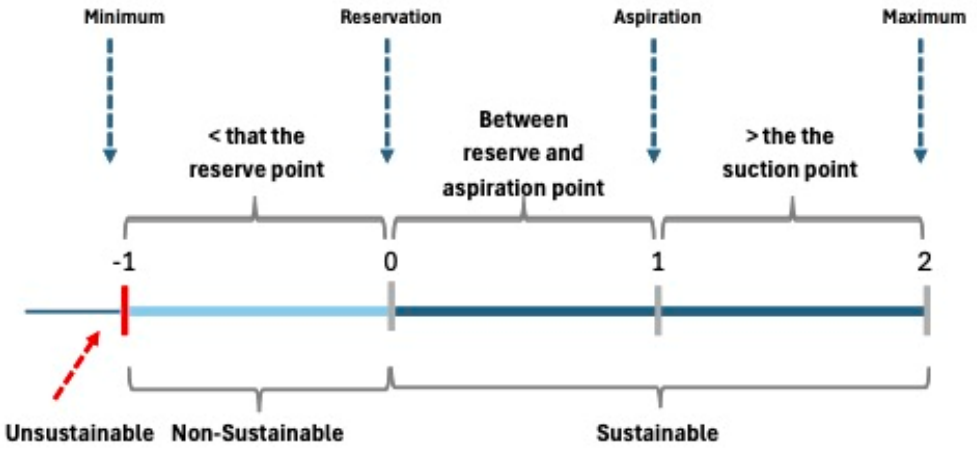

Figure 3. Level of sustainability

Source: Pimentel de Oliveira y Pitarch-Garrido (2022)

Step 4. Weighting.

The technique uses double weighting of indicators and sustainability dimensions. There is no single methodology to determine the weight of each indicator before aggregating them (European Commission, 2020; Soto & Schuschny, 2009 y OCDE, 2008). Therefore, the research uses weighting based on expert opinion, so that indicator "I" has a weighting w_{ki} with the condition (Munda & Nardo, 2003 y OECD, 2008) that:

$$0 \leq w_{ki} \leq 1 \, , \sum_{i=1}^{pk} w_{ki} = 1$$

Step 5. Aggregation, corresponding to the dimension.

Determination of the synthetic indicator within each dimension, according to the philosophy of weak sustainability and strong sustainability of Turner (1993) and (Pearce & Atkinson, 1993).

The weak indicator is defined as I_k^{jd}, and the strong indicator as I_k^{jf}, where K is the dimension. From this we obtain:

$$I_k^{jd} = \sum_{i=1}^{pk} w_{ki} \, S_{ki}^{j}$$

Step 6. Final aggregation

The weak global sustainability indicator I^{jd}, and the strong global sustainability indicator I^{if}, are calculated, with the weights or weightings corresponding to the participatory weights of the citizens' concerns, carried out in the survey, under the following conditions:

$$0 < \mu_k < 1\,, \sum_{k=1}^{D} \mu_{ki} = 1$$

The IS-SIS technique, following J. I. Pulido-Fernández & Rodríguez-Díaz (2016), Cabello et al., (2014), and Ruiz et al., (2017), to obtain the Composite Mean Synthetic Index I^{jm} for each territory, by making a linear combination between the global indicatorsI^{jf} and I^{jd} of the form:

$$I^{jm} = \beta I^{jd} + (1 - \beta) I^{f}$$

The same will be done to reach the synthetic index by dimension.

4. Results and discussions

Following the application of the technique, it was possible to provide answers to the numerous investigations (Ali Selim et al., 2021; European Commission, 2020; Peña-Alonso et al., 2018; Tudorache et al., 2017; Mendola & Volo, 2016; Blancas et al., 2015; Soto & Schuschny, 2009; OCDE, 2008; Munda & Nardo, 2003; among many others), indicated in the theoretical framework section, establishing consensus by applying the principles of sustainability, providing integrity to the territory together with the opinion of residents.

The use of the IS-SIS methodology has provided a comprehensive overview of the current situation of the tourism sector in the Cávado and Ave regions.

Through the integration of governance processes, the consideration of the opinion of regional experts, the combined use of quantitative and qualitative techniques, as well as the cross-sectional analysis of the results, it is possible to understand the reality of tourism and the pressure that this activity exerts on the social, economic, environmental, and political aspects of the territories.

However, it is essential to understand that the use of the IS-SIS requires consideration of the context of the destinations analysed, which underlines the importance of getting closer to the reality of the territory. For this reason, satisfaction surveys and, above all, the opinion of the local population regarding tourism activity are significant.

The ultimate purpose is to provide decision-makers with a sustainability assessment tool that can guide good governance strategies and public policies aimed at the needs of the territory.

4.1. Analysis of the expert interviews and validations

From the initial 1.342 indicators, forty indicators (ten social, ten economic, ten environmental and ten institutional or political) have been selected and validated, seeking to align them with at least one of the 17 SDGs (ONU, 2016), as shown in the table 1.

Table 1. Indicators validated by experts and aligned to the SDGs.

Dimensions	Indicator Description	SDGs Aligned and target
Social	S1. Nº. of education and training offers in some areas of the tourism sector	4
	S2. Average capacity of venues (nº.) per geographical location per inhabitant	12
	S3. % of resident satisfaction with tourism in destination	3
	S4. Tourism flow in destination	9
	S5. % of women employed in the tourism sector	5
	S6. % of accommodation establishments accessible to people with disabilities	10
	S7. % of events held at destination that have an impact on culture and traditional/local heritage	11
	S8. Nº. of employed persons involved in community trades, activities, and customs	8
	S9. % of people who are proud of the community and the culture	3
	S10. Training in tourism	2
Economic	E1. % of enterprises in the tourism sector in relation to other enterprises	9
	E2. Economic losses of the sector attributed to COVID-19, ratio to GDP	1

	E3. Domestic consumption of cultural or tourism goods and services E4.	3
	E4. Rate of change of VAT of non-financial corporations: total and tourism sector	8
	E5. Box-office receipts of cultural products	8
	E6. Nº. of overnight stays of tourists per 100 inhabitants (Ratio)	9
	E7. Daily expenditure of tourists who stay overnight	8
	E8. Total income (€) in tourist accommodation establishments	8
	E9. Average length of stay	8
	E10. Direct employment in the tourism sector as a % of total employment in the destination	8
Political or Institutional	P1. Year-on-year increase in public expenditure on culture as a % of total public expenditure.	8
	P2. Number of activities aimed at improving the management of the cultural heritage	17
	P3. Degree of seasonality	9
	P4. Quality certification in administrative management	11
	P5. Incorporation of cultural criteria in tourism planning and management	11
	P6. % of the population that feels safe with tourism	16
	P7. Management of energy consumption	7
	P8. Variation rate of the foreign population, in relation to the resident population	11
	P9. % of second homes in relation to the total number in Portugal	11
	P10. Variation rate of crime against patrimony	16
Environmental	A1. % of visitors using different modes of transport to reach the resource.	11
	A2. Municipal measures related to climate change in strategic policies and local plans.	13
	A3. Nº. of fires in green areas	15
	A4. Production of selectively collected municipal waste per inhabitant	12
	A5. % of accommodations served by wastewater drainage systems	14
	A6. % of equivalent tourist population	12
	A7. Tourism pressure	12
	A8. % of tourist accommodation with sustainable or environmental quality certification	11
	A9. Water quality for human consumption	6
	A10. Energy consumption (KWh) per capita	7

Source: Own elaboration

4.2. Survey analysis

Overall, most respondents indicate that tourism activity is highly beneficial, safe, facilitates the availability of services and contributes to employment generation (Figure 4).

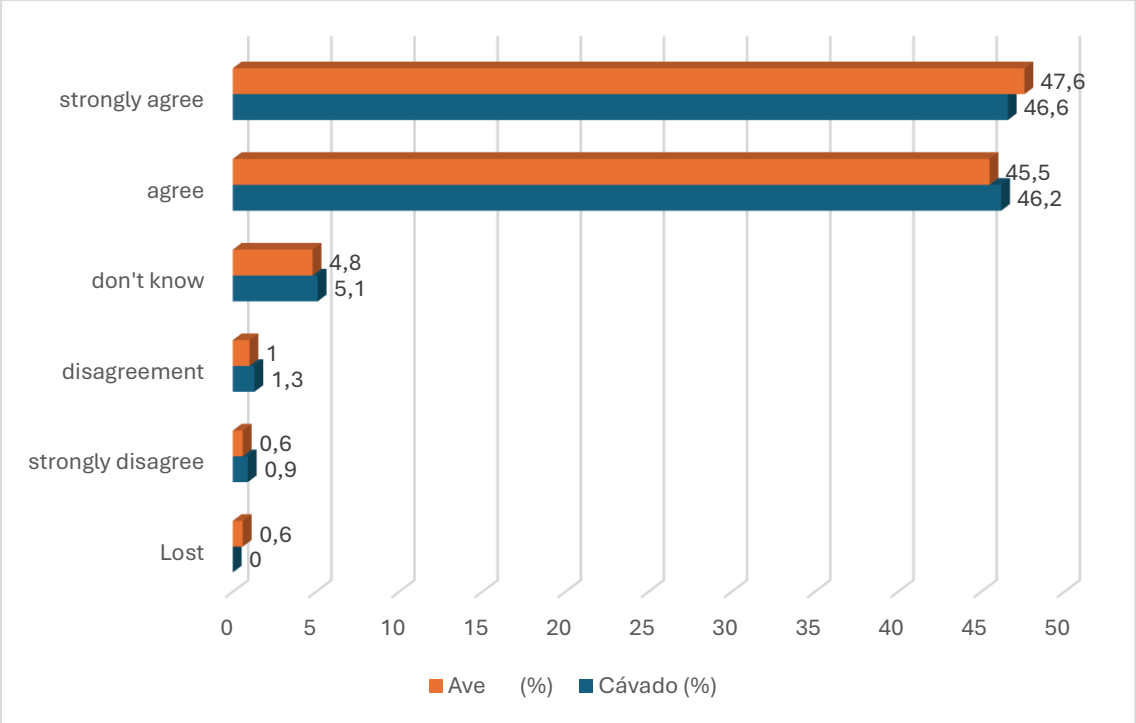

Figure 4. Tourism benefits the Cávado and Ave Regions (%)

Source: Own elaboration

In this sense, a significant percentage of the residents surveyed (53.9%) are satisfied with tourism. Meanwhile, there is a narrow gap between those who want more tourists (41%) and those who prefer the same amount (34.4%). In this respect, in previous studies related to more consolidated environments offering mass sun and beach tourism, also analysed using the IS-SIS methodology (Pimentel de Oliveira & Pitarch-Garrido, 2022), it was observed that the sensitivity of the local population to this aspect differs significantly. This demonstrates that the processes of touristification and over-saturation of the local population in the northern regions of Portugal have not yet reached the scale of social intolerance.

However, a deeper analysis of residents' feelings about tourism activity using the Atlas.ti technique (Table 2) highlights aspects that point to negative feelings. These findings suggest the need for special attention to be paid by territorial managers to these aspects.

Table 2. Sentiment analysis by dimension

Dimension	Aspect related	Feelings and comments
Social	Culture and tradition	1. Opening more cultural spaces, …
		2. …giving more room for showcasing craftsmanship, their way of working, appreciating 'our own'.
		3. I see a lack of recognition from the municipality towards artisans; they are artists who are not valued.
Economic	Tourist Typology Rental price increase	1. We should 'sell' the city better. Because many tourists have the idea that we are a very cheap city and that we have cheap products. These tourists try to haggle…
		2. …the issue of residential rentals of local accommodations, which contribute to the high prices in the real estate market.
		3. …that tourists are of higher quality, leaving more money…
Institucional or Political	Infrastructures Transport City access	1. I believe tourism is well structured, but certain points need improvement, such as the connection with other cities…
		2. Before thinking about tourism, other more necessary works should be carried out such as access roads and public roads.
		3. Improving access, improving parking, and the public transport network, all of that is terrible! Touristification.
Environmental	Turistification Waste management	1. Tourism should be substantially lower in summer and higher in winter. In winter, it's a ghost town, in summer you can't even walk.
		2. Seeking a balance in summer, there's an absurd amount of people, we need to invest in sustainable tourism.
		3. Trying to reduce waste when hosting an event that attracts a lot of people.

Source: Own elaboration with Atlas.ti data

On the other hand, and going deeper into the technique, a word frequency analysis has been carried out, which can be seen in figure 5.

Figure 5. Word frequency analysis

Source: Own elaboration

This analysis made it possible to visualise terms representative of the population's concerns, such as those related to mobility, the activity itself, as well as others associated with culture or attracting more visitors to destinations. This once again demonstrates the incipient sensitivity to processes of touristification.

Going deeper into the aspects presented above in table 2, linked to the social and institutional dimensions, it is noted that 41% of respondents feel identified with their region's own crafts, while 11.73% indicate that the promotion of culture and crafts could be an attractive option to boost tourism in these destinations. These aspects, although of relative significance in the sample size, should be analysed. According to Cifre (Agenda Urbana, 2024), these factors could favour the integration of citizens and prevent destinations far from the main tourist centres from being left out of the economic benefits derived from this sector (Ribeiro & Remoaldo, 2019).

This is corroborated by the analysis of the concerns of the local population by dimension. From this observation, the social and institutional aspects of both regions stand out as the factors of greatest concern on the part of society (Figure 6).

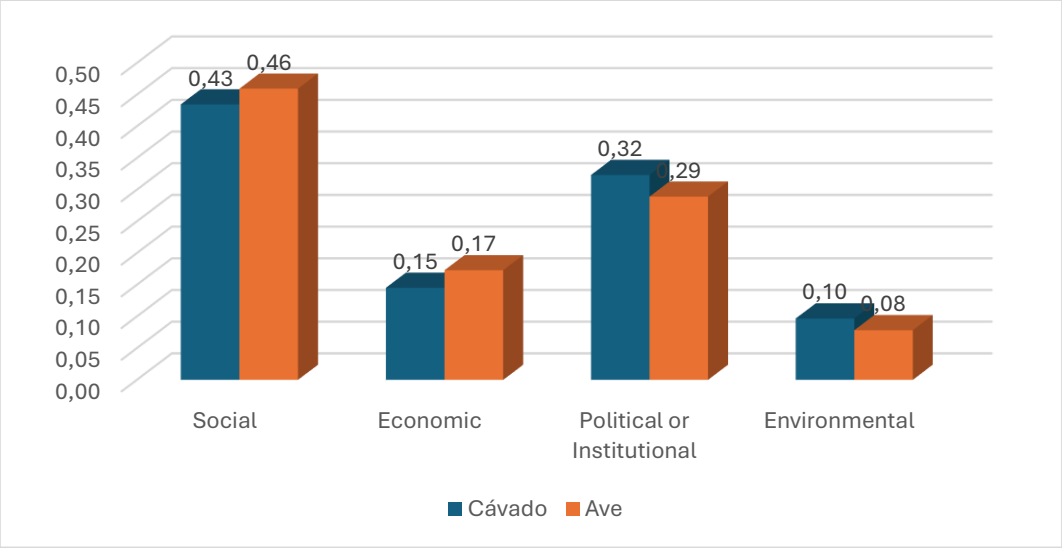

Figure 6. Residents' concerns about activity in the Cávado and Ave (%)

Source: Own elaboration

This research has compared the use of frequently applied techniques, which do not consider the opinion of the destination's residents, with the IS-SIS methodology used in this study. The results are striking for both regions and can be seen in figure 7.

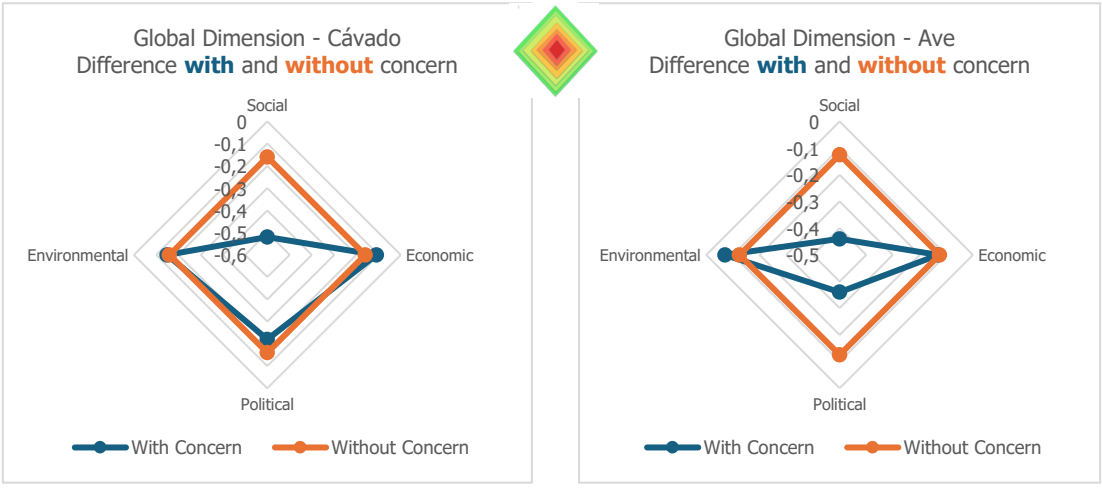

Figure 7. Responses with and without the use of the IS-SIS methodology.

Source: Own elaboration

When analysing the graph for the Region of Cávado, a significant difference can be seen in the social sphere, with respect to the unsustainability of the dimension that is not observed when applying conventional techniques that do not consider the opinion of the residents. A negative consideration with respect to this dimension that must be considered by destination managers.

This negative consideration is also observed in the Ave Region, however, from two dimensions, the social and the institutional or political. Both present aspects of unsustainability that should be analysed from the study of the individual indicators of each dimension, analysed in this study, in table 6.

From the economic point of view and after analysing the data, there is a growing concern among the local population about the increase in prices caused by tourism activity. This concern, combined with the social and institutional concerns expressed by residents (fig. 4), suggests the need for special attention on the part of local administrations and destination managers in both regions, about controlling the negative impacts of the activity on the territory. Particularities highlighted by Pedro-Bueno (Agenda Urbana, 2024), as important characteristics of the beginning of a process of touristification.

In the environmental sphere, a certain ambiguity is perceived among residents in general, with 30.2% of the population expressing disagreement with the idea that tourism generates negative impacts on the natural environment. On the other hand, 25.9% indicate that they do not have an opinion on the matter, while 26.1% agree with this statement. If this aspect is analysed by region, Cávado expresses greater concern about the negative impact (28.6%) than Ave (22.8%).

Having understood the context in which tourism develops in the regions, the implementation of the methodology for assessing the degree of sustainability of destinations is proposed in the following section.

4.3. Analysis of sustainability indicators by region

The weightings of the experts, expressed in the assessments of the indicators through the interviews, added to the concerns of the local population, are the determining elements of the weighting of the dimensions in the IS-SIS (Table 3).

Table 3. Weighting of dimensions

	Weight of the experts (interviews)		**Weight of the concerns of the local population (surveys)**	
	Cávado	Ave	Cávado	Ave
Social	1,145	-0145	0,520	0,440
Economic	0,667	0,126	0,110	0,30
Political or Institutional	-0,112	0,796	0,220	0,360
Environmental	0,363	0,441	0,150	0,070

Source: Own elaboration

Following the idea of weak sustainability and strong sustainability (Turner, 1993; Pearce y Atkinson, 1993), the weak and strong indices are determined (Table 4).

Table 4. Weak and strong indices

	Cávado		**Ave**	
	Weak	Strong	Weak	Strong
Social	-0156	-0.364	-0,132	-0,308
Economic	-0,033	-0,077	-0,039	-0,091
Political or Institutional	-0,066	-0,154	-0,108	-0252
Environmental	-0,045	-0,105	-0,021	-0,049

Source: Own elaboration

The average, or global, index determines the degree of sustainability of the territory analysed. According to the IS-SIS methodology, it should tend to exceed the value of 1,000, to approach the maximum point. Meanwhile, a value greater than 0 would also be positive (Figure 3). The interpretation is clear and useful for decision making (Table 5).

Table 5. Global Index per dimension

	Cávado	**Ave**
Social	-0,520	-0,440
Economic	-0,110	-0,130
Political or Institutional	-0,220	-0,360
Environmental	-0,150	-0,070

Source: Own elaboration

All dimensions show values below zero and close to minus one (considered as non-sustainable). These results point to the need to make changes in management to improve the sustainability levels of the territories analysed.

On the other hand, applying the algorithms indicated in the methodology of this study, and taking into account that: regions that reach a value of -1,000 are directly 'Unsustainable'; those that are between -0,999 and -0,001 are 'Not Sustainable'; and those that obtain values greater than or equal to 0 are 'Sustainable', we have the following values for the global index or the IS-SIS Index, indicated by region in table 6.

Table 6. Degree of sustainability of Cávado and Ave.

	IS-SIS Index
Ave	-0,125
Cávado	-0,520

Source: Own elaboration

In the meantime, to identify the weakest points and determine where significant changes can be made, it is crucial to know the results of each of the indicators (Table 7).

In this way, decision-makers can determine which aspects need to be improved, considering factors such as cost and social impact, which can be addressed by analysing the results of the surveys conducted.

Table 7. Results of indicators by dimension

Cávado		**Ave**	
Social			
S2	-1,000	S2	2,000
S3	-1,000	S3	2,000
S9	-1,000	S9	2,000
S1	2,000	S1	-1,000
S4	2,000	S4	-1,000
S5	2,000	S5	-1,000
S6	2,000	S6	-1,000
S7	2,000	S7	-1,000
S8	2,000	S8	-1,000
S10	2,000	S10	-1,000

Economic			
E1	-1,000	E1	2,000
E2	-1,000	E2	2,000
E3	-1,000	E3	2,000
E7	0,000	E7	0,000
E9	0,000	E9	0,000
E4	2,000	E4	-1,000
E5	2,000	E5	-1,000
E6	2,000	E6	-1,000
E8	2,000	E8	-1,000
E10	2,000	E10	-1,000
Political or Institutional			
P1	2,000	P2	2,000
P10	2,000	P6	2,000
P3	0,000	P7	2,000
P4	0,000	P8	2,000
P5	0,000	P9	2,000
P2	-1,000	P3	0,000
P6	-1,000	P4	0,000
P7	-1,000	P5	0,000
P8	-1,000	P1	-1,000
P9	-1,000	SP10	-1,000
Environmental			
A3	2,000	A4	2,000
A8	2,000	A5	2,000
A9	2,000	A6	2,000
A10	2,000	A7	2,000
A1	0,000	A1	0,000
A2	0,000	A2	0,000
A4	-1,000	A3	-1,000
A5	-1,000	A8	-1,000
A6	-1,000	A9	-1,000
A7	-1,000	A10	-1,000

Source: Own elaboration

Although it is important to pay attention to the indicators that occupy the last positions (negative indicators) in each dimension, as they point to an urgent need for improvement that requires indispensable interventions by destination managers.

5. Conclusion

In this study, the IS-SIS methodology was used to obtain a comprehensive overview of the current situation of the tourism sector in the Cávado and Ave regions. This methodology, which integrates governance processes, the opinion of regional experts and the cross-cutting analysis of indicators, has made it possible to understand the reality of tourism and the pressure it exerts on the social, economic, environmental, and political aspects of the territories.

The results reveal that, while tourism activity is mostly perceived as beneficial by the residents surveyed, there is growing concern about price increases and negative impacts on the natural environment. It is crucial to highlight the importance of considering the opinion of the local population and the need to implement management strategies that balance tourism development with the preservation of the environment and the well-being of the community. In this sense, the research is clear in delving into aspects related to society's concerns about tourism, highlighting significant differences when analysing data with and without considering the opinion of residents.

On the other hand, the analysis of sustainability indicators by region shows that, although there are positive aspects, such as the training offer in tourism and the capacity of performance venues, there are also significant areas for improvement, especially in terms of institutional management and socio-cultural impact.

Impacts that are not yet strongly perceived by the local population, but which are beginning to stand out during the unresolved issues of any region.

For decision-makers, these results offer a valuable tool to guide good governance strategies and public policies that respond to the specific needs of each territory. It is essential to work on the implementation of measures that promote sustainable tourism, which contributes to the economic and social development of regions without compromising their natural and cultural environment. In the meantime, these measures must consider the perspective of the local population, who are the real guarantors of tourism.

Finally, and following the application of the IS-SIS methodology, the indices that determine the degree of non-sustainability of the territories are reached. Indices that have not yet reached the limit of unsustainability, but which unfortunately fail to reach the desired values. All of this offers an odd opportunity for destinations to act in time, avoiding processes of touristification, acting with greater focus on the indicators with the lowest scores.

In summary, this study calls upon the administrative bodies and managers of tourism activity in the Cávado and Ave Regions. Furthermore, it underlines the importance of adopting integrated and participatory approaches to assess and manage the sustainability of tourism in these territories, with the aim of ensuring balanced and sustainable tourism development that benefits all stakeholders and preserves resources for future generations.

To conclude, it is worth mentioning that the study also encountered limitations in its research process, related to the idiosyncrasies of the local population, which is more closed and reluctant to offer sensitive information that could have provided more accurate data regarding their level of satisfaction.

As suggestions for future research, the academic community is invited to apply the IS-SIS at the local level, within each of the regions of Cávado and Ave.

Acknowledgements

This work was supported by the Margarita Salas Grants for the training of young PhDs. A grant funded by the Ministry of Universities as part of the European Recovery Instrument (Next Generation EU) within the PRTR: Recovery, Transformation and Resilience Plan: "Modernisation and digitisation of the education system" with reference number MS21076.

Special thanks to Doctor Vicente Perez Cosín (Director of IIDL - UV) for his support.

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